BABEŞ-BOLYAI" UNIVERSITY OF CLUJ-NAPOCA
FACULTY OF PSYCHOLOGY AND EDUCATIONAL SCIENCES
"EVIDENCE-BASED PSYCHOLOGICAL ASSESSMENT AND INTERVENTIONS" DOCTORAL SCHOOL

Ph.D. THESIS

EXTENDED SUMMARY

INVESTIGATING EMOTION REGULATION IN EATING PATHOLOGY

AUTHOR: Ph.D. CANDIDATE PREFIT ALICE-BEATRICE
SCIENTIFIC ADVISOR: PROFESSOR Ph.D. SZENTAGOTAI-TATAR AURORA

CLUJ-NAPOCA
2019

ACKNOWLEGEMENTS

I would like to express my gratitude to my scientific advisor, Professor , Ph. D. Szentagotai-Tatar Aurora, from "Babeș-Bolyai" University, Cluj-Napoca for the valuable input and guidance through this process of scientific discovery. I would also like to thank my thesis committee advisors and all members of the Department of Clinical Psychology and Psychotherapy, as well as the "Evidence-Based Psychological Assessment and Interventions" Doctoral School for their insightful comments and support. A special thanks to my fellow graduate students, whose friendship and support helped me with the development of my thesis and my self-development. Last but not the least, I would like to thank my family and friends, who form my secure base and help me learn that I am worthy of love and belonging.

This work was possible due to the financial support of the Sectorial Operational Program for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project number POSDRU/187/1.5/S/155383 with the title "Quality, excellence, transnational mobility in doctoral research", awarded to Alice-Beatrice Prefit.

Notes.

(1) This is to certify by Prefit Alice-Beatrice that:

(a) The thesis includes the original research work of Prefit Alice-Beatrice (author) towards the Ph.D.;

(b) Parts of the thesis have been already published.

(c) Appropriate citations for these publications were included in the thesis. Other co-authors have been included in the publications, if they contributed to the study.

(d) The thesis was written according to the academic writing standards (e.g., appropriate scientific acknowledgements and citations have been made in the text by the author of the thesis). All the text of the thesis and its summary was written by Prefit Alice-Beatrice who assumes all responsibility for the academic writing;

(e) All the Tables and Figures are numbered within the corresponding chapter or subchapter of the thesis.

Table of Contents

Keywords: eating disorders; anorexia nervosa; bulimia nervosa; binge eating; eating-related symptoms; emotion regulation; emotion regulation abilities and strategies

CHAPTER I. THEORETICAL BACKGROUND

Emotion regulation (ER) refers to the attempts of influencing what emotions we experience, and how we experience and express these emotions (Gross, 1998). In recent years, emotion regulation has received a great deal of attention in research focused on the psychological mechanisms and treatment of eating disorders (ED) (e.g. Sim & Zeman, 2005). The main objective of the current thesis was to investigate general and specific aspects of the relationship between ER and eating pathology. EDs are life-threatening mental disorders, with serious health consequences and with high rates of healthcare utilization. EDs are characterized by a persistent disturbance of eating and other eating-related behaviors that result in the altered consumption or absorption of food and a significantly deteriorated physical health or psycho-social functioning (American Psychiatric Association [APA], 2013). In the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM 5; American Psychiatric Association [APA], 2013), three main categories of EDs are described: anorexia nervosa, bulimia nervosa, and binge eating disorder, previously known as ED not otherwise specified (EDNOS) in DSM-IV (American Psychiatric Association [APA], 2000). Anorexia nervosa (AN) is characterized by the following core diagnostic criteria: (1) the refusal to maintain a normal body weight in the context of age, gender and physical health; (2) an intense fear of weight gain or of becoming fat and persistent behaviors with the purpose of maintaining a significantly low weight; (3) negative over-evaluation of weight and/or shape and persistent poor recognition of the seriousness and implications of the low body weight. Bulimia nervosa (BN) is characterized by recurrent episodes of eating, in a specific period of time (e.g., within any 2-hour period), of a larger amount of food than most people would consume in a similar situation. These episodes of binge eating are accompanied by a sense of inability to stop eating or control what or how much one is eating. The episodes are followed by inappropriate compensatory behaviors (e.g., self-induced vomiting, laxative, diuretics, or other medications use, fasting, or excessive exercise) in an attempt to compensate for caloric intake. Binge eating (BED) is characterized by episodes of binge eating similar to binge episodes in BN. The episodes are characterized by three or more of the following: eating more rapidly than normal; eating to the uncomfortable feeling of fullness; eating large amounts of food when not feeling hungry; eating alone because of embarrassment about the quantity of food consumed; and feeling disgusted, depressed, or very guilty after overeating. Unlike individuals with BN, those with BED do not engage in regular compensatory behaviors. According to the APA (2013), EDs and related behaviors commonly begin during adolescence or young adulthood, and rarely before puberty or after age 40. These disorders affect both genders, although rates are significantly higher in women than men, with an approximately 10:1 female-to-male ratio in lifetime prevalence (APA, 2013). EDs are associated with high levels of mortality, comorbidity, a psycho-social and physical impairment.

Psychological Models

EDs are mental disorders characterized by severe disturbance of eating and eating-related behaviors, thoughts and emotions. Cognitive-behavioral therapy (CBT) models of EDs refer to the development and maintenance of EDs, and describe dysfunctions at cognitive, emotional and behavioral levels (Fairburn & Cooper, 1989). According to this model, AN and BN share essentially the same core psychopathology mechanisms: over-evaluation of eating, shape and weight and control over them, which is expressed in similar impaired attitudes and behaviors. In recent years, the influence of emotions and ER on disordered eating behaviors has received a great deal of attention (e.g. Sim & Zeman, 2005). The conceptualization of ER varies across discipline and researcher, therefore it becomes imperative to define what is meant by ER when discussing its implications on a particular

body of literature. Some of the most important conceptualization models of ER have been proposed by Gross (1998), Thompson (1994), Gross and Thompson (2007), and Gratz & Roemer (2004). Emotion regulation can be considered to be an umbrella term which refers to a conscious or unconscious process influencing which emotions we have, and how we experience, and express these emotions (Rottenberg & Gross, 2007; Gross & Jazaieri, 2014). Therefore, ER could influence the increase, maintenance, or decrease of negative or positive emotions (Gross, 1998). Put together, theoretical models of ER emphasize the abilities to identify and discriminate between emotional states (e.g., awareness and emotional clarity) and two main categoriesof ER strategies: adaptive strategies (e.g., acceptance, reappraisal, problem-solving) and maladaptive strategies (e.g., avoidance, rumination and suppression) which are related to psychopathology (Aldao, Nolen-Hoeksema, & Schweizer, 2010). An expanding literature supports both overall ER and specific dimensions of ER being associated with EDs and with specific eating-related symptoms. The use of adaptive and maladaptive ER strategies has been linked to ED symptomatology also in non-clinical individuals (Gupta, Rosenthal, Mancini, Cheavens & Lynch, 2008; Lavender et al., 2009; Lavender & Anderson, 2010; Hughes & Gullone, 2011). The relationship between high levels of negative affect (e.g., depression, anxiety) and eating have been extensively studied, and there is a considerable influence of negative emotional states on disordered eating behaviors (e.g., Wallis & Hetherington, 2009; Renner, Sproesser, Strohbach, & Schupp, 2012). Body image problems are also strongly associated with poor emotional awareness and understanding and, additionally, with lack of adaptive ER strategies, and with a higher use of maladaptive ER (e.g., Lavender & Anderson, 2010; Hughes & Gullone, 2011). The golden standard psychotherapy treatment for people with EDs, Cognitive Behaviour Therapy (CBT), achieves clinically significant improvements. However, a number of individuals still struggle with this mental disorder despite such interventions, indicating a need for improvements in psychological therapies (NICE, 2004). A growing number of cognitive-behavioral interventions target problems with emotions and ER. These include dialectical-behavioral therapy (Linehan, 1993), acceptance and mindfulness-based interventions (e.g., Hayes, Strosahl, & Wilson, 1999; Williams, Russe & Russell, 2008), emotion-focused therapy (Greenberg, 2002), the unified protocol for emotional disorders (Barlow, Allen, & Choate, 2004), and emotion regulation therapy (Mennin & Fresco, 2009). A small but growing body of research suggests that acceptance-based treatment approaches may be effective in the treatment of EDs (e.g. Jurascio et al., 2017). Acceptance- and mindfulness-based treatments aim to develop ER skills and facilitate the development of more adaptive ways of responding to emotions. Some of the mechanisms addressed as intervention methods include: emotional acceptance (Brown & Ryan, 2004), bodily awareness (Schure, Christopher, & Christopher, 2008), cognitive defusion and metacognitive insight (i.e., experiencing thoughts as transient events rather than fixed, accurate representation of reality) (Bishop et al., 2004; Hayes, 2004), and decreases in rumination and avoidance (Bishop et al., 2004).

The starting point of this thesis is the evidence that emotions or emotion-regulatory problems are related to the development and maintenance of EDs (e.g., Brockmeyer et al., 2014; Oldershaw et al., 2015). However, conceptual and practical clarifications regarding the role of emotional regulation across EDs and eating-related symptoms is sorely needed. Our review of the literature points out several limitations that will be addressed as questions for our original research. As has been emphasized, some studies (e.g., Aldao et al., 2010) showed that EDs are not significantly associated with ER problems. Also, considering the limited data regarding differences in emotion dysregulation dimensions across EDs or eating-related symptoms, a better understanding of this relation is needed. Furthermore, the degree to which specific emotion dysregulation dimensions are associated with specific eating-related symptoms remains unclear. Therefore, more information regarding the extent to

which particular emotion regulation difficulties are related to various behavioral EDs symptoms (e.g., restraint, binge eating) would be quite useful.

Another unclear aspect concerns the interaction of specific emotions with eating behaviors. For example, depression, independently or in conjunction with other negative emotions (e.g. anxiety), seems to play an important role in the development and maintenance of eating disturbances (McCarthy, 1990), but in order to improve understanding of the effects of depression on eating, studies have to identify mediating mechanisms (e.g., Macht , 2008). Previous studies have mostly focused on the relation between depression and eating behaviors, or eating behaviors and emotion regulation.

Further, very little is known about the association of ER with body image. The few existing studies show that body dissatisfaction is one of the most consistent and powerful risk factors for EDs. Regarding differences in the influence of ER strategies on body image, previous studies (Svaldi & Naumann, 2014, Naumann et al., 2016) focused on comparing adaptive versus maladaptive ER strategies (as have been conceptualised by Aldao et al., 2010), but not on comparing adaptive strategies, such as acceptance and reappraisal, for example. This comparison could yield results of both theoretical importance and practical importance.

Finally, despite existing treatment options, EDs are still characterized by high chronicity and relapse rates (Keel & Brown, 2010). Thus, the need to identify factors responsible for the occurrence and maintenance of EDs is still timely, as they may serve as potential treatment targets. In recent years, acceptance-based interventions and internet-delivery psychological interventions have gained increased attention. However, only a few studies have been conducted so far, despite results showing that acceptance-based treatment approaches may be effective in the treatment of EDs (e.g. Jurascio et al., 2017). Also, there is some research on acceptance-based interventions targeted to specific components of EDs. For instance, emotional eating is an important associated behavior to EDs, which can have serious implications such as weight gain and obesity (e.g., Groesz et al., 2012). This type of eating behavior strongly involves emotional components and poor emotional regulation, therefore it would be useful to investigate the effectiveness of interventions targeting ER (such as acceptance-based approaches) in reducing emotional eating.

CHAPTER II. RESEARCH OBJECTIVES AND OVERALL METHODOLOGY

Research Objectives

Our first objective was to investigate the magnitude of the associations between *emotional abilities* (e.g., emotional awareness and clarity) and *emotion regulation strategies* (adaptive: acceptance, reappraisal and problem-solving; and maladaptive: rumination, avoidance and suppression) on the one hand, and eating pathology on the other. Specifically, we investigated the variability of adaptive and maladaptive ER across ED sub-types (AN, BN and BED). We were also interested in the association between adaptive and maladaptive ER and eating-related symptoms in non-clinical individuals.

Our second objective was to investigate the relation between depression, emotion regulation strategies and abnormal eating behavior (i.e., restrained, emotional and uncontrolled eating). Specifically, we investigated the effect of depression on disordered eating, and on how its relation with estrained, emotional and uncontrolled eating is mediated by difficulties in emotion regulation.

Our third objective was the investigation of the impact of acceptance and reappraisal on body dissatisfaction. We experimentally investigated the effect of acceptance and reappraisal on body

dissatisfaction compared to a control group. Additionally, we aimed the investigation of the impact of acceptance and reappraisal on positive and negative affect, as factors closely associated with body dissatisfaction.

Finally, our fourth objective was to assess the preliminary efficacy of an asynchronous online acceptance-based training in reducing emotional eating and improving affect and emotional acceptance. The effect of the acceptance-based training was assessed against a group who received psychoeducation. Additionaly, we investigated the effect of the training on negative and positive affect, and emotional acceptance as ER strategy.

Overall Methodology

A meta-analytical approach was adopted in Study 1, focused on the relation between an ED diagnosis or eating-related symptoms and emotion regulation abilities and adaptive (e.g., emotional awareness and clarity, acceptance, problem-solving and reappraisal) and maladaptive (e.g., rumination, avoidance and suppression) ER strategies. Study 2, related to the second objective of the thesis, employs a correlational design to investigate the relations between depression and emotion regulation. The third objective was approached in Study 3, in which we used an experimental design to assess the impact of acceptance and reappraisal on body dissatisfaction. Our final objective was approached in Study 4, through a randomized controlled trial which investigates the effect of an asynchronous online acceptance-based training in reducing emotional eating.

CHAPTER III. ORIGINAL RESEARCH

STUDY 1. EMOTION REGULATION ACROSS EATING PATHOLOGY: A QUANTITATIVE META-ANALYSIS[1]

Theoretical models of emotion regulation (Aldao, Nolen-Hoeksema & Schweizer, 2010; Gratz & Roemer, 2004; Gross, 1998) emphasized two main categories of ER strategies: adaptive and maladaptive. In recent years, an extensive research has focused on emotion regulation as a transdiagnostic risk factor involved in a variety of psychological disorders, including eating disorders (EDs) and disordered eating symptoms (e.g., Mallorquí-Bagué et al., 2018; Brockmeyer et al., 2014; Aldao et al., 2010). A growing body of evidence shows that difficulties in differentiating, describing and regulating emotions are main deficits in EDs (e.g., Westwood, Kerr-Gaffney, Stahl, & Tchanturia, 2017; Lavender et al., 2015; Leehr et al., 2015; Oldershaw, Lavender, Sallis, Stahl, & Schmidt, 2015; Aldao et al., 2010). Lack of adaptive and/or maladaptive ER strategies and abilities are related to eating pathology in both clinical (e.g.,Westwood et al., 2017; Lavender et al., 2015; Leehr et al., 2015; Oldershaw et al., 2015; Aldao et al., 2010) and non-clinical (e.g., Skinner, Rojas, & Veilleux, 2017; Mills, Newman, Cossar & Murray, 2014; Hughes & Gullone, 2011) samples of women and/or men. Regarding specific EDs, some studies have shown that anorexia nervosa (AN), bulimia nervosa (BN)

1

Prefit, A.B., Cândea , D.M., Szentagotai-Tătar, A. (2019). Emotion regulation across eating pathology: A meta-analysis. *Appetite*, 143. doi: 10.1016/j.appet.2019.104438

and binge eating disorder (BED) are related to adaptive and maladaptative ER. Data on the differences among EDs in terms of the magnitude of the associations with various ER abilities and strategies are inconclusive. For example, in a study by Svaldi and collaborators (2012), individuals with BED reported higher levels of emotional clarity and awareness and capacity to accept negative situations than participants with BN, and higher levels of access to ER strategies than individuals with AN and BN (Svaldi et al., 2012). Another study suggested that cognitive avoidance is related to the onset of AN, while rumination predicted the onset of BN (Rawal, Park & Williams, 2010). Other studies, however, did not support differences among EDs with respect to their associations with specific ER abilities and strategies. A meta-analysis by Westwood et al. (2017) suggested that difficulties in identifying and describing emotions are transdiagnostic across the spectrum of EDs. Furthermore, it is not clear if there are differences in ER between BN and BED. A few studies have examined the affect regulation model in relation to binge eating in both BN and BED, and there is limited research examining if and how emotional functioning differs in BN compared to BED. Eating-related symptoms in normal population are associated with poor ER skills and strategies, including emotional awareness, clarity, acceptance, ability to engage in goal-directed behavior, and reappraisal (Han & Lee, 2017; Han & Pistole, 2014; Buckholdt, Parra, Jobe-Shields, 2010; Sim & Zeman, 2006).

Objectives

In sum, there is evidence supporting the fact that disordered eating can be associated with lack of ER abilities and adaptive strategies and more maladaptive ER strategies, which promote the vicious circle of eating pathology (e.g., Dingemans et al., 2017; Oldershaw et al., 2015; Brockmeyer et al., 2014; Aldao et al., 2010; Sim & Zeman, 2006). Previous findings have some limitations. Meta-analyses by Aldao et al. (2010) and by Oldershaw et al. (2015) have analyzed specific ER strategies only in relation to ED overall, or AN respectively, but there is no unitary data for all three EDs. On the other hand, given the increased number of studies on the relation between ER and eating-related symptoms in the non-clinical population, this association needs to be clarified. Furthermore, Aldao et al. (2010) did not take into account ER abilities such as emotional awareness and clarity, even though they are important predictors of adaptive ER. Finally, in this previous meta-analysis, only effect sizes for problem-solving, reappraisal, rumination and avoidance were computed in relation to EDs, due to the low number of studies on other strategies and abilities. It is, therefore, important to investigate which ER difficulties are most relevant for eating pathology, and which of these difficulties are predominant among different groups of individuals with EDs or with eating-related symptoms in the general population. Therefore, we were interested in the magnitude of the associations between emotional awareness, emotional clarity and acceptance, reappraisal and problem-solving, on the one hand, and eating pathology, on the other. Also, we aimed to investigate the associations between maladaptive ER strategies and eating pathology. Additionally, we investigated the variability of adaptive and maladaptive ER across ED sub-types. Finally, we were interested in the association between adaptive and maladaptive ER and eating-related symptoms in normal individuals.

This meta-analysis aimed to highlight the relation between ER and eating pathology, with a potential effect on future research and therapeutic interventions. The identification of specific relations between ER strategies and EDs and EDs symptoms can facilitate the improvement of existing treatments, but also the development of new interventions.

Method

Literature searches

We searched for potentially relevant studies in the following databases: PsycInfo, Pubmed, and Medline. Our search contained combinations of the following keywords in title and abstract: "_emotion

regulation_", "_acceptance", "_awareness_", "_clarity_", "_problem solving_","_(re)appraisal_", "_avoidance_", "_rumination_", "_suppression_" and "_eat_", "_binge_", "_bulimia_", "_anorexia_". We used filters for peer reviewed journals, English as writing language and studies conducted on human participants. We also checked the reference sections of already published systematic reviews and meta-analyses. Two of the authors conducted independent searches that yielded similar results.

Selection of studies

The selection process followed the PRISMA- Statement (Moher, Liberati, Tetzlaff, & Altman., 2010). A number of 5520 articles were identified. After removing duplicates and screening by title and abstract (4601 articles), 423 articles resulted. Finally, full-text selection yielded 96 eligible articles and 239 effect sizes.

Inclusion/exclusion criteria

Only studies that met the following criteria were included in the meta-analysis: (1) reported at least one relationship between global or specific ER adaptive or maladaptive abilities and strategies, and a diagnosis of eating disorder in general, a specific eating disorder or an eating pathology self-report measure, (2) were conducted on clinical population (AN, BN, BED or ED in general) or on non-clinical population with eating pathology symptoms that were assessed via self-report scales for disordered eating, (3) measured ER by self-report scales and eating pathology by self-report scales or diagnostic interview, (5) were correlational, experimental (e.g., emotion induction), randomized clinical trials, longitudinal and scale development studies, as long as they provided baseline data for the relationship between ER and eating pathology, (6) reported enough information for computation of an effect size. Studies that did not comply with the above criteria or had the following characteristics, were excluded: (1) measured only emotions or emotional eating as an emotion control strategy, but did not measure ER strategies, (2) were conducted on populations with a medical condition (e.g. obesity) without using eating pathology measurements.

Coding studies

For each study we included the following data: study information (author, year), type of ER (global adaptive emotion regulation, global maladaptive emotion regulation, and specific ER abilities and strategies), type of clinical diagnosis (ED, AN, BN, BED) or eating disorder symptoms, age and the percentage of females. Consequently, we fielded specific scale or subscale scores (per strategy) and total scores that represented global adaptive or maladaptive ER. We included studies that reported global scores for ER, or scores for specific adaptive ER abilities and strategies (i.e., awareness, emotion clarity, acceptance, problem-solving and reappraisal) and/or for specific maladaptive ER strategies (i.e., suppression, rumination and avoidance). Studies used unidimensional and multidimensional scales for global or specific ER assessment. Therefore, we coded scores on scales measuring a specific ER strategy (e.g., Levels of Emotional Awareness Scale), scores on subscales belonging to multidimensional measures that assess several adaptive and/or maladaptive ER strategies (e.g. Coping Strategies Inventory: Problem solving scale) and scores on scales that assess global ER (e.g., Regulation of Emotions Questionnaire). For studies conducted on clinical population, we used global or specific ER scores for ED populations compared to scores for control samples, or the correlation between ER and eating pathology assessed using self-report scales. Data were coded such that a positive correlation indicates a higher use of a maladaptive strategy.

Effect sizes extraction

For each combination, we extracted relevant data to calculate effect sizes of the r-family or d-family. We searched for correlational data for each relation, but, if this data was not possible to extract, we searched for d-family data (standardized mean differences between pathology and control groups).

Therefore, we extracted either correlational data (Pearson's *r* coefficient) or standardized mean differences (*d* coefficients) for each relationship and put them in the same metric (r-metric). When studies provided effect sizes of the d-family, we first calculated Cohen's *D* standardized mean difference by subtracting the mean of the control group from that of the clinical group and then dividing this difference by the pooled variance (Cohen, 1988). We then converted Cohen's *D* into correlational coefficient (Rosenthal & DiMatteo, 2001). The *r* coefficients were transformed into Fisher's Z which is considered a more suitable index for statistical operations, as Pearson's *r* becomes skewed at the extreme ends of its scale. After that the Fisher's *z* coefficients were converted back to Pearson's *r* for interpretation. Effect sizes were interpreted according to Cohen's guidelines (1988): above .40 as large, around .25, as medium, and below .10, as small.

Meta-Analytic Plan

We used the random-effect model for all analyses. The random-effect model assumes that studies come from populations in which the effect size differs. To examine heterogeneity of effect sizes, we used the inconsistency I2 index (Higgins, Thompson, Deeks, & Altman, 2003), with values that range from 0% (no inconsistency) to 100% (high heterogeneity; Higgins et al., 2003). In order to account for heterogeneity, we conducted moderation analysis for each type of sample eating disorder and eating-related symptoms in the general population. We ran a separate analysis for each type of sample and ED using a mixed-effects model. For continuous moderators (age and the percentage of female), we conducted meta-regression analysis using a mixed-effects regression model. In order to examine publication bias, we visually inspected the distribution of the funnel plot, and, additionally, we computed Fail-safe N (Orwin, 1983) and applied the Trim and Fill method (Duval & Tweedie, 2000) using a random effects model.

Results

We calculated correlation coefficients of global adaptive and maladaptive ER with eating pathology, and of each ER ability and strategy with eating pathology. We then conducted moderation analyses for every combination grouped by sample and ED type, where at least two effect sizes in each level of the variable were available (see Table 2).

Table 2. Emotion regulation abilities and strategies across EDs

Emotion regulation strategy	Sample/EDs types	Mean *r*	95% CI	95% CI	*p*-value	*k*	*Q*-statistics (df)	*Q*-statistics *p*-value	I2
Awareness	AN	-.41	-.50	-.31	<.001	9	25.42 (8)	.001	68.53
Awareness	BN	-.36	-.56	-.13	<.001	4	24.9 (3)	<.001	87.96
Awareness	BED	-.36	-.48	-.23	<.001	4	10.16 (3)	.017	70.47
Awareness	non-specific ED	-.25	-.32	-.18	<.001	6	4.88 (5)	.43	0
Awareness	Eating-related symptoms	-.21	-.28	-.13	<.001	10	48.11 (8)	<.001	83.37
Clarity	AN	-.51	-.62	-.38	<.001	8	44.97 (7)	<.001	84.43
Clarity	BN	-.47	-.59	-.32	<.001	4	13.62 (3)	.003	77.67
Clarity	BED	-.37	-.46	-.27	<.001	4	5.47 (3)	.14	45.2
Clarity	non-specific ED	-.45	-.53	-.37	<.001	3	4.51 (2)	.11	55.69
Clarity	Eating-related symptoms	-.32	-39	-.25	<.001	8	17.65 (6)	.007	66
Acceptance	AN	-.43	-.54	-.30	<.001	9	44.31 (8)	<.001	81.95
Acceptance	BN	-.48	-.59	-.34	<.001	4	11.29 (3)	.01	73.43
Acceptance	BED	-.39	-.49	-.28	<.001	4	7.75 (3)	.05	61.31
Acceptance	non-specific ED	-.33	-.39	-.25	<.001	6	11.83 (4)	.019	66.19
Acceptance	Eating-related symptoms	-.29	-.36	-.22	<.001	9	38.98 (8)	<.001	79.48
Problem-solving	AN	-.34	-.44	-.25	<.001	13	43.25 (12)	<.001	72.26
Problem-solving	BN	-.47	-.56	-.36	<.001	7	17.76 (6)	.007	66.22
Problem-solving	BED	-.34	-.45	-.23	<.001	4	7.21 (3)	.06	58.37
Problem-solving	non-specific ED	-.35	-.41	-.29	<.001	7	22.91 (6)	.001	73.81
Problem-solving	Eating-related symptoms	-.175	-.26	-.04	<.001	14	170.33 (12)	<.001	92.96
Reappraisal	AN	-.28	-.37	-.17	<.001	4	1.88 (3)	.59	0
Reappraisal	BN	-.37	-.49	-.26	<.001	3	0.77 (2)	.68	0
Reappraisal	BED	-.27	-.38	-.15	<.001	3	0.43 (2)	.80	0

Reappraisal	non-specific ED	-.21	-.31	-.09	<.001	2	0.32 (1)	.57	0
Rumination	AN	.55	.42	.65	<.001	3	.5 (2)	.78	0
Rumination	BN	.58	.43	.70	<.001	2	.68 (1)	.41	0
Rumination	Eating-related symptoms	.25	.20	.29	<.001	9	15.38 (7)	.03	54.48
Avoidance	AN	.40	.24	.54	<.001	7	25.21 (6)	<.001	76.19
Avoidance	BN	.27	.07	.45	<.001	4	6.64 (3)	.08	54.79
Avoidance	non-specific ED	.23	.14	.32	<.001	9	14.41 (7)	.04	51.42
Avoidance	Eating-related symptoms	.27	.21	.32	<.001	24	129.73 (39)	<.001	82.27
Suppression	AN	.59	.49	.68	<.001	4	6.17 (3)	.10	51.41
Suppression	BN	.35	.20	.47	<.001	2	0	.99	0
Suppression	BED	.23	.09	.36	<.001	3	2.58 (2)	.28	22.47
Suppression	Eating-related symptoms	.23	.17	.31	<.001	6	7.76	.17	35.52

Adaptive emotion regulation and eating pathology

Overall, adaptive ER abilities and strategies had a significant negative relation with disordered eating (r = -.33; 95% CI [-.36; -.30]; k = 158). Heterogeneity analysis indicated a high degree of variability (Q (157) = 1016.39; p <.001; I^2 = 84.55%). Moderation analysis indicated a larger effect size of the relation between adaptive ER and eating pathology (Q (1) = 39.43, p <.001) for studies including clinical participants (r = -38; 95% CI [-.41; -.35]; k = 112) compared to those including non-clinical population with eating-related symptoms (r = -.21; 95% CI [-.26; -.17]; k = 46). Further, moderation analysis by type of ED indicated similar significant large associations (Q (2) = 5.22, p = .07) between adaptive ER and AN (r = -.41; 95% CI [-.45; -.36]; k = 45), BN (r = -.44; 95% CI [-.50; -.38]; k = 23), and BED (r =.-35; 95% CI [-.40; -.31]; k = 20). Studies including samples with non-specific ED indicated a negative medium-size association with adaptive ER (r = -.32; 95% CI [-.37; -.26]; k = 24).

Specific adaptive emotion regulation abilities and strategies and eating pathology

Awareness of emotions was negatively associated with eating pathology (r = -.27; 95% CI [-.31; -.23]; k = 33). The heterogeneity for this relationship was high (Q (32) = 187.58; p <.001; I^2 = 82.94%). Subgroup analysis (Q (2) = 38.13, p <.001) revealed that studies including clinical participants reported a larger effect size of the relation between awareness of emotions and eating pathology (r = -.35; 95% CI [-.41; -.29]; k = 23) than those including non-clinical participants with eating-related symptoms (r = -.21; 95% CI [-.28; -.13]; k = 10). Moderation analysis by ED type was not significant (Q (3) = 7.35, p = .06), AN being strongly associated with emotional awareness (r = -.41; 95% CI [-.50; .-31]; k = 9), similar to BN (r = -.36; 95% CI [-.56; -.13]; k = 4), and BED (r = -.36; 95% CI [-.48; -.23]; k = 4). Studies including samples with non-specific ED indicated a negative medium association with awareness of emotions (r = -.25; 95% CI [-.32; -.18]; k = 6).

Clarity about emotions was negatively associated with disordered eating (r = -.41; 95% CI [-.46; -.36]; k = 27). This relation showed a high heterogeneity (Q (26) = 133.88; p <.001; I^2 = 80.58%). The association between clarity about emotions and eating pathology (Q (2) = 19.39, p <.001) had a larger effect in studies including clinical participants (r = -.46; 95% CI [-.52; -.39]; k = 19) than in those including non-clinical participants with eating-related symptoms (r = -.32; 95% CI [-.39; -.25]; k =8). Type of ED did not moderate the relation between clarity about emotions and eating pathology (Q (2) = 3.41, p =.18). Studies including participants with AN yielded a large effect (r = -.51; 95% CI [-.62; -.38]; k = 8), similar to those including participants with BN (r = -.47; 95% CI [-.59; -.32]; k = 4), and BED (r = -.37; 95% CI [-.46; -.27]; k = 4). Studies including samples with non-specific ED indicated a negative medium association with emotional clarity (r = -.45; 95% CI [-.53; -.37]; k = 3).

Acceptance of emotions was negatively associated with disordered eating (r = -.35; 95% CI [-.40; -.31]; k = 32), with a high heterogeneity (Q (32) = 167.66; p <.001; I^2 = 80.91%). Sample type moderated the relations between acceptance of emotions and eating pathology (Q (2) = 4.89, p =.027), studies including clinical participants showing larger effect (r = -.40; 95% CI [-.46; -.33]; k = 23) compared to those including non-clinical participants with eating-related symptoms (r = -.29; 95% CI [-.36; .-22]; k = 9). Studies including AN (r = -.43; 95% CI [-.54; -.30]; k = 9), BN (r = -.48; 95% CI [-.59; -.34]; k = 4), and BED (r = -.39; 95% CI [-.49; -.28], k = 4) participants showed similar effect sizes (Q (2) = 1.07, p =.59) of the relationship between acceptance of emotions and eating pathology. Studies including samples with non-specific EDs indicated a medium association with emotional acceptance (r = -.33; 95% CI [-.39; -.25]; k = 6).

Reappraisal was negatively associated with eating pathology (r = -.28; 95% CI [-.35; -.21]; k = 13). The Q (12) = 20.86; p = .05; I^2 = 42.47% showed a significant medium heterogeneity. Due to lack of data, it was not possible to examine the relation between reappraisal and eating-related symptoms in general population. Type of ED did not moderate the relations between reappraisal and eating pathology (Q (2) = 2.22, p = .32), studies including AN showing similar effect (r = -.28; 95% CI [-.37; -.17]; k = 4) with those including BN (r = -.37; 95% CI [-.49; -.26]; k =3), and BED (r = -.27; 95% CI [-.38; -.15]; k = 3). Studies including samples with non-specific EDs indicated a medium association with reappraisal (r = -.21; 95% CI [-.31; -.09]; k = 2).

Problem-solving was negatively associated with eating pathology (r = -.30; 95% CI [-.36; -.24]; k = 45), with a high heterogeneity (Q (44) = 364.52; p <.001; I^2 = 87.93%). Sample type moderated the relation between problem-solving and eating pathology (Q (1) = 12.75, p <.001), with studies including clinical participants showing a larger effect (r = -.37; 95% CI [-.43; -.32]; k = 31) than those including non-clinical participants with eating-related symptoms (r = -.15; 95% CI [-.26; -.04]; k = 14). Studies including patients with AN (r = -.35; 95% CI [-.44; -.25]; k = 13), similar to those including participants with BN (r = -.47; 95% CI [-.56; -.36]; k = 7), and BED (r = -.34; 95% CI [-.45; -.23]; k = 4) reflected a large effect size (Q (2) = 3.44, p = .18) of this relation. Studies including samples with non-specific EDs indicated a medium association with problem-solving (r = -.35; 95% CI [-.41; -.29]; k = 7).

Maladaptive emotion regulation and eating pathology

Maladaptive ER showed a significant positive relation with overall eating pathology (r = .32; 95% CI [.28; .35]; k = 81). Heterogeneity was high (Q (80) = 442.27; p <.001; I^2 = 81.91%). Moderation analyses indicated a larger effect size of the relation between maladaptive ER and eating pathology (Q (1) = 6.21, p =.01) in studies including clinical participants (r =.38; 95% CI [.31; .44]; k = 37) than in those including non-clinical participants with eating-related symptoms (r = .28; 95%

CI [.24; .32]; k = 44). Type of ED did not moderate this relation (Q (2) = 21.9, p <.001), a large effect sizes were observed both in studies including AN participants (r = .51; 95% CI [.42; .59]; k = 15), and in those including participants with BN (r = .38; 95% CI [.25; .49]; k = 8). Studies including non-specific ED populations indicated a medium association with ER (r = .26; 95% CI [.16; .35]; k = 10). Due to lack of data, it was not possible to examine the relation between maladaptive ER and BED.

Specific maladaptive emotion regulation strategies and eating pathology

Rumination was positively associated with disordered eating (r = .33; 95% CI [.26; .40]; k = 14), and a high level of heterogeneity was observed (Q (13) = 52.66; p <.001; I^2 = 75.31%). Subgroup analysis (Q (1) = 31.52, p <.001) showed a larger effect size of the relation between rumination and eating pathology in studies including clinical participants (r = .56; 95% CI [.47; .64]; k = 5) than in those including non-clinical participants with eating-related symptoms (r = .25; 95% CI [.20; .29]; k = 9). Moderation analysis by ED type (Q (1) = .13, p = .72) indicated a large effect sizes of the relation between rumination and AN (r = .55; 95% CI [.42; .65]; k = 3), and of the relation between rumination and BN (r = .58; 95% CI [.43; .70]; k = 2). Due to lack of data, it was not possible to examine the relation between rumination and BED.

Avoidance of emotions (negative and positive avoidance) was positively associated with eating pathology (r = .28; 95% CI [.23; .32]; k = 45), and a high level of heterogeneity was observed (Q (44) = 208.01; p <.001; I^2 = 78.84%). Moderation analyses indicated similar effect sizes of the relation between avoidance of emotions and eating pathology (Q (1) = .204, p = .65) in studies including clinical participants (r = .29; 95% CI [.21; .36]; k = 21), and in those including non-clinical participants with eating-related symptoms (r = .27; 95% CI [.21; .32]; k = 24). Moderation analysis by ED type reflected a similar association (Q (1) = 1.11, p =.29) between avoidance of emotions and AN (r =.40; 95% CI [.24; .54]; k = 7), and emotional avoidance and BN (r =.27; 95% CI [.07; .45]; k = 4). Due to lack of data, it was not possible to examine the relation between avoidance of emotions and BED. Studies including samples with non-specific EDs indicated a medium association with ER (r = .23; 95% CI [.14; .32]; k = 9).

Suppression was positively associated with eating pathology (r = .36; 95% CI [.27; .44]; k = 16), showing a high heterogeneity (Q (15) = 80.34; p <.001; I^2 = 81.33%). Sample type positively moderated the relation between suppression - eating pathology (Q (1) = 7.69, p = .006), with larger effect sizes in studies including clinical participants (r = .43; 95% CI [.32; .54]; k = 10) compared to those including non-clinical participants with eating-related symptoms (r = .23; 95% CI [.17; .31]; k = 6). Moderation analysis showed that ED type significantly moderated the relation between EDs and suppression (Q (2) = 20.73, p <.001), studies including AN participants showing a larger effect (r = .59; 95% CI [.49; .68]; k = 4) than those including BN (r = .35; 95% CI [.20; .47]; k = 2), and BED participants (r = .23; 95% CI [.09; .36]; k = 3).

Age and gender as moderators

We ran a meta-regression analysis with age and the percentage of females as continuous moderators in cases where at least two effect sizes for each level of the moderator variable were available. Age was not a significant moderator of the relation between adaptive ER and overall disordered eating (*slope* β = −.002; 95% CI [-.006; .001]; p = .16), meaning that increasing age was not associated with an increase of the correlation between functional ER and eating pathology. The percentage of females negatively predicts moderated the relation between adaptive ER and overall disordered eating (*slope* β = −.39; 95% CI [-.56; -.22]; p <.001); a higher percentage of female participants predicted a higher effect size of the negative relation between functional ER and eating

pathology.

Age was not a significant moderator in the relation between specific ER: emotional awareness (*slope β* = -.006; 95% CI [-.02; .003]; *p* = .202), clarity (*slope β* < -.001; 95% CI [-.009; .01]; *p* = .95), acceptance (*slope β* <.001; 95% CI [-.009; .011]; *p* = .92), reappraisal (*slope β* = .002; 95% CI [-.007; .011]; *p* = .63), problem-solving (*slope β* < -.01; 95% CI [-.02; .001]; *p* = .06) and eating pathology.

The percentage of females was a significant moderator in the relation between specific ER: awareness of emotions (*slope β* = -.61; 95% CI [-.91; -.32]; *p* <.001), clarity about emotions (*slope β* = -.52; 95% CI [-.89; -.15]; *p* = 006) and eating pathology, but not in the relation between acceptance of emotions (*slope β* = -.31; 95% CI [-.7; .08]; *p* = .12), reappraisal (*slope β* = - 1.73; 95% CI [-4.96; 1.51]; *p* = .29), problem-solving (*slope β* = -.42; 95% CI [-.87; .03]; *p* =.07) and eating pathology.

Participants' age was not a significant moderator of the relation between maladaptive ER and disordered eating (*slope β* < .001; 95% CI [−.005; .005]; *p* = .95), that is, increases in age were not associated with an increase of the correlation between maladaptive ER and eating pathology. The percentage of females did not moderate the relation between maladaptive ER and eating pathology either (*slope β* = .15; 95% CI [-.02; .31]; *p* = .08). Moreover, participants' age and the percentage of females was not a significant moderator in the relation between rumination (age: *slope β* = .009; 95% CI [-.01; .03]; *p* = .34); avoidance of emotions (age: *slope β* = .005; 95% CI [-.002; .01]; *p* = .15; percentage of females: *slope β* = .14; 95% CI [-.13; .42]; *p* = .31); suppression (age: *slope β* = -.007; 95% CI [-.02; 003]; *p* = .19; percentage of females: *slope β* = .24; 95% CI [-.13; .61]; *p* =. 20) and eating pathology.

Publication bias

The funnel plot of the relation between adaptive ER and eating pathology showed asymmetry, and the trim-and-fill analysis indicated no missing studies to the left and to the right of the mean. Orwin's fail-safe N indicated that 326 studies with a mean effect size of 0 would be needed to bring the effect size down to -0.1.

For emotional awareness, clarity and acceptance, problem-solving and reappraisal, the funnel plot showed an asymmetrical distribution of the combined effect size. Based on Orwin's fail-safe N analysis, 83 studies with a mean effect size of 0 would be needed for the relation of eating pathology with awareness of emotions, 105 for the relation with clarity about emotions, 121 studies for the relation with acceptance of emotions, 36 for the relation with reappraisal, and 128 for the relation with problem-solving to bring the combined effect size down to -0.1. The trim-and-fill analysis indicated no missing studies for specific adaptive ER related to eating pathology, except for the relation with emotional acceptance, with 6 studies missing to the left of the mean, but which did not significantly change the results (r = -.41; 95% CI [-.47; -.36]) and reappraisal, with 1 study missing below the mean, but which did not significantly change the results (r = -.29; 95% CI [-.36; -.22]). For maladaptive ER in relation to eating pathology, the funnel plot showed some asymmetry and the trim-and-fill method indicated 5 effect sizes missing to the right of the mean (r =.34; 95% CI [.30; .37]). Orwin's fail-safe indicated that an additional 157 studies with a mean correlation of 0 would be needed to bring the effect size to 0.1. The distribution was also asymmetrical for specific maladaptive ER strategies. Based on Orwin's fail-safe analysis, 23 studies for rumination, 73 studies for avoidance of emotions and 41 studies for suppression with a mean correlation with eating pathology would be needed to bring the combined effect size down to 0.1. The trim and fill analysis showed 5 studies missing to the left of the mean for rumination (r = .25; 95% CI [.18; .32]), 6 study

to right of the mean for avoidance of emotions (r = .30; 95% CI [.26; .35]), and 1 study to the right of the mean for suppression (r = .37; 95% CI [.28; .46]) in association with eating pathology.

Discussion

As expected, results showed a significant relation between EDs and lack of ability to be aware, to recognize, and to regulate emotions, in a medium-to-large range of effect sizes. In conjunction, a significant relationship between EDs and maladaptive ER strategies was identified, in the medium-to-large range of the effect sizes. These findings are consistent with those of Aldao and colleagues (2010), in respect to the significance of the association between maladaptive ER and EDs, but not to the magnitude of the relations, as the analysis of Aldao and colleagues (2010) indicated low to medium effect sizes of these relations. On the other hand, regarding the lack of adaptive ER strategies the current results are in contrast with those of Aldao and colleagues (2010), as they indicated a small or insignificant relationship between EDs and this type of ER strategies. Regarding the magnitude of the association between ER abilities and strategies overall and EDs, there was no difference between ED subtypes, with large effect sizes in all cases. Also, specific maladaptive ER strategies are similarly associated with both AN and BN, with a large magnitude of effect sizes. We found a large range of effect sizes for the associations between lack of ER abilities (emotional awareness and clarity) and EDs. Regarding the variance of ER abilities across EDs, results showed that lack of emotional awareness and clarity are similar across EDs types. Results indicate a large effect sizes for the relations between EDs and acceptance, reappraisal and problem-solving. These findings are confirmed by Oldershaw et al. (2015), who found that individuals with AN employ adaptive emotion regulation strategies less than healthy controls, and by a review (Lavander at al., 2015) suggesting that AN and BN are characterized by elevated emotion nonacceptance. However, our findings are not consistent with the results of Aldao and colleagues (2010), who found weaker or insignificant relations between EDs and lack of problem-solving and reappraisal. Moreover, we found that the effect of acceptance, reappraisal and problem-solving is similar for AN, BN and BED. This finding is in line with some studies indicating that poor access to adaptive ER strategies is as trans-diagnostic feature across the spectrum of EDs (e.g., Lavander at al., 2015; Danner et al., 2014).

The specific maladaptive ER strategies of rumination, avoidance and suppression display large associations with AN and BN. Rumination and avoidance were strongly associated with AN and BN, while suppression shows a strong relation with AN and BN and a moderate one with BED.As expected, in non-clinical samples, lack of overall and specific adaptive emotion-regulation abilities and strategies, and maladaptive emotion-regulation strategies were related with eating-related symptoms, in the medium range of effect sizes. These findings are in line with the primary studies reflecting significant relations between adaptive (Buckholdt et al., 2010; Sim & Zeman, 2006) and maladaptive (Rawal et al., 2010; VanBoven & Espelage, 2006) ER and eating-related symptoms in the non-clinical population.

The relation between adaptive ER and eating pathology differed by gender, being stronger for women, but did not differ depending on age. This difference, however, only appeared in the case of lack of emotional awareness and clarity in relation with eating pathology. The relation between overall and specific maladaptive ER and eating pathology did not differ depending on the percentage of females or age.

Implications

One of the main implications of these results is that promoting the use of ER abilities and adaptive ER strategies might be a relevant target in the prevention of EDs and in interventions

targeting these disorders. Our results support a negative relation between eating pathology and ER abilities and strategies that represent important factors in two major therapeutic approaches: acceptance-based treatments and cognitive-behavioral therapy (Baer, Fischer, & Huss, 2005; Fairburn, Cooper, & Shafran, 2003). Future investigations should devote more attention to adaptive ER strategies and skills enhancement in the treatment and prevention of EDs. Further, it might also be promising to explore distinct ER strategies, but also interactions of strategies in association with different patterns of ED symptoms. Finally, a potential causal role of ER in the etiology of EDs should be explored in future research by including these abilities and strategies in longitudinal and experimental approaches that enable the examination of multiple factors and causal relationships including whether eating patterns itself may be an attempt to regulate distressing emotional states.

Study limitations

Many of the studies included used small samples or mixed ED samples, which limits the conclusions regarding specific emotion dysregulation dimensions, particularly in relation to ED subtypes. Also, due to lack of data, it was not possible to examine differences between AN-restricting type (AN-R) and patients with AN-binge/purge type (AN-BP). Another limitation of the primary studies is the poor evaluation of emotion dysregulation in EDs compared to other psychiatric disorders.

Moreover, research in this area has been conducted predominantly with female samples which limits the generalization of findings to males. Most of the relevant research has been conducted in adult samples, thus caution should be taken in generalizing these findings to younger populations (e.g., children and adolescents). The use of self-report data for the assessment of emotion dysregulation and eating-related symptoms limits what is reported to the subjective experience of participants. Response tendencies and social desirability may influence the data, as well as current mood states and (meta-)cognitive factors (Zeman, Klimes-Dougan, Cassano, Adrian, 2007). An additional concern lies in a possible item overlap between clinical assessment measures and ER assessment instruments (Aldao et al. 2010). For example, the assessment of ER might be confounded by the presence of affective items in instruments evaluating eating symptoms (Barker & Galambos, 2008). The sub-analyses presented aimed to provide possible explanations for the variability in the relation between ER and eating pathology. However, the small number of studies included in the moderation analyses can be a limitation, leading to lack of power. Moreover, for some specific relationships between ER abilities and strategies (e.g., reappraisal) and disordered eating we did not find at least 2 effect sizes in order to compute the moderation analyses.

In sum, many studies identified lack of skills and strategies required to adaptively and effectively regulate negative affect (i.e., poorer emotional awareness and clarity, nonacceptance, difficulties with reappraisal and with problem-solving) as being associated with eating pathology. On the other hand, individuals with disordered eating may have a greater vulnerability to use maladaptive ER strategies (i.e., rumination, avoidance, and suppression). These findings have implications for emotion regulation-based theoretical and treatment models for EDs and eating-related symptoms in individuals at risk.

STUDY 2. DEPRESSION AND DISORDERED EATING BEHAVIORS : THE ROLE OF EMOTION REGULATION DIFFICULTIES [2]

Disordered eating behaviors have serious health consequences, being among the most important factors leading to eating disorders and contributing to high rates of health service use (Klump, Bulik, Kaye, Treasure, & Tyson, 2008). Several studies suggest that depression, independently or in conjunction with other negative emotions (e.g. anxiety), plays an important role in the course of developing and maintaining of eating disturbances (McCarthy, 1990; Jeffery et al., 2009; Konttinen, Silventoinen, Sarlio-Lähteenkorva, Männistö, & Haukkala, 2010). The importance of depression as factor associated with abnormal eating behaviors is sustained by the evidence of this relationship in both clinical (depression is comorbid with eating disorders) (Mischoulon et al., 2011) and non-clinical population (McCarthy, 1990). Moreover, depression and disordered eating are also related with other psychological factors involved in eating disorders, such as distorted body image and low self-esteem (Berg, Wertheim, Thompson, & Paxton, 2002; Khodabakhsh, Borjali, Sohrabi, & Farrokhi, 2015). However, the mechanism linking depression to different disordered eating behaviors (e.g. restrained, uncontrolled, emotional eating) is not yet fully understood. An answer can be found in emotion regulation models. Several authors (e.g. Luck, Waller, Meyer, Ussher, & Lacey, 2005; Sim & Zerman, 2006; Buckholdt, Parra, & Jobe-Shields, 2010) have emphasize that specific eating disorder symptoms are maintained by their emotion-regulating functions. Supporting affect regulation models of disordered eating, some researchers have proposed that individuals who experience emotion regulation difficulties may be prone to periods of intense emotional distress, which in turn increases the risk of engaging in disordered eating behaviors (Sim & Zerman, 2006; Buckholdt et al., 2010). Specifically, previous studies had provided evidence that disordered eating behavior are related with emotional overload and are also associated with a lack of adaptive emotion regulation strategies and skills, including ability to clearly identify and adaptively cope with emotional situations (Harrison, Sullivan, Tchanturia, & Treasure, 2010; Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012). In line with existing conceptualizations (Gratz and Roemer, 2004; Berking et al., 2008) emotion regulation refers to: (1) awareness and understanding of emotions; (2) acceptance of emotions; (3) the ability to engage in goal-directed behavior, and refrain from impulsive behavior when experiencing negative emotions; and (4) access to emotion regulation strategies perceived as effective. These individual factors, and difficulties in emotion regulation overall, were found to be related to disordered eating (Sim & Zeman, 2005, 2006; Harrison et al. 2010; Svaldi et al., 2012; Khodabakhsh et al. 2015; Douglas & Varnado-Sullivan, 2016). According to ER models for ED, one of the main assumptions is that individuals with eating disorders are vulnerable to engaging in disturbed eating behaviors because they lack adaptive emotion regulation strategies and skills (Sim & Zeman, 2005, 2006; Khodabakhsh et al., 2015; Douglas & Varnado-Sullivan, 2016). However, it remains unclear if depression interacts with emotion regulation difficulties in influencing eating behaviors, as previous studies have mostly focused on the relation between depression and eating behaviors, or eating behaviors and emotion

---

2

Prefit, A. B., & Szentagotai-Tătar, A. (2018). Depression and disordered eating behaviors: The role of emotion regulation difficulties. *Journal of Evidence-Based Psychotherapies,* 18, 95-106. 10.24193/jebp.2018.1.8.

regulation.

The aim of this study was to investigate the direct and indirect association of psychological factors (emotion regulation and depression) with abnormal eating behavior. In addition, we examined a possible mediating effect of general difficulties in emotion regulation in this relationship. Therefore, it was hypothesized that the effect of depression on disordered eating overall and specifically, on restrained, emotional and uncontrolled eating is mediated by difficulties in emotion regulation.

Method

Participants

The sample consisted of 269 female undergraduate psychology students recruited from Babes-Bolyai University. All participants were at least 18 years of age (mean age = 23.87; SD = 6.98). They received course credits for their participation. The informed consent and questionnaires were filled in using an online survey format.

Measures

Disordered eating behaviors. The Three-Factor Eating Questionnaire (TFEQ-R18; Karlsson et al., 2000) consists of 18 items with response categories on a 4-point Likert scale (definitely true/mostly true/mostly false/definitely false). The questionnaire refers to current dietary practice and measures three disordered eating behavior: restrained eating (conscious food restriction in order to control body weight or to promote weight loss), uncontrolled eating (the tendency to eat more than usual due to a loss of control over intake and subjective feelings of hunger), and emotional eating (difficulty to resist emotional cues). Responses to each of the 18 items are given a score between 1 and 4 and item scores are summed into scale scores for restrained, uncontrolled, and emotional eating. Higher scores in the respective scales are indicative of greater restrained, uncontrolled, or emotional eating. In the current study, internal consistency estimates using Cronbach's alpha were .90 for the total scale, .81 for restrained eating, .88 for emotional eating and .88 uncontrolled eating.

Difficulties in emotion regulation. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) consists of 36 items and is based on a multidimensional model of emotion regulation that includes modulating emotional arousal and maintaining behavioral control despite emotional arousal as well as emotional understanding, acceptance, and awareness. Each item is rated on a five-point scale ranging from ‘‘almost never (0–10%)’’ to ‘‘almost always (91–100%)’’.The six subscales include: (1) lack of emotional awareness (awareness; six items), (2) lack of emotional clarity (clarity; five items), (3) difficulties engaging in goal-directed behaviors (goals; five items), (4) impulse control difficulties (impulse; six items), (5) nonacceptance of emotional responses (nonacceptance; six items), and (6) limited access to emotion regulation strategies (strategies; eight items). Higher scores on this scale represent greater emotion regulation difficulties. Cronbach's alpha of .96 in the present study indicates an excellent internal consistency.

Depression. The Patient Health Questionnaire (PHQ-9; Martin, Winfried Rief, Klaiberg, & Braehler, 2006) consists of nine questions based on the nine DSM-IV criteria for a major depressive episode. Each of the questions asks patients to select the frequency of the depressive symptoms that they experienced in the two weeks before survey administration. Scores for each item range from 0,

not at all, to 3, nearly every day. In this study, Cronbach's alpha for the PHQ-9 was .88.

Data analysis

Bivariate correlations were conducted to examine the associations between the variables (Table 1). Multiple mediation analysis was conducted using SPSS version 19 and 'MEDIATE', a PASW macro (Hayes & Preacher, 2013; downloadable from: http://afhayes.com/spss-sas-and-mplus-macros-and-code.html). This macro allows the testing of direct and indirect effects of one or more independent variables (IV) on a dependent variable (DV) through one or more mediators (M). It also computes the indirect effects, (e.g. the effects of IV through M), along with bias-corrected bootstrapped confidence intervals. The indirect effects were interpreted as significant if the confidence intervals did not contain a zero value. Confidence intervals were based on 5,000 bootstrap samples.

Results

Descriptive Statistics and Correlation

Descriptive statistics and correlations are presented in Table 1. The variables included in the study were depressive symptoms (M = 8.1, SD = 5.84), disordered eating overall (M = 37.93, SD = 10.76), restrained eating (M = 12.76, SD = 4.15), emotional eating (M = 6.33, SD = 3.01), uncontrolled eating (M = 18.84, SD = 6.40) and difficulties in emotion regulation (M = 83.19, SD = 23.56). Depression was significantly correlated with disordered eating overall (r = .32, p<.01), restrained eating (r =.187, p =.002), emotional eating (r = .276, p<.01) and uncontrolled eating (r = .287, p<.01). Similarly, difficulties in emotion regulation were significantly related with disordered eating overall (r = .455, p<.01), with restrained eating (r =.226, p<.01), with emotional eating (r = .42, p<.01) and with uncontrolled eating (r = .42, p<.01).

Table 1: Mean, standard deviation and Person's correlations

	M	SD	1	2	3	4	5	6
1. TFEQ Total	37.93	10.76	-					
2. TFEQ Restrained	12.76	4.15	.61*	-				
3. TFEQ Uncontrolled eating	18.84	6.4	.89*	.25*	-			
4. TFEQ Emotional eating	6.33	3.01	.81*	.28*	.71*	-		
5. PHQ	8.1	5.84	.32*	.18*	.28*	.27*	.-	
6. DERS Total	83.19	23.59	.45*	.22*	.42*	.42*	.33*	-

Note. TFEQ Total = disordered eating, TFEQ Restrained = restrained eating subscale, TFEQ Uncontrolled eating = uncontrolled eating subscale, TFEQ Emotional eating = emotional eating subscale, PHQ = depression, CPN DERS = emotion regulation difficulties. * p<0.001

Mediation Analysis

Coefficients for the regression analyses are presented in Table 2 and Fig. 1. Regression analyses revealed that the mediator was predicted by the IV ($\beta = 1.33$, $p < .001$). The disordered eating (restrained, emotional and uncontrolled eating) score was regressed onto the depression scores and proposed mediators, emotion dysregulation. All three models computed for each disordered eating behaviors were significant. Depression and emotion regulation scores were added

accounting for an additional 23% of disordered eating (F Change = 41.84, p < .001); .06% of the variance in restrained eating (F Change = 5.32, p = .023).(F(2) = 9.3, p < .001); 10% of the variance in emotional eating (F(2) = 32.82, p < .001); and 20% of the variance in uncontrolled eating: F(2) = 33.44, p < .001). Further, emotion dysregulation and depression significantly predicted disordered eating overall (t = 6.391, p < .001 and t = 3.37, p < .008 respectively), restrained eating (t = 2.94, p < .003 and t = 2.00, p < 005 respectively), emotional eating (t = 6.34, p < .001 and t = 2.65, p < .008 respectively) and uncontrolled eating (t = 6.27, p < .001 and t = 2.87, p < .005 respectively). The omnibus test for the direct effect of the independent variables on disordered eating was significant (β (disordered eating overall) =. 35, p < .001; β (restrained eating) =. 08, p < .05; β (emotional eating) = .07, p < .008; β (uncontrolled eating) = 18., p < 004).

Table 2. Direct effect of depression and ER on disordered eating

Predictors	Outcome	β	SE	t	p
Depression→	ER difficulties	1.33	.23	5.71	<.001
ER difficulties→	Disordered eating overall	.17	.02	9.55	<.001
	Restrained eating	.03	.01	2.94	.003
	Emotional eating	.04	.007	6.34	.004
	Uncontrolled eating	.09	.06	2.87	.004
Direct effect of depression→	Disordered eating overall	.35	.10	3.37	<.001
	Restrained eating	.08	.04	2.00	.04
	Emotional eating	.07	.03	2.65	.008
	Uncontrolled eating	.18	.06	2.87	.004

Finally, the bootstrap results (see Table 3) indicated that emotion regulation difficulties had significant indirect (mediated) effects on disordered eating overall $\beta = .23$, bootstrap CI [.13; .36]; on restrained eating $\beta = .04$, bootstrap CI [.015; .08]; on emotional eating $\beta = .06$, bootstrap CI [.03 to .09]; and on uncontrolled eating $\beta = .13$, bootstrap CI [.07 to .21]). Confidence intervals did not contain zero value.

Table 3. Bootstrap confidence intervals for the indirect effects of depression on disordered eating through emotion regulation.

	Effect	SE	bootstrap CI	
			Lower	Upper
Disordered eating overall	.23	.05	.138	.362
Restrained eating	.04	.01	.015	.084
Emotional eating	.06	.01	.035	.009
Uncontrolled eating	.13	.03	.072	.217

Note: SE=standard error; CI=confidence intervals. Confidence intervals are based on 5,000 samples.

Importantly, depression was found to have both a direct and indirect effect (through emotion dysregulation) on disordered eating behaviors (see Fig. 1). Emotion dysregulation is a partial

mediator of depression and disordered eating behaviors (overall and specific restrained, emotional and uncontrolled eating) relationship.

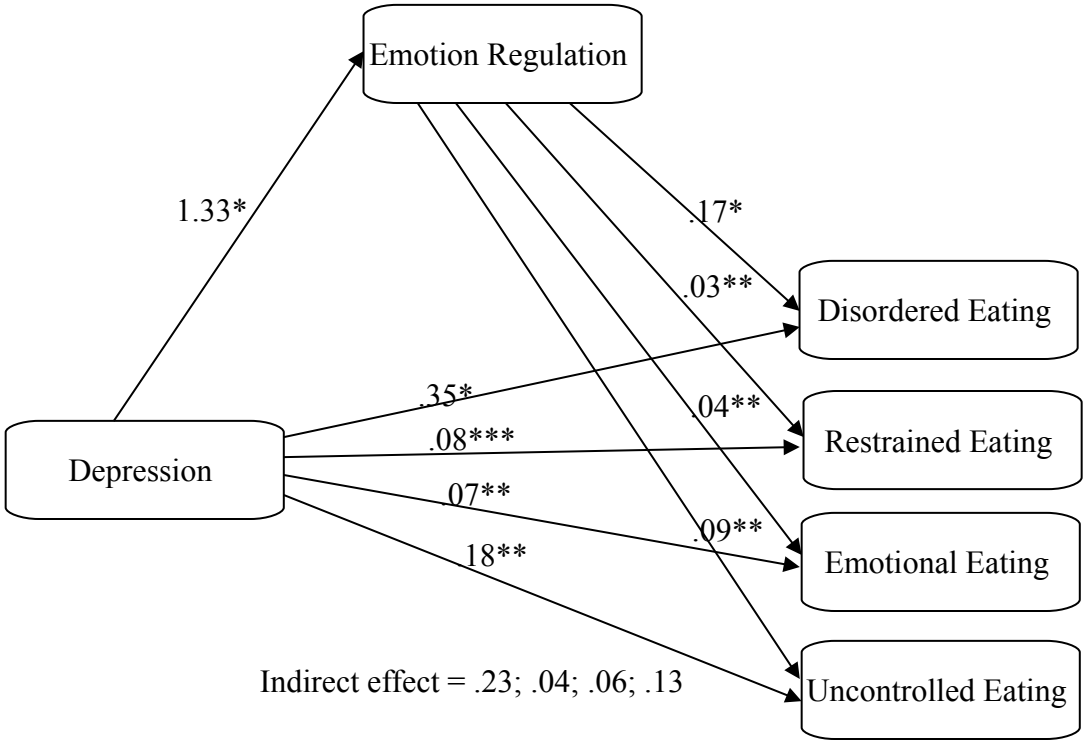

Fig. 1.Model showing that emotion dysregulation partially mediates the relation between depression and disordered eating behaviors. Note. *$p < 0.001$; **$p < 0.01$; ***$p < 0.05$.

Discussion

Consistent with expectations, results revealed independent association of depression and emotion regulation with disordered eating. Results also confirmed our hypothesis that depression and emotion regulation directly predict disordered eating behaviors, the combination of these two predictors explaining 23% of the variance in disordered eating behaviors. In addition, results confirm an indirect effect of depression on disordered eating (through the emotion regulation difficulties). Our findings are consistent with the suggestion that women who have deficits in adaptive emotion regulation strategies may be more likely to engage in disordered eating behaviors in an attempt to modulate or escape aversive affective states (McCarthy, 1990; Sim & Zerman, 2006). Another potential explanation for this findings, as noted by Whiteside et al. (2007), is that individuals who engage in disordered eating behaviors and who lack adaptive emotion regulation, as we found in this study, experience more intense emotions. Future studies should be conducted to identify the causality in this relationship. The second aim of the current study was to investigate possible differences between different types of disordered eating behaviors in term of their relationship with depression depending on emotion regulation difficulties. We found that depression has a direct and indirect (via emotion regulation) effect on each disordered eating (restrained, uncontrolled, and emotional eating), explaining more variance in uncontrolled eating (20%)

compared to variance in emotional eating (10%) and restrained eating (.06%). Only few previous studies have addressed the relationship between different disordered eating behaviors and emotion regulation and most of them in clinical populations (Bydlowski et al., 2005; Svaldi at al. 2012). Our results are consistent with these prior studies, which found no significant differences between ED groups. This findings support the transdiagnostic view of ER difficulties being present across all disordered eating behaviors.

Limitations

There are several limitations to consider when interpreting the findings of the present study. First, all analyses were cross-sectional and therefore, causality cannot be determined. Longitudinal studies should be conducted to determine whether individuals with depression symptoms are at an increased risk for developing disordered eating, because of their difficulties in regulating their emotions, or whether emotion dysregulation is merely a risk factor for the development of both depression and eating disorders. However, the findings of the present study suggest that emotion dysregulation and depression are important transdiagnostic risk factors for eating disorders. The second limitation is the reliance on self-report measures. Although psychometrically valid measures were used, incorporating clinical interviews and behavioral measures might provide additional information regarding the mediating role of emotional regulation in the relationship between depression and disordered eating. Finally, participants were undergraduate students, which limits generalization to the general population and the exclusively female sample precludes generalization of our findings to males. Moreover, it remains to be seen in future studies if these results can be generalized to a sample of individuals diagnosed with eating disorders.

Despite these limitations, the current investigation provides important information on the relationships between depression, emotion regulation difficulties and disordered eating. Investigating depression and emotion regulation is important for informing developmental risk models of eating pathology, as well as for refining prevention, screening, and early intervention strategies for eating disorders (Goldschmidt, Wall, Loth, Bucchianeri, & Neumark-Sztainer, 2014). However, future studies should examine these factors more comprehensively in order to allow the development of interventions that specifically focus on emotion regulation in eating disorders.

STUDY 3. EFFECTS OF ACCEPTANCE AND REAPPRAISAL ON BODY DISSATISFACTION: AN EXPERIMENTAL COMPARISON OF TWO ADAPTIVE EMOTION REGULATION STRATEGIES[3]

Body image dissatisfaction is as important issue among women, associated with numerous negative psychological and physical health consequences that can ultimately lead to the development and maintenance of eating disorders (Burnette, Davies, Boutté, & Mazzeo, 2019, Fuller-Tyszkiewicz et al.,2019, Lantz et al., 2018). Traditional cognitive-behavioral approaches to body image issues, which focus mainly on challenging the relative importance of achieving an ideal body weight as a measure of personal success, are limited in their efficacy, thus justifying the need for alternative approaches in order to more efficiently tackle body dissatisfaction (Lantz et al., 2018). Thus, it is

3 Prefit, A.B., Candea, D.M., Szentagotai-Tătar, A. (2019). Effects of acceptance and reappraisal on body dissatisfaction: an experimental comparison of two adaptive emotion regulation strategies. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity,*
DOI **:** 10.1007/s40519-019-00691-y

important to conduct research on factors that influence body image as this may hold implications for the improvement of current prevention and treatment programs. Recently, the importance of emotion regulation for body image has received a great deal of attention (Naumann et al., 2016; Svaldi, & Naumann, 2014; Etu & Gray, 2010), but this relationship has not yet been fully explored. A study that investigated the effect of emotional disturbance on the associations between body dissatisfaction and body mass index and eating pathology showed that overall distress (i.e., high levels of anxiety and depression) and mood instability are mediating factors in these relations (Rosewall, Gleaves, & Latner, 2019). In some studies, acceptance significantly improved body satisfaction in response to body dissatisfaction induction (Naumann et al., 2016; Wade, George, & Atkinson, 2009). In the present study, we focused on the effect of two adaptive ER strategies, acceptance and reappraisal, on body dissatisfaction. We chose to investigate these strategies because they are described as important treatment components in established therapeutic interventions (e.g., CBT; Beck, Rush, Shaw, & Emery, 1979; ACT; Hayes, Strosahl, & Wilson, 1999) for eating pathology, which could lead specifically to improvement of body dissatisfaction (Lewis-Smith, Diedrichs, Rumsey, & Harcourt, 2015; Pearson et al., 2012). Understanding them better could lead to improved effects of these intervention programs. Psychological acceptance refers to focusing attention, being aware and non-judgmental of personal experiences (e.g. thoughts, feelings or bodily experiences), without trying to manipulate, escape or avoid them, and responding to the actual experienced events as they occur (Pearson, Follette & Hayes, 2012; Hayes et al., 2006). As previously mentioned, some studies showed that acceptance improves body image in general population (Lantz et al., 2018; Atkinson, & Wade, 2012; Pearson et al., 2012) or in individuals with ED (Naumann et al., 2016). Consistent with previous studies, cognitive reappraisal (e.g., appearance reappraisal) is another ER strategy associated with body satisfaction (Margolis, & Orsillo, 2016; Cash, 2012; McLean, Paxton, & Wertheim, 2011). It involves rational reframing of emotional events in order to change their emotional impact (Gross, 2015). Reappraisal could be a useful strategy for reducing body dissatisfaction due to the fact that the way individuals emotionally react to their body image while comparing themselves with thin-ideal models is determined by the way they interpret these silhouettes (Cash, 2012).

The present study investigated the effect of acceptance and reappraisal (used as an antecedent-focused strategy) in downregulating body dissatisfaction compared to a control condition. Additionally, we examined the effect of acceptance and reappraisal on positive and negative affect, as factors closely associated with body dissatisfaction. We hypothesized that acceptance and reappraisal will facilitate a low level of body dissatisfaction and negative affect and an increased level of positive affect compared to the control group.

Method

Participants

Participants were recruited from May 2017 to November 2018, from the Babeș-Bolyai University undergraduate pool, and via online social networks. In exchange for their participation, the undergraduate students received course credit. Participants were eligible if they were over 18 and were excluded if any self-reported eating disorders were present. We calculated an estimated sample size of 66 (effect size *f =.25; statistical power =.95)* using the G*Power software. The final sample consisted of 105 women, with ages ranging from 19 to 32 (mean age [M]= 22.07; standard deviation [SD]= 6.11). While most participants were young adults, we also included middle-aged adults, given that previous findings showed body dissatisfaction in women is stable across the adult life span, at least until older age (Runfola et al., 2012; Tiggemann, 2004). Participants were randomly

assigned to one of the two emotion regulation conditions: acceptance ($n = 35$), reappraisal ($n = 35$) or to a control condition ($n = 35$). Random assignment was accomplished using an online random number generator (random.org). All participants provided informed consent prior to study participation.

Materials and measures

Emotion regulation instructions

In the acceptance condition, we followed the instruction used by Singer and Dobson (2007), and Wolgast et al. (2011). Participants were instructed to experience the body image-related thoughts and emotions without judging them. They were encouraged to experience their emotions by simple observation of the current thoughts and feelings, and without making effort to control them (e.g., "Allow yourself to accept your thoughts and emotions without trying to eliminate them"). Participants were instructed to think of thoughts and feelings as if they were projected on the screen at the cinema: "You are watching the screen, waiting for the thoughts or images to arise".

In the reappraisal condition, participants were instructed to interpret potential emotional body image stimuli in unemotional, realistic terms. Participants were given the instructions for reappraisal, based on Gross (1998), and Wolgast et al. (2011): "While watching the images, please remember that this is just an experiment, with no negative implication, so there is no real motive of concern."

In the control condition, participants were simply informed that they were going to be exposed to some pictures of female silhouettes that meet criteria for the ideal of beauty.

Manipulation Check

Following Wolgast et al. (2011), we developed a measure as an experimental manipulation check in order to assess participants' understanding of the instructions. We formulated the following two items for the acceptance condition ("I am to accept my emotions and thoughts without trying to change or control them"; "The adaptive way to cope with emotions is by letting them follow their natural course, without trying to reduce or change them") and two items for the reappraisal condition ("I will attempt to influence my emotional reactions by thinking in a rational way about the content of the images"; "By thinking in a rational way about the content of the images I am going to see, I will be able to influence my emotional reactions, so that I experience less distress about my body image"). All participants were asked to rate to what extent they agreed with each statement on a 5 point Likert scale (1 -"not at all" and 5 - "very much"). After the induction of body dissatisfaction, we administered the questions once again, in order for participants to rate to what extent they were successful in following the emotion regulation instructions.

Induction of body dissatisfaction

To induce body dissatisfaction, we used a set of 15 images collected from fashion magazines from websites, portraying female bodies that fulfill a thin-ideal. These images were displayed on a computer screen. Other studies have used similar body dissatisfaction induction procedures (Svaldi, & Naumann, 2014; Wade et al., 2009). In order to heighten the impact of the images (Tiggemann, & Mcgill, 2004), we asked participants to compare themselves with the models after viewing each image, indicating their agreement, on a scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"), with two statements: "I would like my body to look like this woman's body", and "This woman is thinner than me".

Questionnaires

Body Image States Scale (BISS; Cash et al., 2002). BISS consists of six items covering the following domains of current body experience: (1) dissatisfaction–satisfaction with the general

physical appearance; (2) dissatisfaction–satisfaction with body size and shape; (3) dissatisfaction–satisfaction with weight; (4) feelings of body attractiveness– unattractiveness; (5) current feelings about personal looks relative to how the person usually feels; and (6) evaluation of the appearance relative to how the average person looks. Responses were rated on a 9-point, bipolar, Likert-type scale, and they describe feelings related to each statements at the moment of the evaluation. The scale is presented in a negative-to-positive direction for half of the items and a positive-to-negative direction for the other half, with higher scores indicating more positive body image. The Cronbach's alpha of .90 in the present study indicates an excellent internal consistency.

The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). PANAS consists of 20-items grouped in two sub-scales that measure positive affect and negative affect. Respondents are asked to rate the extent to which they have experienced each particular affect at the time of the evaluation. Possible scores range from 1 to 5(1-"very slightly or not at all" and 5 -"very much"). Scores can range from 10 – 50, with higher scores representing higher levels of positive affect, and lower scores representing lower levels of negative affect. Both the positive and negative affect subscales had an excellent internal consistency (PA Cronbach's alpha = .85; NA Cronbach's alpha = .90).

Procedure

The experimental sessions took place in a sound attenuated laboratory room where participants were invited to seat in front of a computer. The flow diagram of the procedure is shown in Fig. 1. After providing informed consent, participants filled in self-report measures evaluating current body image satisfaction and positive and negative emotional states (T1). After filling in the scales, participants received the verbal instructions for their assigned condition (i.e., acceptance, reappraisal or control), from an experimenter. Next, they completed the body dissatisfaction induction procedure. Finally, they completed again the self-report measures regarding current body image satisfaction and emotional states (T2).

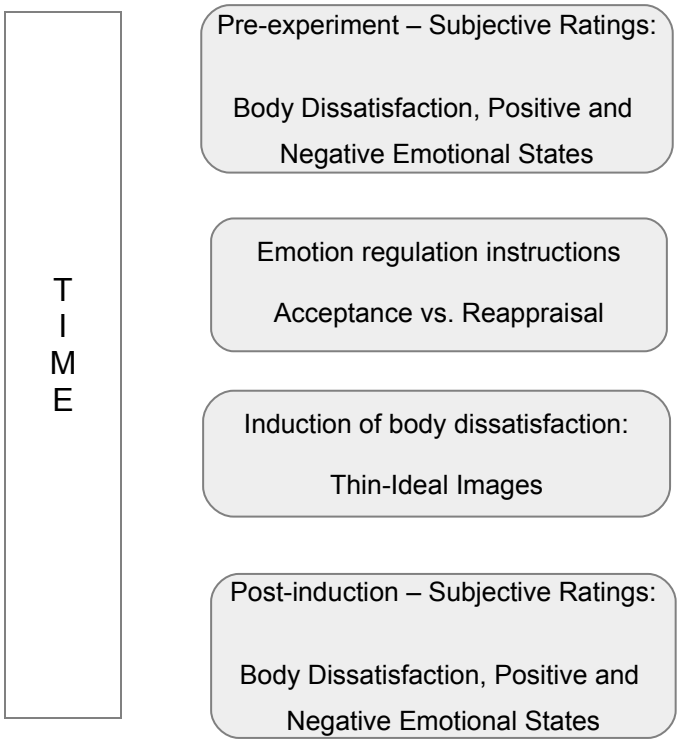

Fig. **1** Flow diagram of the experimental procedure

Statistical analyses

Student t-tests were used to assess compliance with the emotion regulation instruction just after the instructions, and once again after body dissatisfaction induction. Mixed within-between ANOVAs were conducted in order to explore baseline and post-induction differences in body image satisfaction and positive and negative emotional states among the three groups (i.e., acceptance, reappraisal and control). Effect sizes of the group differences and interactions are reported using the partial eta squared coefficient (η^2), whereby values up to 0.01 refer to small, 0.06 to moderate, and 0.14 to large effect sizes (Cohen, 1988).

Results

Compliance with emotion regulation instructions

Two t-tests were computed, one for assessing compliance with the assigned emotion regulation strategy evaluated just after the instructions (T1), and another one for the evaluation at T2 (after body dissatisfaction induction), in order to test if the effects of the instructions were still present. Results indicated that participants in the experimental conditions understood the instructions and were able to successfully distinguish between acceptance and reappraisal. At T1, participants in the acceptance condition understood the instructions indicated by the fact they being able to significantly distinguish between acceptance and reappraisal, t (68) =10.55, $p < .001$ (acceptance M/SD: 8.25 /1.61; reappraisal M/SD: 3.8/1.9). Similar results were obtained at T2, t (68) =16.-62, $p < .001$ (acceptance M/SD: 9. /1.02; reappraisal M/SD: 3.68/1.58). Participants in the reappraisal condition also distinguished between reappraisal and acceptance, both at T1, t (68) = 4.58, $p < .001$ (reappraisal M/SD: 7.37 /1.84; acceptance M/SD: 5.6/1.28) and at T2, t (68) = 5.55, $p < .001$ (reappraisal M/SD: 8.25/1.72; acceptance M/SD: 5.94 /1.76).

Effects of acceptance and reappraisal on body dissatisfaction

Body satisfaction means and standard deviations at baseline (T1) and post-test (T2) across all the three conditions (acceptance, reappraisal and control) are presented in Table 1. Group changes in body satisfaction across time were examined using a mixed within-between ANOVA, with one between factor (i.e., condition: acceptance, reappraisal and control) and one within factor (i.e., time: baseline - T1, and post-test - T2). The analysis yielded a nonsignificant main effect of Time, F (1, 102) = 3.05, $p = .08$, $\eta^2 = .02$, and a significant effect of the Time x Condition interaction, F (2, 102) = 9.66, $p < .001$, $\eta^2 = .16$. Between- subjects effect was nonsignificant, F(2, 102) = .74, $p = .78$. Within-pairwise comparisons showed that body satisfaction significantly increased in the experimental conditions: acceptance (Mean difference = -1.4, F (1, 102) = 7.55, $p = .007$, $\eta^2 = .07$), reappraisal (Mean difference = -1.45, F (1, 102) = 8.18, $p = .005$, $\eta^2 = .07$), and decreased in the control group (Mean difference = 1.31, F (1, 102) = 6.65, $p = .01$, $\eta^2 = .06$) from T1 to T2. Between-subjects pairwise comparisons indicated no significant differences between groups, neither at baseline nor at post-test.

Effects of acceptance and reappraisal on positive affect

Changes in positive affect were examined using a mixed within-between ANOVA, with one between factor (i.e., condition: acceptance, reappraisal and control) and one within factor (i.e., time: baseline - T1 and post-test - T2) (see Table 1. for means and standard deviations at T1 and T2). A significant main effect of Time, F (1, 147) = 18.49, $p < .001$, $\eta^2 = .15$, and a significant Time x Condition interaction effect, F (2, 428) = 5.38, $p = .006$, $\eta^2 = .09$ were observed. Between- subjects

effect was nonsignificant, F (2, 102) = .58, p = .56. Within-pairwise comparisons showed that positive affect significantly decreased in the control group from T1 to T2 (Mean difference = 3.48, F (1, 29) = 7.19, $p < .001$, $\eta^2 = .21$) and remained similar in the acceptance (Mean difference = .77, F (1, 102) = 1.31, p = .26) and reappraisal groups (Mean difference = .77, F (1, 102)= 1.31, p = .26). Between-subjects pairwise comparisons indicated no significant differences between groups, neither at baseline nor at post-test.

Effects of acceptance and reappraisal on negative affect

Changes in negative affect were examined using a mixed within-between ANOVA, with one between factor (i.e., condition: acceptance, reappraisal and control) and one within factor (i.e., time: baseline - T1, and post-test - T2) (see Table 1). There was a nonsignificant main effect of Time, F (1, 9) = .74, p = .39, $\eta^2 = .007$, and a significant main effect of the Time x Condition interaction, F (2, 47)= 3.76, p = .03, $\eta^2 = .07$. Between- subjects effect was nonsignificant, F(2, 102) = .58, p = . 56. Between- subjects effect was nonsignificant, F(2, 102) = .03, p = .97. Within-pairwise comparisons showed that negative affect significantly changed in the control group form T1 to T2 (Mean difference = - 1.97, F (1,102) = 5.47, p = .02, η^2 = .05), and remained similar in the acceptance (Mean difference = 1.28, F (1,102) = 2.32, p = .13), and reappraisal group (Mean difference = -.57, F(1,102) = .46, p = .49). Between-subjects pairwise comparisons indicated no significant differences between groups, neither at baseline nor at post-test.

Table 1. Means and standard deviations for body dissatisfaction, negative and positive affect at baseline and post-induction.

	BASELINE			POST-TEST		
	Acceptance N= 30 M (SD)	Reappraisal N= 30 M (SD)	Control N= 30 M (SD)	Acceptance N= 30 M (SD)	Reappraisal N= 30 M (SD)	Control N= 30 M (SD)
Body Dissatisfaction	29.34 (9.38)	27.02 (7.15)	29.97 (7.95)	30.74 (8.37)	28.48 (7.35)	28.65 (8.54)
Negative affect	18.8 (5.56)	18.11 (7.54)	17.6 (8.46)	17.51 (5.64)	18.68 (8.49)	19.57 (8.52)
Positive affect	31.28 (7.36)	30.37 (7.07)	30.77 (6.9)	30.51 (7.42)	29.6 (8.62)	27.28 (7.72)

Discussion

As we expected, participants in the reappraisal and acceptance conditions reported higher body satisfaction after body dissatisfaction induction compared to the control group. These results are consistent with previous experimental studies and randomized controlled trials showing that acceptance (Margolis, & Orsillo, 2016; Naumann et al., 2016; Atkinson, & Wade, 2012; Wade et al., 2009) and reappraisal (Chithambo, & Huey, 2017; Margolis, & Orsillo, 2016) are negatively associated with appearance and weight dissatisfaction, in the general population or in individual with ED. Although previous studies have focused more on acceptance as a specific emotional regulation strategy for body image (Naumann et al., 2016; Wade, et al., 2009), our findings extend previous results by showing that reappraisal is also efficient in reducing body dissatisfaction, but more investigations are needed to evaluate the effects of reappraisal on body image. Moreover, as we

expected, our results support a similar efficacy of both strategies in decreasing body dissatisfaction. A previous study conducted on general population, that compared the effect of cognitive reappraisal and acceptance on subjective distress, physiological reactions associated with aversive emotions and behavioral avoidance, showed similar effects of the two strategies (Wolgast, Lundh, &Viborg, 2011)

Negative affect did not increase significantly from the pre- to post-induction of body dissatisfaction, neither in the acceptance nor in the reappraisal condition. This suggest a beneficial effect of adaptive ER strategies in preventing the increase of negative affect associated with the induction of body dissatisfaction. Moreover, as we expected, negative affect significantly increased in the control group following the induction of body dissatisfaction. These findings are consistent with previous studies that reported an increase of body dissatisfaction, but also of negative mood as a result of experimental induction of body dissatisfaction (Loeber et al., 2016; Wyssen et al., 2016).

In which positive affect is concerned, it remained similar in both acceptance and reappraisal conditions from pre-to post-induction of body dissatisfaction but significantly decreased in the control group. Very few studies have explored the relation between positive affect and body image, but our findings are congruent with the results of McCabe et al. (2001), who found that levels of positive affect were directly predicted by body image satisfaction (McCabe, Ricciardelli, & Banfield, 2001).

Limitation and Future Directions

The present study has several limitations. Some of these are related to sample characteristics. The effects of reappraisal and acceptance in a non-clinical sample cannot be generalized to individuals with clinical problems. Future studies should investigate the influence of reappraisal and acceptance on body dissatisfaction in individuals with EDs. Also, for a better control of the effects of ER strategies on body-related cognitions and feelings, participants could be selected based on different levels of body dissatisfaction. Another limitation is related to the method used to induce body dissatisfaction. Results can only be interpreted in the context of body dissatisfaction in response to thin-ideal media images. Also, given the direct instructions and the short period of time between measures, we cannot exclude demand characteristics. Future studies should use longer body dissatisfaction induction methods, and research would benefit from using a more ecological methodology such as ecological momentary assessment (EMA), for a naturalistic evaluation of ER and body dissatisfaction in EDs (Heron, & Smyth, 2013). Future studies should also consider the role of body dissatisfaction in the context of the individual's actual weight and behavioral efforts to lose weight (Lantz et al., 2018) and its association with emotion regulation. The use of a cross-sectional design in the present study also limits the interpretation of the results. Longitudinal assessments will be necessary in the future to determine the importance of specific ER strategies in the etiology EDs. And finally, to better understand the role of ER for body dissatisfaction, future studies should test the causal effects of various ER strategies (both adaptive or maladaptive) with regard to the maintenance of body dissatisfaction. Despite these limitations, we believe the results of this study are relevant to the literature, as they emphasize the benefits of cognitive reappraisal and acceptance, two important components of both traditional cognitive behavioral therapies and third wave behavior therapies (e.g., ACT), as efficient ER strategies for reducing body dissatisfaction.

STUDY 4. INTERNET-DELIVERED ACCEPTANCE–BASED TRAINING FOR EMOTIONAL EATING

The present study investigated an internet-delivered acceptance-based training for emotional

eating, which aimed to improve emotional awareness and emotional acceptance and tolerance strategies. Emotional eating refers to the tendency to overeat in response to negative emotions and stress, eating tendency that is not physiologically required (Arnow, Kenardy & Agras, 1995). Emotional eating is generally associated with mental health problems and plays an important role in body image, weight and eating-related disorders (Ricca et al., 2012; Waller & Osman, 1998). It has been suggested that individuals who engage in emotional eating have deficits in the ability to efficiently modulate emotions and, therefore, this behavior itself can serve as a mean of regulating affective states (such as anger, anxiety, tension, and guilt; Evers, Stok & Ridder, 2010). Specifically, some findings supported that individuals engage in emotional eating in order to regulate emotions experienced as difficult to tolerate in the moment, rather than more long-lasting emotional experiences such as mood (Overton et al, 2005). Acceptance-based interventions for emotional eating promote psychological skills and strategies such as emotional awareness and clarity, through which individuals are encouraged to observe their emotions as they occur at the moment and to label them objectively. Through this process, individuals increase contact with their emotions, focusing attention on the different components of their emotional responses and developing the ability to identify, label, and differentiate between emotional states (Hayes et al., 1999; Kristeller et al., 2006). The process of observing one's emotions and behaviors that often accompany them facilitates awareness and the ability to control them when distressed. Thus, taking a nonjudgmental approach toward negative emotions is expected to facilitate emotional acceptance and increase emotional tolerance. Further, given that emotional nonacceptance and avoidance may amplify emotions and contribute to the experience of emotions as undesirable, practicing emotional acceptance and tolerance is expected to reduce dysfunctional emotions (inclusive secondary emotional responses) and behaviors (Forman & Butryn, 2014). Finally, another component is represented by cognitive defusion, a process that changes the individual's stance towards his/her thoughts, by "stepping back" and simply witnessing their presence. Defusing means disentanglement from self-talk and observing cognition as separate from the self, as just words (Hayes et al., 1999). The present study evaluates an internet-delivered training aimed to improve emotional awareness, acceptance and tolerance skills and functional emotion regulation strategies by daily practice. Several studies have examined the efficacy of asynchronous (Franko et al., 2005) and synchronous online interventions for body image and disordered eating (Gollings & Paxton, 2006; Heinicke, Paxton, McLean, & Wertheim, 2007; Zabinski, Wilfley, Calfas, Winzelberg, & Taylor 2004; Zabinski et al., 2001). Participants in these studies showed significant decreases in weight and shape concerns and emotional eating at post-test. Internet-based interventions offer several advantages over traditional face-to-face programs. Most notably, they offer the convenience of increased access for individuals who cannot easily be present to a face-to-face intervention (Winzelberg, Luce, & Abascal, 2004). Despite these encouraging preliminary findings, there is a lack of data regarding the efficacy of an acceptance-based training on emotional eating delivered via the Internet.

The current study aimed to assess the efficacy of an asynchronous online acceptance–based training in reducing emotional eating and improving affect and emotional acceptance as an emotion regulation strategy. We hypothesized that compared to the group who receive psychoeducation, individuals who receive acceptance-based training will experience a significant reduction in emotional eating. Additionally, we hypothesized that negative affect will decrease and positive affect and emotional acceptance will increase after acceptance-based training compared to the group who receive psychoeducation.

Method

Participants

The sample consisted of 50 participants from the general population with ages ranging from 19 to 37 (76% female; mean age [M]= 24.64; standard deviation [SD]= 4.21). Recruitment was made through the student pool and Internet advertising. Undergraduate students received course credit in exchange for their participation. Inclusion criteria were age over 18, and a high level of emotional eating as assessed by the Emotional Eating Scale, a self-report measure. Because no normative data are available for this scale, in order to establish the cutoffs for our sample we used the means of the Emotional Eating subscales from a previously published study on non-clinical population (Waller & Osman, 1998): EES Anger score ≥11.2, EES Anxiety score ≥6.42, or EES Depression score ≥8.10.

Fig. 1 shows the participant flow in this study. Participants were randomly assigned to one of the two conditions: treatment and psychoeducation. Random assignment was accomplished using an online random number generator (random.org). In what dropout rates are concerned, an overall dropout rate of 33.33% (n = 12) for treatment, and 25.71% (n = 9) for psychoeducation condition occurred. A multivariate ANOVA indicated no statistically significant differences between completers and dropouts on baseline measures, $F(4, 66) = .35$, $p = .85$, Wilk's $\lambda = .98$.

All participants provided informed consent prior to study participation.

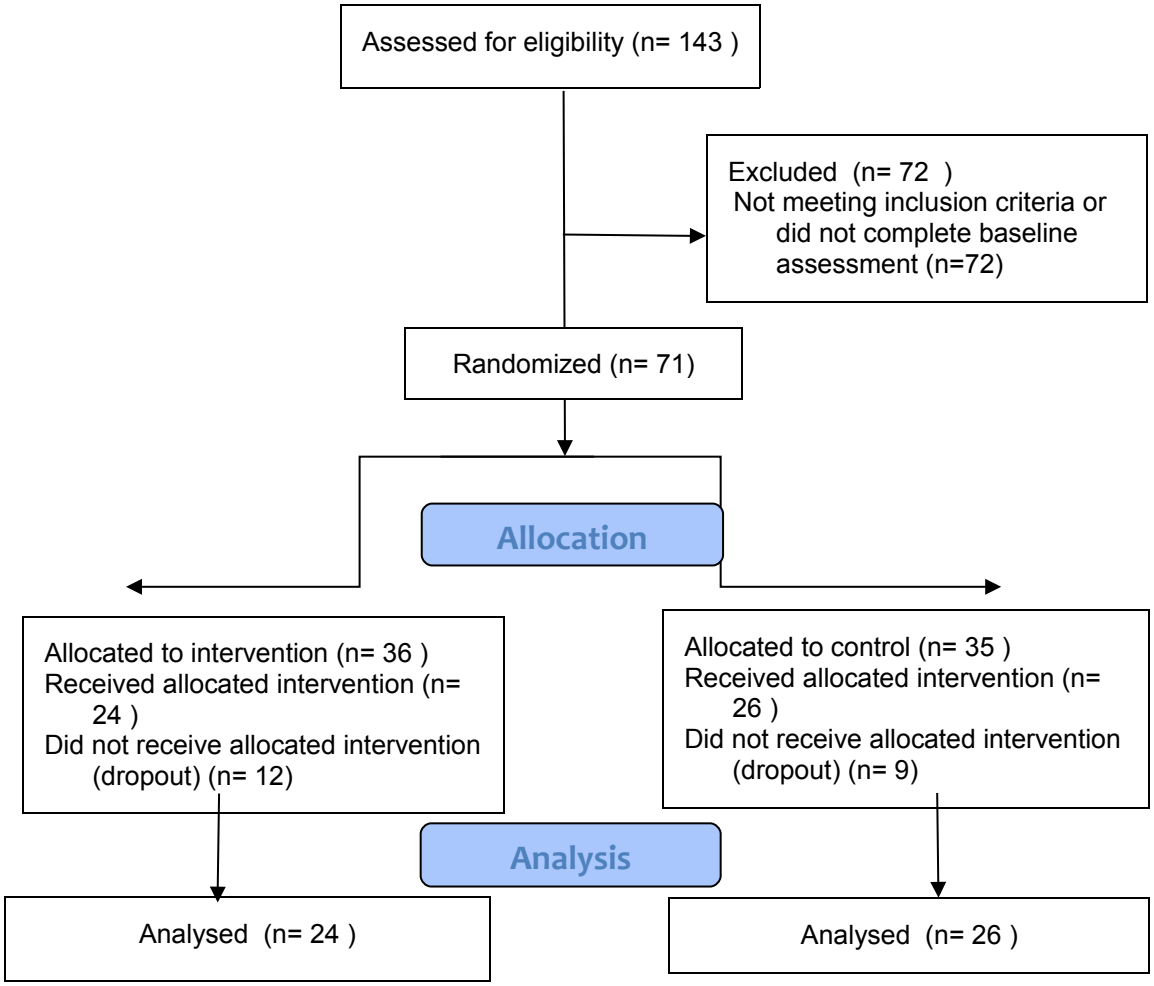

Fig. 1. Diagram of participant flow in the study.

Measures of outcomes

Emotional Eating Scale (EES; Arnow et al., 1995) is a self-report measure composed of 25 items that measured the individual's desire to eat when feeling certain emotions. The EES includes three subscales, each assessing a specific emotion: (a) Depression, (b) Anxiety, and (c) Anger/Frustration. Participants rate their desire to eat in response to given emotions on a 5-point scale, ranging from 1 (No desire to eat) to 5 (An overwhelming urge to eat). Cronbach's Alpha in this study was .89.

Distress Tolerance Scale (DTS; Simons & Gaher, 2005). The 14-item DTS is a self-report questionnaire examining the degree to which individuals experience negative emotions as intolerable (e.g., ''I can't handle feeling distressed or upset.''). Items are rated on a Likert scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree), where lower scores indicate a tendency to experience psychological distress as unacceptable. Cronbach's Alpha for this sample was .88.

Positive and Negative Affect Scales (PANAS; Watson et al. 1988). PANAS is a 20-item self-report instrument measuring two global dimensions of affect: negative affect (PANAS-NA) and positive affect (PANAS-PA). Participants use a 5-point Likert scale (0 = not at all to 4 = almost always) to rate the extent to which they experience different feelings and emotions in a given time period. The subscales has very good internal consistency (PANAS-NA, α=.91; PANAS-PA, α=.89) in the current sample.

Acceptance–based training

The acceptance-based training aimed to enhance skills of adaptively regulating unwanted affective states (e.g., stress, anxiety, anger, sadness, guilt, shame, etc.) and to prevent emotional eating as a maladaptive strategy of regulating unwanted emotions. This training focused of the development and improvement of nonjudgmental awareness, emotional acceptance and tolerance, and cognitive defusion. In order to develop and improve the use of adaptive emotional abilities and strategies, structured exercises for each main sequence of the training were provided provided. We briefly describe the main components of the training below.

Nonjudgmental awareness was focused on the improvement of identifying, labeling, differentiating and rating the intensity of emotional states (e.g., sadness, fear, anger, and shame), and on identifying the cognitive and physiological components of emotions. Exercises included in the training aimed to promote: a) understanding the connection between emotions and emotional eating; b) examining the functions of emotions (e.g., to communicate needs and desires); c) identifying emotions (i.e., sadness, fear, anger, and shame) and their cognitive and physiological and behavioral components; d) using descriptions rather than judgments of the emotional reactions.

Acceptance and tolerance of emotions focused on letting negative emotions to be present, at least the time necessary for them to change. The assumption is that fighting against emotions is likely to make them even stronger. Participants had to: a) set acceptance and tolerance as goals; b) provide self-motivation to focus and prioritize acceptance and tolerance as goals; c) view emotions as allies; d) remember that they had managed challenging emotions in the past and that emotions are not permanent.

Cognitive defusion was focused on clarifying personal values and on drawing a connection between the behavioral strategies and these values. Participants had to: a) set personal aims related

to eating behaviors; b) question themselves whether these aims were congruent with emotional eating; c) find alternative activities.

The control group received general and brief information about emotions and each ER skill and strategy (emotional awareness, acceptance and tolerance and cognitive defusion) and emotional eating.

Procedure

In the first phase, participants filled in the informed consent for their participation in the study, and the self-report questionnaires. The training phase for the experimental group consisted of three weeks of emotional awareness, acceptance and tolerance skills enhancement. Three main phases were targeted for each week: 1) nonjudgmental awareness of emotions; 2) emotional acceptance and tolerance; 3) cognitive defusion. At the beginning of each week, participants received an informative material about the ability or strategy which was to be developed during the week. Participants had to complete structured exercises every day, to develop specific emotion regulation skills. In the psychoeducation condition, brief information was provided each week, on each skill/strategy without practicing the main abilities and strategies, therefore without receiving the active part of the training. Emotional eating, positive and negative affect and emotional acceptance were reassessed following the training phase (posttest). We used Google Drive forms, a web-based tool, for the pre and post-intervention self-report assessment, as well as for the daily exercises. Psychoeducational materials (a total of three materials in pdf format) were attached to an e-mail at the beginning of each of the three stages.

Data analyses

Mixed within-between ANOVA was used, with time as a within-subjects factor (two levels; pre-test and post-test) and condition as a between-subjects factor (two levels; treatment and control), in order to analyze the effect of the acceptance-based training on emotional eating, emotional acceptance, and positive and negative affect. Effect sizes of the group differences and interactions are reported by partial eta squared (η^2), whereby values up to 0.01 refer to small, 0.06 to moderate, and 0.14 to large effect sizes (Cohen, 1988).

Results

Table 1 presents means and standard deviations of the intervention and psychoeducation effects on emotional eating, positive and negative affect, and emotional acceptance, pre- and post-evaluation.

Table 1. Means and standard deviations of the treatment and psychoeducation effects on pre and post measurement of emotional eating, positive and negative affect, and emotional acceptance.

Measure	Treatment group (N=24)		Control (psychoeducation) group (N=26)	
	Pre-measurement	Post-measurement	Pre-measurement	Post-measurement
Emotional eating	45.38 (19.12)	28.46 (19.32)	44.85 (17.78)	42.46 (13.18)
Positive affect	29.79 (8.02)	31.08 (8.73)	28.81 (6.76)	30.88 (6.77)
Negative				

affect	20.5 (8.36)	28.96 (8.29)	28.38 (8.04)	27.27 (10.24)
Emotional acceptance	46.38 (10.56)	45.08 (13.05)	41.69 (11.26)	45.61 (11.51)

Effects of intervention on emotional eating

Group differences in emotional eating across the intervention and psychoeducation conditions were examined using a 2 (intervention and palcebo) x 2 (T1, T2), mixed within-between ANOVA. A significant main effect of Time, F (1, 48) = 7.15, p = .01, η^2 = .13, and a significant Time x Condition interaction effect, F (1, 48) = 4.05, p = .05, η^2 = .08 were observed. Emotional eating significantly decreased in the treatment group compared to control, $F(1,48) = 4$, p = .05, η^2 = .08.

Effects of intervention on secondary outcomes (positive, negative affect and emotional acceptance)

For positive affect, a nonsignificant main effect of Time, F (1, 48) = 1.37, p = .25, and Time x Condition interaction effect, F (1, 48) = .07, p = .79 were observed. Positive affect did not significantly change in the treatment compared to the control group F (1,48) = .14, p = .71. For negative affect, a nonsignificant main effect of Time, F (1, 48) = .55, p = .46, and Time x Condition interaction, F (1, 48)= .01, p = .91 were observed. Negative affect did not significantly change in the treatment compared to the control group F (1,48) = 1.22, p = .27. For emotional acceptance as general ability, a nonsignificant main effect of Time, F (1, 48) = .37, p = .55, and Time x Condition interaction, F (1, 48)= 1.44, p = .24 were observed. Emotional acceptance did not significantly change in the treatment compared to the control group F (1,48) = .71, p = .41.

Discussion

Acceptance-based interventions for eating- or weight-related issues represent a topic of increasing research and clinical interest. The present study provides preliminary data about the impact of an asynchronous online acceptance-based training on emotional eating, positive and negative affect and emotional acceptance compared to a psychoeducation as control condition. As we expected regarding the primary outcome, the group that received the emotion regulation training reported a decreased level of emotional eating compared to the control group. The lack of abilities and strategies such as emotional awareness and clarity, emotional acceptance and tolerance that have been shown to lead to emotional eating in previous studies (e.g., Moon &nBerenbaum, 2009), were successfully integrated into the present psychological training. The present findings confirm the efficacy of a psychological training targeting the improvement emotional awareness, acceptance and tolerance, and are consistent with previous research on mindfulness and acceptance-based interventions for emotional eating provided face-to-face (e.g., Alberts et al., 2012; Daubenmier et al., 2011; Schnepper et al., 2019). On the other hand, these results are inconsistent with one study which did not find evidence of reductions in emotional eating as an effect of a mindfulness-based intervention (Kearney et al., 2012). Overall, our results suggest that asynchronous online interventions for the improvement of emotional eating are a promising approach. The efficacy of an asynchronous online intervention was also reported in another study on body image and disordered eating (Franko et al., 2005). In which negative and positive affect are concerned, our hypotheses were not confirmed. Thus, the negative affect did not decrease and positive affect did not increase as a result of our training. One possible explanation might be the relatively small sample used in this study. Other possible explanations are related to the limitations of the affect measures we used and the duration of the training. Also, other emotion regulation strategies should be considered and

explored to reduce negative emotions associated to emotional eating. Our study also examined the effect of the intervention on positive affect associated to emotional eating. Positive affect did not increase but also did not decrease post-intervention. However, more research is required to examine the relation between positive affect and emotional eating. Finally, our hypothesis regarding emotional acceptance was not confirmed. The tendency to experience psychological distress as unacceptable did not change in our intervention group compared to the control group. A possible explanations might be the duration of the training and the size of the sample. Future research should investigate alternative strategies targeting individuals with emotional eating and examine whether there are differences in emotional eating in response to specific emotions.

Limitation and futures directions

There are several limitations of this study. First, the sample size was relatively small, and the training was of fairly short duration. Future studies should examine more elaborate internet-delivered acceptance-based trainings, in larger samples. Second, the results of the current study cannot be generalized to particular populations. The present study was conducted on a sample with emotional eating, but did not control for the presence of eating disorders, binge eating disorder in particular, but also for obesity, the most commonly associated conditions with emotional eating. Future studies should focus on individuals meeting diagnostic criteria for bulimia nervosa and binge eating disorder or with a high BMI (30 or above, indicating obesity). Futures studies should also test the mechanisms through which acceptance-based intervention can reduce emotional eating. This is an important question for future investigations, in order to understand whether changes in emotional acceptance represent a mechanism of change. Moreover, despite the strengths of the EES, PANAS and DTS, it is possible that the exclusive use self-report measure led to response biases. Using an Internet-delivered acceptance-based training presents both advantages and disadvantages. One advantage is that participants can easily complete daily acceptance and tolerance exercises using the Internet. Moreover, using a common folder with the experimenter, monitored in real time, could favor greater compliance and motivation, and better monitoring. However, the absence of face-to-face sessions has the downside of the lack of a therapeutic relationship. In sum, the present findings could stimulate future research on intervention and prevention programs which include nonjudgmental awareness, emotional acceptance and tolerance, and cognitive defusion as strategies of reducing emotional eating. Also, future studies can focus more specifically on the efficacy of acceptance-based interventions on the associated emotions linked to emotional eating.

CHAPTER IV. GENERAL DISCUSSION, IMPLICATIONS AND LIMITATIONS

General discussion

Various mechanisms are involved in the development and maintenance of eating pathology (e.g., over-evaluation of body shape or weight and control over them, rules about eating, perfectionism, low self-esteem; Fairburn et al., 2003). These mechanisms have been largely addressed in psychological interventions for eating disorders. However, despite existing treatment options, EDs are still characterized by high chronicity and relapse rates (NICE, 2004). Thus, the purpose of this thesis was to investigate the ER factors associated with ED symptomatology, as they may serve as potential treatment targets. With regards to etiology, we started from findings suggesting that high levels of negative affect prospectively increase the risk of ED and that ER is an important process involved in unhealthy eating behaviors (e.g., Macht, 2008; Sim & Zeman, 2005).

It has been demonstrated that individuals with eating disorders often experience a great deal of distress (e.g., high levels of negative affect, depression, anxiety), and display great difficulties in ER. Moreover, disordered eating behaviors themselves (e.g. restrictive, binge eating) may serve to regulate emotions (e.g., Aldao et al., 2010; Brockmeyer et al., 2014; Leehr et al., 2015; Oldershaw et al., 2015). Fundamental research and clinical trials revealed an important role of the emotion dysregulation in all EDs compared to control/healthy groups (e.g. Harrison et al., 2009; Svaldi et al., 2012). However some gaps remained in the literature and we developed the research questions of our project based on these gaps that needed to be addressed. The general aim of the thesis was to comprehensively explore the relations between general and specific difficulties in ER and eating pathology (diagnostic or specific factors such as body image and eating behaviors). We approached this general aim through four specific objectives, addressed in four studies.

Theoretical and practical implications

The Meta-analysis (Study 1) is the first study that extensively covers the relations between general and specific EDs or eating-related symptoms and ER abilities and strategies. The main implication of this study is that it points to ER abilities and adaptive strategies as relevant targets of prevention and intervention. One important contribution is the finding that poor access to adaptive ER strategies is a trans-diagnostic feature across EDs (Danner et al., 2014). Another implication refers to the importance of studying both adaptive and maladaptive ER strategies in the same sample. Exploring distinct ER strategies and the interactions of ER strategies with specific symptoms would also be important. Most important, our findings support ER models suggesting that lack of ER abilities (e.g., awareness and clarity of emotions) may limit the engagement in adaptive ER strategies (Gross & Jazaieri, 2014) and favor a maladaptive ER answer, including disordered eating behaviors (Corstorphine et al, 2006). These findings support the perspective of several major therapeutic approaches, such as acceptance-based treatments and cognitive-behavioral therapy (Baer et al., 2005; Fairburn et al., 2003), which maintain that ER abilities and strategies are important to address in order to improve eating pathology.

The second study contributes to the understanding of the effect of one of the emotions most frequently associated with disordered eating - depression. Furthermore, the study also points to the mediating role of ER in the relation between depression and disordered eating. Very few previous studies have addressed the relations between disordered eating behaviors (e.g., uncontrolled eating, emotional eating and restrained eating), depression and ER. One important finding of the study is that the relation between depression and various disordered eating behaviors is mediated by ER. This finding supports the transdiagnostic view of ER difficulties associated with all disordered eating behaviors. Thus, similar with the first study, these results point out the importance of interventions addressing dysfunctional ER to reduce disordered eating.

The third study contributes with relevant data regarding the relation of body dissatisfaction, one of the most consistent and powerful risk factors for EDs, with ER strategies. Previous studies have mainly focused on comparing adaptive with maladaptive ER strategies. Our study compares the impact of two important adaptive strategies (i.e., acceptance and reappraisal) on body dissatisfaction. Results indicate that acceptance and reappraisal are efficient ER strategies, leading to a significant decrease of body dissatisfaction. Few previous experimental studies have focused on acceptance and reappraisal as specific ER strategies in relation with body dissatisfaction. These results have not only

theoretical importance, but also implications in clinical practice. Similar to our first two studies, these results confirm the relevance of adaptive ER in eating pathology. These strategies are important treatment components relevant therapeutic interventions (e.g., CBT, ACT; Beck et al., 1979; Hayes et al., 1999). Finally, our study suggests a beneficial effect of adaptive ER strategies in the prevention of negative affect associated with body dissatisfaction.

The fourth study provides preliminary data on the efficacy of an asynchronous online acceptance–based training on emotional eating, negative and positive affect and emotional acceptance. The high number of individuals that still struggle with EDs, despite the significant improvements of psychological interventions in recent years, remains a serious issue. We focused on this behavior as it is highly relevant in the context of eating disorders, and only a few randomized trials have specifically examined emotional eating (e.g., Forman et al. 2013; Hill et al., 2015). The first important contribution of the study is that it confirms the efficacy of a psychological training targeting the development of emotional acceptance and emotional tolerance in reducing emotional eating. Second, this study confirms the promise of asynchronous online interventions for reducing disordered eating. Additionally, positive affect associated with emotional eating has not been investigated previously in studies testing the efficacy of acceptance-based interventions. However, more research is required regarding positive affect and emotional eating.

Limitations and future directions

Overall, the samples used in three of our studies include a high proportion of females and a high proportion of undergraduate students, thus participants were generally young. The high number of undergraduate students limits the generalization to the general population, and the high proportion of female precludes the generalization of our findings to males. Moreover, future studies should investigate if these results can be generalized to a sample of individuals diagnosed with EDs. Future studies examining the effect of ER strategies on eating behavior and assessing the efficacy of acceptance-based programs on specific symptoms, should involve subclinical or clinical populations, as two of our studies (Study 3 and 4) were conducted on non-clinical samples. However, the focus on specific factors such as those in this thesis (i.e., body image and emotional eating) or other relevant factors for ED (e.g., restrained eating, compensatory behaviors) is a promising approach that could lead to a better understanding of the psychological mechanisms involved in eating disorders, and to the development of effective interventions for these disorders. Moreover, looking at specific ER strategies is an important direction of future research, and studies should investigate specific ER strategies associated with specific ED symptoms, on non-clinical and clinical populations. This approach would also be beneficial due to the great heterogeneity of ER conceptualizations, which make it difficult to study ER in association with psychopathology. We used self-report measures in our studies to assess the psychological factors of interest. A strength is that only measures with good psychometric properties were used. However incorporating clinical interviews and behavioral measures might provide additional information regarding the relations that we investigated.

General conclusions

The present thesis has several theoretical and practical contributions in terms of understanding eating disorders and related factors, such as body image dissatisfaction, uncontrolled eating, emotional eating and restrained eating. The investigation of the relation between disordered

eating on the one hand, and emotion regulation and depression, on the other is important both for improving models on the risk factors for EDs, as well as for refining prevention, screening, and early intervention strategies (Goldschmidt et al. 2014). ER abilities and strategies seem to be highly relevant factors in the development and maintenance of EDs, and are also important components of acceptance- and mindfulness-based treatments addressed to patients with EDs. Body image dissatisfaction and emotional eating are important issue among women, associated with numerous negative psychological and physical health consequences, that can ultimately lead to the development and maintenance of eating disorders. Future studies should examine ER mechanism more comprehensively in order to support the development of interventions that focus on specific ER strategies, relevant for particular EDs or ED symptoms. Moreover, adaptive and maladaptive ER strategies and ER abilities should be studied in relation to specific elements of eating pathology, as this could lead to significant improvements in psychological treatments and prevention programs for EDs.

SELECTED REFERENCES

Anglé, S., Engblom, J.,Eriksson, T., Kautiainen, S., Saha, M.T., Lindfors,... Rimpelä, A. (2009). Three factor eating questionnaire-R18 as a measure of cognitive restraint, uncontrolled eating and emotional eating in a sample of young Finnish females. *International Journal of Behavioral Nutrition and Physical Activity*, *6*, 41. doi:10.1186/1479-5868-6-41.

Arnow, B., Kenardy, J., & Agras, W. S. (1995). The Emotional Eating Scale: The development of a measure to assess coping with negative affect by eating. *International Journal of Eating Disorders*, 18, 79–90.

doi:10.1002/1098108X(199507)18:1%3C79::AIDEAT2260180109%3E3.0.CO;2-V

Baer, R.A., Fischer, S. & Huss, D.B. (2005). Mindfulness and Acceptance in the Treatment of Disordered Eating. *J Rat-Emo Cognitive-Behav Ther,* 23, 281-300. https://doi.org/10.1007/s10942-005-0015-9

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). Cognitive therapy of depression. New York: Guilford Press.

*Breithaupt, L., Rallis, B., Mehlenbeck, R., Kleiman, E. (2016). Rumination and self-control interact to predict bulimic symptomatology in college students. *Eating behaviors*, 22, 1-4. doi:10.1016/j.eatbeh.2016.03.011

Burnette, C. B., Davies, A. E., Boutté, R. L., & Mazzeo, S. E. (2019). What are you losing it for Weight suppression motivations in undergraduates. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity.* doi:10.1007/s40519-018-00635-y

*Bydlowski, S., Corcos, M., Jeammet, P., Paterniti, S., Berthoz, S., Laurier, C., … Consoli, S.M. (2005). Emotion-processing deficits in eating disorders. *International Journal of Eating Disorders 37*, 321–329.

Cash, T.F., Fleming, E.C., Alindogan, J., Steadman, L., & Whitehead, A. (2002). Beyond body image as a trait: The development and validation of the Body Image States Scale. *Eating Disorders: The Journal of Treatment & Prevention*, 10(2), 103-113. DOI:10.1080/10640260290081678

Cohen, J. (1988). Statistical power analysis for the behavioral sciences, 2nd ed. Hillsdale, NJ: Erlbaum.

*Danner, U.N.,Sternheim, L., & Evers, C. (2014). The importance of distinguishing between the different eating disorders (sub)types when assessing emotion regulation strategies. *Psychiatry Research*, 215 (3), 727-732.

Dingemans, A., Danner, U., & Parks, M. (2017). Emotion Regulation in Binge Eating Disorder: A Review. *Nutrients*, 9 (11). doi: 10.3390/nu9111274.

Douglas, V., & Varnado-Sullivan, P. (2016). Weight Stigmatization, Internalization, and Eating Disorder Symptoms: The Role of Emotion Dysregulation. *Stigma and Health*. *Advance online publication.* http://dx.doi.org/10.1037/sah0000029.

Etu, S.F., & Gray, J.J. (2010). A preliminary investigation of the relationship between induced rumination and state body image dissatisfaction and anxiety. *Body Image*, 7: 82-85. http://dx.doi.org/10.1016/j.bodyim.2009.09.004

Fairburn C. G., Cooper Z., Doll H. A., O'Connor M. E., Bohn K., Hawker D. M., ... Palmer R. L. (2009). Transdiagnostic Cognitive-Behavioral Therapy for Patients With Eating Disorders:

A Two-Site Trial With 60-Week Follow-Up.American Journal of Psychiatry, 166(3), 311-319.

Fuller-Tyszkiewicz, M., Chhouk, J., McCann, L.-A., Urbina, G., Vuo, H., Krug, I., …Richardson, B. (2019). Appearance comparison and other appearance-related influences on body dissatisfaction in everyday life. *Body Image,* 28, 101–109. doi:10.1016/j.bodyim.2019.01.002

Grabe, S., Ward, L., & Shibley-Hyde, J. (2008). The role of the media in body image concerns among women: A meta-analysis of experimental and correlational studies. *Psychological Bulletin,* 134, 460 – 476. doi: 10.1037/0033-2909.134.3.460

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, 26, 41-54.

Gross, J.J. (2015). Emotion Regulation: Current Status and Future Prospects. *Psychological Inquiry*, 26(1), 1-26. doi: 10.1080/1047840X.2014.940781.

Heinicke, B.E., Paxton, S.J., McLean, S.A., Wertheim, E.H. (2007). Internet-Delivered Targeted Group Intervention for Body Dissatisfaction and Disordered Eating in Adolescent Girls: A randomized controlled trial. *J Abnorm Child Psychol,* 35, 379–391. DOI:10.1007/s10802-006-9097-9

*Harrison, A., Sullivan, S., Tchanturia, K. &Treasure, J. (2009). Emotion recognition and regulation in anorexia nervosa. *Clin. Psychol. Psychother,* 16, 348–356. doi:10.1002/cpp.628.

Harrison, A., Sullivan, S., Tchanturia, K., & Treasure, J. (2010). Emotional functioning in eating disorders: Attentional bias, emotion recognition and emotion regulation. *Psychological Medicine, 40*(11), 1887-1897. doi:10.1017/S0033291710000036

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes, and outcomes. *Behaviour Research and Therapy*, 44(1), 1–25. DOI: 10.1016/j.brat.2005.06.006

Karlsson, Persson J. L.O., Sjöström L., Sullivan M. (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. *Int J Obes Relat Metab Disord*, 1715-1725.

Khodabakhsh, M.R., Borjali, A., Sohrabi, F., Farrokhi, N. R. (2015). The Role of Emotion Regulation Difficulties as a Mediator of the Relationship between Body Image Disturbance and Disordered Eating Behavior. *Int J Pediatr, 3, 23-32.*

Lantz, E. L., Gaspar, M. E., DiTore, R., Piers, A. D., & Schaumberg, K. (2018). Conceptualizing body dissatisfaction in eating disorders within a self-discrepancy framework: a review of evidence. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity,* 23(3), 275–291.doi:10.1007/s40519-018-0483-4

*Lavender, J.M., Wonderlich, S.A., Peterson, C.B., Crosby, R.D., Engel, S.G., Mitchell, J.E., et al. (2014). Dimensions of emotion dysregulation in bulimia nervosa. *European Eating Disorders Review*, 22, 212–216. http://dx.doi.org/10.1002/erv.2288.

Margolis, S., & Orsillo, S. (2016). Acceptance and Body Dissatisfaction: Examining the Efficacy of a Brief Acceptance Based Intervention for Body Dissatisfaction in College Women. *Behavioural and Cognitive Psychotherapy,* 44(4), 482-492. doi:10.1017/S1352465816000072

Martin, A.,Winfried Rief, T., Klaiberg, A., Braehler, E. (2006). Validity of the Brief Patient Health Questionnaire Mood Scale (PHQ-9) in the general population. *General Hospital Psychiatry,*

28, 71 – 77.

National Institute for Clinical Excellence (NICE, 2004). Eating Disorders – Core Interventions in the treatment and management of anorexia nervosa, bulimia nervosa, related eating disorders. NICE Clinical Guideline No. 9. London: National Institute for Clinical Excellence.

*Naumann, E., Tuschen-Caffier, B., Voderholzer, U., Schaefer, J. & Svaldi, J. (2016). Effects of emotional acceptance and rumination on media-induced body dissatisfaction in anorexia and bulimia nervosa. *Journal of Psychiatric Research,* 82. 10.1016/j.jpsychires.2016.07.021.

*Racine, S. E., & Horvath, S. A. (2018). Emotion dysregulation across the spectrum of pathological eating: Comparisons among women with binge eating, overeating, and loss of control eating. *Eating Disorders*, 26 (1), 13-25. DOI: 10.1080/10640266.2018.1418381

*Rawal, A., Park, R. J., Williams, J. M. (2010). Rumination, experiential avoidance, and dysfunctional thinking in eating disorders. *Behaviour Research and Therapy*, 48 (9),851-859. https://doi.org/10.1016/j.brat.2010.05.009.

*Sim, L., & Zeman, J. (2006). The contribution of emotion regulation to body dissatisfaction and disordered eating in early adolescent girls. *Journal of Youth and Adolescence*, 35, 219-228.

*Svaldi, J., Griepenstroh, J., Tuschen-Caffier, B., & Ehring, T. (2012). Emotion regulation deficits in eating disorders: A marker of eating pathology or general psychopathology? *Psychiatry Research, 197(1-2), 103-111.*

*Svaldi, J., & Naumann, E. (2014). Effects of Rumination and Acceptance on Body Dissatisfaction in Binge Eating Disorder. *Eur. Eat. Disorders Rev.*, 22, 338–345. doi: 10.1002/erv.2312

Wade, T.D., George, W.M., Atkinson, M. (2009). A randomized controlled trial of brief interventions for body dissatisfaction. *J. Consult. Clin. Psych,* 77(5): 845-854. doi:10.1037/a0016879

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(6), 1063–1070. http://dx.doi.org/10.1037/0022-3514.54.6.1063

Winzelberg, A. J., Luce, K. H., & Abascal, L. B. (2004). Internet-based treatment strategies. In J.K. Thompson (Ed.), Handbook of Eating Disorders and Obesity (pp. 279–296). New Jersey: John Wiley & Sons, Inc

*Whiteside, U., Chen, E., Neighbors, C., Hunter, D., Lo, T., & Larimer, M. E. (2007). Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect? *Eating Behaviors*, 8, 162-169.

Wolgast, M., Lundh, L.G, Viborg, G. (2011). Cognitive reappraisal and acceptance: an experimental comparison of two emotion regulation strategies. *Behav Res Ther.*, 49(12), 858-66. doi: 10.1016/j.brat.2011.09.011.

Zabinski, M. F., Wilfley, D. E., Pung, M. A., Winzelberg, A. J., Eldredge, K., & Taylor, C. B. (2001). An interactive internet-based intervention for women at risk of eating disorders: A pilot study. *International Journal of Eating Disorders*, 30, 129–137.