

Emotion Regulation Difficulties and Maladaptive Behaviors: Examination of Deliberate Self-harm, Disordered Eating, and Substance Misuse in Two Samples

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Abstract Data from two studies were utilized to examine whether the co-occurrence of maladaptive behaviors thought to serve an emotion regulating function would be associated with greater emotion regulation difficulties compared to one or none of these behaviors. Study 1 included an undergraduate sample ($N = 119$; 76 % female) and Study 2 included a sample of patients receiving treatment at a residential substance abuse treatment facility ($N = 82$; 48 % female). Subgroups were created based on the presence or absence of the following maladaptive behaviors: (a) deliberate self-harm (DSH) and disordered eating (Study 1); and (b) DSH, disordered eating, and substance misuse (Study 2). Subgroup differences in mean levels of emotion regulation

difficulties (overall and six dimensions) were evaluated for each study. In Study 1, individuals who reported clinically-relevant levels of both DSH and disordered eating had more difficulties with emotion regulation (overall and three dimensions) compared to those who reported neither behavior. In Study 2, individuals who reported clinically-relevant levels of both DSH and substance misuse had more difficulties with emotion regulation (Study 2; overall and five dimensions) compared to those with only substance misuse. Overall, the results of these studies support the hypothesis that the co-occurrence of clinically-relevant maladaptive behaviors is associated with greater difficulties regulating emotions than the presence of only one maladaptive behavior (or no maladaptive behaviors). These findings suggest that clinical interventions targeting emotion regulation skills may be particularly useful for individuals who display a pattern of co-occurring maladaptive behaviors.

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Introduction

Theoretical and empirical literatures suggest that a variety of maladaptive behaviors may function to escape, avoid, or otherwise regulate aversive or unwanted emotional states (Cappell and Greeley 1987; Klonsky 2007, 2009; Lavender and Anderson 2010; Nixon et al. 2002; Thorberg and Lyvers 2010). Three widely studied maladaptive behaviors that have been posited to serve an emotion regulating function are deliberate self-harm (DSH), disordered eating, and substance misuse (e.g., Klonsky 2007; Sherwood et al. 2000). As defined here, DSH refers to the

deliberate, direct, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned (Gratz 2001); disordered eating refers to symptoms of eating disorders (e.g., binge eating, purging, excessive exercise) that may not meet the threshold necessary to warrant a diagnosis, but may nonetheless be associated with distress or impairment (Gadalla and Piran 2008; Reyes-Rodriguez et al. 2011); and substance misuse refers to the use of illicit drugs, misuse of prescribed medications, or problematic use of alcohol.

Given that DSH, disordered eating, and substance misuse commonly co-occur (e.g., Claes et al. 2010, 2012; Croyle and Waltz 2007; Harrop and Marlatt 2010; Holderness et al. 1994; Nøkleby 2012; Moller et al. 2013; Sansone and Levitt 2002), examining shared factors thought to underlie each of these behaviors (e.g., emotion regulation difficulties, impulsivity, executive functioning) may facilitate identification of shared functions or underlying mechanisms of these behaviors. Indeed, despite evidence that these behaviors may have a similar emotion-regulating function, few studies have examined their co-occurrence or associations with emotion regulation.

Co-occurrence of Maladaptive Behaviors

Co-occurrence of DSH with Disordered Eating or Substance Misuse

Within inpatient and outpatient samples of individuals with eating disorders, rates of DSH range from 25 to 45 % (Sansone and Levitt 2002)—consistent with findings of a relation between DSH and disordered eating behaviors in college students (Croyle and Waltz 2007). Likewise, research indicates that the co-occurrence of substance misuse and DSH ranges from 10 to 35 % (Evren and Evren 2008; Gratz and Tull 2010a; Lyne et al. 2011), with rates of DSH nearly double among adolescents with (vs. without) substance use disorders (Claes et al. 2012).

Co-occurrence of Disordered Eating and Substance Misuse

A recent review found that rates of co-occurring substance use disorders among individuals with eating disorders range from 8 to 43 %, and rates of co-occurring eating disorders among those with substance use disorders range from 14 to 27 % (Nøkleby 2012). Similarly, reviews by Harrop and Marlatt (2010) and Holderness et al. (1994) found the rate of co-occurrence between substance use disorders and eating disorders to range from 17 to 50 % (see also Gadalla and Piran 2007).

Co-occurrence of DSH, Disordered Eating, and Substance Misuse

Women with both substance use and eating disorders have been found to be more likely to engage in other self-destructive behaviors than women with one or neither of these disorders (Sansone et al. 1994). In addition, the co-occurrence of substance misuse and DSH in students was associated with higher rates of disordered eating (Serras et al. 2010).

Emotion Regulation Difficulties Across Maladaptive Behaviors

As defined here, emotion regulation is a multidimensional construct involving the: (a) awareness, understanding, and acceptance of emotions; (b) ability to inhibit impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions; (c) flexible use of situationally appropriate strategies to modulate the intensity or duration of emotional responses in order to meet individual goals and situational demands; and (d) willingness to experience negative emotions as part of pursuing meaningful activities in life (Gratz and Roemer 2004; see also Gratz 2007; Gratz and Tull 2010a). Individuals may exhibit difficulties in one or more of these dimensions of emotion regulation.

There is extensive support for associations between emotion regulation difficulties and engagement in maladaptive behaviors (Aldao et al. 2010; Berking and Wupperman 2012; Selby et al. 2008). When examining each of these behaviors individually, support has been provided for the role of emotion regulation difficulties in DSH (Klonsky 2007, 2009; Nixon et al. 2002), eating disorders (Anestis et al. 2007; Burton et al. 2007; Smyth et al. 2007), and substance misuse (Cappell and Greeley 1987; Thorberg and Lyvers 2010). Theoretical models posit that such behaviors may function to modify or avoid emotional experiences (Chapman et al. 2006; Corstorphine et al. 2007; Hayes et al. 1996; Polivy and Herman 1993; Khantzian 1997). Further, the avoidance of emotions has been found to be a shared factor that helps explain the associations between maladaptive behaviors (Kingston et al. 2010; see also Claes et al. 2010).

Notably, specific dimensions of emotion regulation difficulties have been found to be *differentially* associated with individual (Gratz and Roemer 2004; Lafrance Robinson et al. 2014; Weinberg and Klonsky 2009) and co-occurring (Gratz and Tull 2010b; Martin et al. 2011) maladaptive behaviors. For example, despite evidencing similar associations with many emotion regulation difficulties (e.g., lack of access to effective regulation strategies), eating disorders but not substance misuse evidenced

a significant relation to lack of emotional awareness (Weinburg and Klonsky 2009). Likewise, the co-occurrence of maladaptive behaviors (e.g., DSH and substance misuse vs. substance misuse only) has been found to be associated with higher levels of some dimensions of emotion regulation difficulties but not others (Gratz and Tull 2010b; Martin et al. 2011).

Current Investigation

Although previous research has examined both the relations between single maladaptive behaviors and emotion regulation difficulties and the co-occurrence of certain combinations of the behaviors examined here, no studies to date have concurrently investigated all three of these behaviors and their relation to emotion regulation difficulties. Data from two independent studies were used here. The first study examined emotion regulation difficulties in a nonclinical sample of undergraduates who were classified into four subgroups based on the presence or absence of DSH and disordered eating (i.e., neither behavior, disordered eating only, DSH only, and both behaviors). The second study examined emotion regulation difficulties in a clinical sample of substance use disorder patients in residential treatment. As all individuals in the second study were in treatment for substance misuse, four subgroups were created (i.e., substance misuse only, disordered eating and substance misuse, DSH and substance misuse, and all three behaviors).

We hypothesized a positive relation between emotion regulation difficulties and the co-occurrence of multiple maladaptive behaviors. Specifically, we hypothesized that this positive association would be additive in nature, such that individuals who engaged in all three maladaptive behaviors would report the highest levels of emotion regulation difficulties, followed by those who engaged in two of the behaviors, followed by those who engaged in only one of the behaviors. Additionally, an exploratory aim of this research was to identify specific dimensions of emotion regulation difficulties that may distinguish between groups.

Study 1: Undergraduate Sample

Methods

Participants

Participants were undergraduates from a mid-sized university in the Southern United States ($N = 118$; 76 % female; 54 % White, 41 % African-American; mean age = 20.9 ± 4.8 years).

Measures

DSH Participants were asked to complete the *Deliberate Self-Harm Inventory* (DSHI; Gratz 2001), a 17-item self-report measure that assesses an individual's lifetime history of DSH. Participants are asked to indicate whether they have ever engaged in 16 different forms of DSH, with an additional item asking about other forms of DSH not captured by the original 16 items. For any DSH behavior endorsed, follow-up questions assess the frequency of that particular behavior. Participants then rated the frequency on a scale from 1 to 4, where 1 was "yearly," 2 was "monthly," 3 was "weekly," and 4 was "daily." Participants were included in one of the DSH subgroups if they reported clinically-relevant DSH, defined as engaging in either multiple forms of DSH (given increasing evidence that DSH versatility, or the use of multiple forms of DSH, is associated with DSH severity and risk for future DSH; see Glenn and Klonsky 2011; Nock et al. 2006; Turner et al. 2012), or at least "monthly" use of one or more DSH behaviors. The DSHI has been found to have adequate test-retest reliability and construct, discriminant, and convergent validity among diverse college student and patient samples (Fliege et al. 2006; Gratz 2001). Internal consistency was adequate ($\alpha = .63$).

Disordered Eating Participants were asked to complete the *Bulimia Test-Revised* (BULIT-R; Thelen et al. 1991), a self-report questionnaire comprised of 28 items assessing bulimic symptoms and other disordered eating behaviors (e.g., binge eating, lack of control of eating behavior, compensatory behaviors). Participants respond on a five-point scale ranging from 1 to 5, with response options varying for each question. Higher scores indicate greater disordered eating. The BULIT-R has been validated with nonclinical college student samples as a continuous measure of eating disorder symptoms (Thelen et al. 1991). Individuals with a total score that fell 1.5 SD above the mean (i.e., a score of 75) were coded as a "1" and classified as positive for clinically-relevant disordered eating. The selected cutoff score of 75 (i.e., +1.5 SD) falls within the range found for individuals who engage in subthreshold problematic eating behaviors (i.e., purging, binge eating, subthreshold bulimia; Thelen et al. 1996), but below the level indicative of an eating disorder diagnosis (e.g., a cutoff score of 104 for a diagnosis of bulimia nervosa and an average score of 91 for EDNOS; Thelen et al. 1991, 1996). Internal consistency was excellent ($\alpha = .93$).

Emotion Regulation Difficulties Participants were asked to complete the *Difficulties in Emotion Regulation Scale* (DERS; Gratz and Roemer 2004), a 36-item self-report measure that assesses individuals' typical levels of

emotion dysregulation across six domains: nonacceptance of negative emotions, difficulties engaging in goal-directed behaviors when distressed, difficulties controlling impulsive behaviors when distressed, limited access to emotion regulation strategies perceived as effective, lack of emotional awareness, and lack of emotional clarity. Participants rate each item using a 5-point Likert-type scale (1 = *almost never*, 5 = *almost always*). The DERS has been found to demonstrate good test–retest reliability and adequate construct and predictive validity (Gratz and Roemer 2004; Gratz and Tull 2010a). Further, the DERS and its subscales have been found to be significantly associated with objective measures of emotion regulation, including behavioral (Gratz et al. 2006, 2007; Tull et al. 2010) and physiological (Vasilev et al. 2009) measures. Internal consistency was as follows: overall composite score ($\alpha = .94$), acceptance ($\alpha = .89$), goal-directed behavior ($\alpha = .88$), impulsive behavior ($\alpha = .74$), awareness ($\alpha = .79$), strategies ($\alpha = .90$), and clarity ($\alpha = .86$).

Procedure

All study procedures were reviewed and approved by the university's institutional review board. Data were collected as part of a larger project examining stressful life events, emotion-related family processes, and a variety of problematic behaviors and adjustment difficulties (e.g., DSH, disordered eating, symptoms of depression, aggressive behaviors). Potential participants were recruited from undergraduate courses and provided with online access to a list of available departmental research projects in which they could participate for course credit. Potential participants who expressed interest were contacted to schedule an individual timeslot during which information about study procedures and associated risks was provided and written informed consent was obtained. Trained graduate students or bachelors-level research assistants administered a semi-structured interview and questionnaires to each participant individually. Only questionnaire data were included in the present study.

Data Analytic Strategy

Covariates were selected by examining relations between demographic variables (i.e., age, sex, and racial/ethnic background) and both maladaptive behaviors (disordered eating behaviors and DSH) and emotion regulation difficulties (both overall and across the six dimensions). Chi square analyses were used to examine differences in DSH and disordered eating subgroup status as a function of sex. Point-biserial correlation analyses were used to examine associations between sex and continuous measures of

maladaptive behaviors and emotion regulation difficulties. Analyses of variance (ANOVAs) were used to examine differences in mean levels of maladaptive behaviors and emotion regulation difficulties as a function of racial/ethnic background. Finally, correlation analyses were used to examine associations between age and continuous measures of maladaptive behaviors and outcome variables. Only those demographic characteristics that were significantly associated with maladaptive behaviors or emotion regulation difficulties were included as covariates in primary analyses.

Analyses of covariance (ANCOVAs) or ANOVAs (if no covariates were identified) were conducted using the PROC GLM in SAS 9.1 for each of the emotion regulation difficulties (i.e., the overall score and six subscale scores). Post hoc analyses were then conducted to explore specific subgroup differences using least squares means with a Bonferroni adjustment for multiple comparisons.

Results

Preliminary Analysis

The primary goal of the analyses was to examine differences in mean levels of emotion regulation difficulties among subgroups of individuals categorized based on the presence, absence, and co-occurrence of the maladaptive behaviors of interest. Participants were given scores of “0” (i.e., does not meet criteria for clinically-relevant levels of the behavior) or “1” (i.e., meets criteria for clinically-relevant levels of the behavior) for each of the maladaptive behaviors. The criteria for classifying DSH and disordered eating as clinically-relevant (vs. not) are described in detail in the measures section.

Twenty-two percent of participants in Study 1 reported at least one instance of DSH, with 17 % reporting clinically-relevant levels of DSH (i.e., at least monthly DSH behavior or two or more forms of DSH). Cutting was the most common form of DSH (10 %), followed by severe scratching (8 %). With regard to disordered eating, 14 % of participants reported clinically-relevant levels of disordered eating behaviors (i.e., scores ≥ 1.5 SD above the sample mean). Based on their DSH and disordered eating classifications, four subgroups were created, with 77 % of participants not meeting criteria for clinically-relevant levels of either behavior, 7 % meeting criteria for clinically-relevant levels of disordered eating only, 10 % for DSH only, and 7 % for both DSH and disordered eating.

Results revealed no significant associations between demographic characteristics and either maladaptive behaviors or emotion regulation difficulties ($ps > .05$),

with one exception: age was negatively associated with difficulties in emotional clarity ($r = -.23, p < .05$). Thus, age was included as a covariate in the analysis of the emotion regulation dimension involving emotional clarity.

Descriptive data on the primary variables of interest are provided in Table 1. Correlations between continuous measures of maladaptive behaviors and emotion regulation variables are provided in Table 2.

Table 1 Comparison of participants across studies

	Study 1		Study 2	
	N	%	N	%
Participants	118		82	
Sex				
Male	28	24	42	52
Female	90	76	39	48
Ethnicity				
White	61	54	66	82.5
African American	47	41	10	12.5
Other	6	5	4	5
	Mean (SD)	Range	Mean (SD)	Range
Age	20.9 (4.8)	18–52	36.6 (11.4)	18–62
BULIT score	50.1 (17.8)	29–118	46.1 (18.0)	28–112
Forms of DSH	.5 (1.1)	0–5	.7 (1.4)	0–6
Emotion regulation	78.9 (22.6)	45–159	92.6 (24.9)	44–150
Strategies	16.6 (7.3)	8–40	19.6 (7.9)	8–36
Awareness	13.0 (4.3)	6–26	17.0 (4.9)	6–28
Goals	14.6 (5.0)	5–25	15.2 (5.4)	5–25
Clarity	10.4 (4.0)	5–25	12.1 (4.3)	5–22
Impulse	11.9 (4.0)	6–25	15.1 (5.1)	6–30
Nonacceptance	12.4 (5.6)	6–30	13.6 (5.8)	6–30

Table 2 Correlations between maladaptive behaviors and emotion regulation difficulties total and dimension scores

Measure	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Substance misuse										
2. Disordered eating	.06		.44***	.40***	.41***	-.02	.36***	.25**	.35***	.29**
3. Deliberate self-harm	.15	.27*		.40***	.42***	.10	.39***	.10	.34***	.34***
4. Emotion regulation	.18	.43***	.45***		.89***	.48***	.73***	.72***	.75***	.80***
5. ER strategies	.14	.33**	.46***	.90***		.23*	.67***	.52***	.70***	.64***
6. ER awareness	.05	.34**	.30**	.54***	.30**		.10	.54***	.18*	.26**
7. ER goals	.27*	.28*	.36**	.75***	.75***	.16		.37***	.52***	.48***
8. ER clarity	.11	.31**	.34**	.77***	.58***	.56***	.46***		.34***	.51***
9. ER impulse	.06	.28*	.32**	.76***	.70***	.24*	.57***	.45***		.56***
10. ER nonacceptance	.15	.35**	.18	.67***	.49***	.30**	.31**	.46***	.37***	

Substance misuse score is overall frequency of substance use. Disordered eating score is BULIT-R total. Deliberate self-harm score is the number of DSH behaviors. ER emotion regulation. Correlations for Study 1 are presented in the upper right; correlations for Study 2 are presented in the bottom left

*** $p < .001$; ** $p < .01$; * $p < .05$

Primary Analyses

Emotion Regulation Total Score Individuals with clinically-relevant levels of both disordered eating and DSH (but not only one of these behaviors) reported significantly greater emotion regulation difficulties than those without clinically relevant levels of either behavior, $F(3, 114) = 5.19, p < .01$ (see Fig. 1).

Dimensions of Emotion Regulation Difficulties Individuals with clinically-relevant levels of both disordered eating and DSH (but not only one of these behaviors) reported significantly greater difficulties accessing effective emotion regulation strategies than those without clinically relevant levels of either behavior, $F(3, 114) = 6.99, p < .001$ (see Fig. 2a). Similarly, individuals with clinically-relevant levels of both disordered eating and DSH (but not only one of these behaviors) reported significantly greater difficulties controlling impulsive behaviors when distressed compared to those without clinically relevant levels of either behavior, $F(3, 114) = 4.01, p < .01$ (see Fig. 2e). Both individuals with clinically-relevant levels of both disordered eating and DSH and those with clinically-relevant levels of DSH only reported significantly greater difficulties engaging in goal directed behaviors when distressed compared to individuals without clinically relevant levels of either behavior, $F(3, 114) = 6.53, p < .001$ (see Fig. 2c). Finally, individuals with clinically-relevant levels of only DSH reported significantly greater difficulties with emotional acceptance than those without clinically relevant levels of either DSH or disordered eating behaviors, $F(3, 114) = 3.98, p < .01$ (see Fig. 2f). There were no instances in which individuals who reported clinically-relevant levels of disordered eating alone differed on any emotion regulation dimension from those without clinically relevant levels of either behavior (see Table 3).

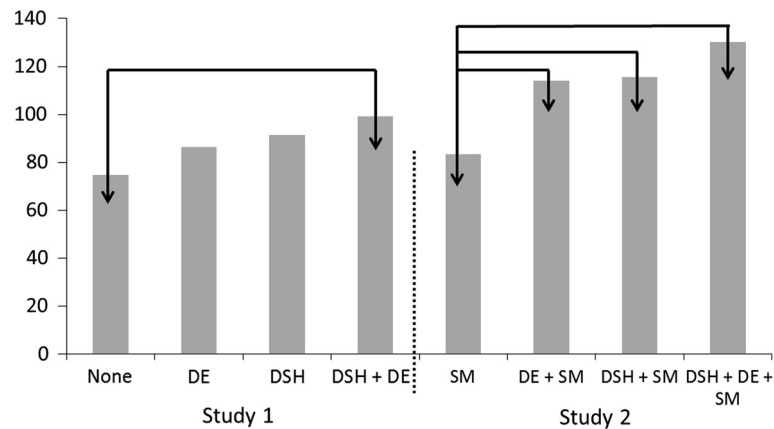


Fig. 1 Least squares means for emotion regulation difficulties total score (sum of six components shown in Fig. 2) controlling for age in Study 2. Bonferroni adjustment for multiple comparisons was applied. *DSH* deliberate self-harm, *DE* disordered eating, *SM* substance

misuse. The vertical center line indicates the boundary between study data, such that the four groups to the left were obtained in Study 1 and the four groups to the right were obtained in Study 2

Study 2: Clinical Sample

Methods

Participants

Participants in Study 2 were patients in a residential substance abuse treatment facility in central Mississippi ($N = 82$; 48 % female; 82.5 % White, 12.5 % African-American; mean age = 36.6 ± 11.4 years). Approximately one-third of the participants had a high school diploma or GED (34.1 %), another one-third had completed some college (34.1 %), the remaining participants completed college, technical, or business school (20.8 %), had not graduated high school or equivalency (8.5 %), or completed graduate school (2.4 %).

Comparison of Samples There was a significant difference in the gender composition of Studies 1 and 2 [$\chi^2(1, N = 197) = 17.90, p < .001$], with a greater proportion of females in Study 1 versus Study 2. Moreover, participants in Study 2 ($M = 36.6, SD = 11.4$) were significantly older than participants in Study 1 [$M = 20.9, SD = 4.8; t(95) = -11.63, p < .001$]. There was also a significant difference in racial/ethnic diversity across the two studies [$\chi^2(2, N = 194) = 19.25, p < .001$], with Study 1 having a more diverse sample (i.e., 54 % White) than Study 2 (i.e., 82.5 % White). Finally, with the exception of difficulties in emotional acceptance and the ability to engage in goal-directed behaviors when distressed, Study 2 participants reported significantly greater difficulties across the dimensions of emotion regulation and in overall emotion regulation compared to participants in Study 1 (see Table 1 for descriptive data on the variables of interest across both samples).

Measures

DSH DSH was assessed in Study 2 using the DSHI (the same measure used in Study 1). Study 2 asked participants to indicate the precise number of times they had engaged in each behavior. For Study 2, participants were included in one of the clinically-relevant DSH groups if they reported either (a) engaging in multiple forms of DSH, or (b) engaging in DSH at least 5 times (previously demonstrated to be a clinically-relevant cutoff for DSH; American Psychiatric Association 2013; Sansone et al. 1998; Dulit et al. 1994; Shaffer and Jacobson 2009; Zanarini et al. 2006). Internal consistency was adequate ($\alpha = .64$).

Disordered Eating Participants in Study 2 also completed the *Bulimia Test-Revised* (BULIT-R; Thelen et al. 1991), a self-report questionnaire comprised of 28 items assessing bulimic symptoms and other disordered eating behaviors (e.g., binge eating, lack of control of eating behavior, compensatory behaviors; see Study 1 Methods for additional information). Internal consistency for the clinical sample was excellent ($\alpha = .93$).

Substance Misuse Participants in Study 2 completed the *Drug Use Questionnaire* (Hien and First 1991), a 13-item self-report measure used to assess past-year frequency of alcohol and drug use. Participants indicate the frequency with which they have used each substance in the past year on a 5-point Likert-type scale ranging from 0 (*never*) to 5 (*4 or more times per week*). Responses are summed to create an overall score representing frequency of past-year substance use across a variety of substances (e.g., alcohol, cannabis, cocaine, stimulants, opiates). For the purposes of this study, the item assessing nicotine use was excluded. The DUQ is modeled after other well-established, empirically-supported measures of substance and alcohol use

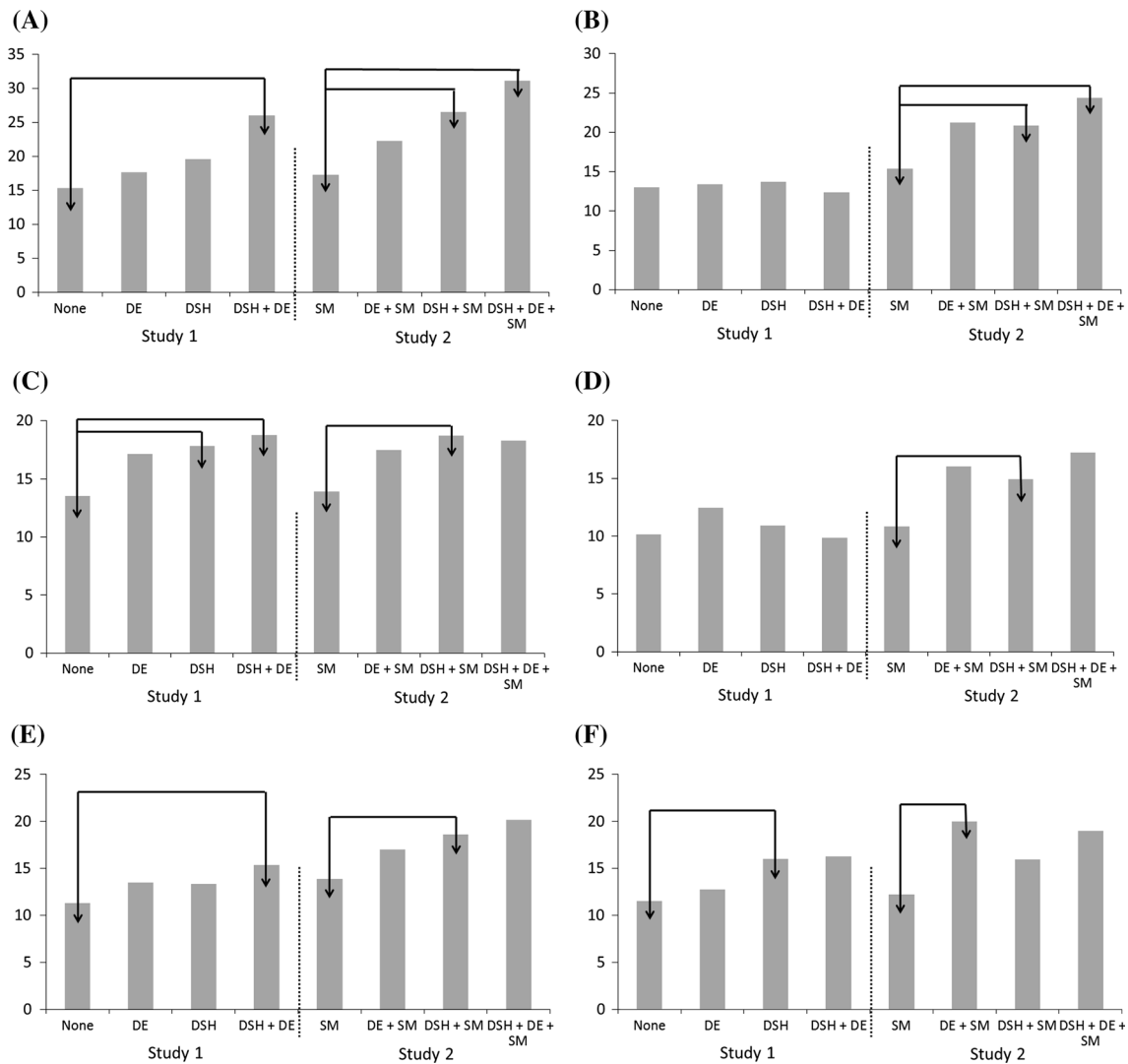


Fig. 2 Least squares means for emotion regulation dimensions controlling for age in analysis of lack of emotional clarity in Study 1 and all analyses in Study 2. Bonferroni adjustment for multiple comparisons was applied. *DSH* deliberate self-harm, *DE* disordered eating, *SM* substance misuse. The vertical center line indicates the boundary between study data, such that the four groups to the left

were obtained in Study 1 and the four groups to the right were obtained in Study 2. **a** Limited access to emotion regulation strategies, **b** lack of emotional awareness, **c** difficulties engaging in goal-directed behavior, **d** lack of emotional clarity, **e** impulse control difficulties, **f** nonacceptance of emotional responses

(e.g., Alcohol Use Disorders Identification Test; Saunders et al. 1993) and has demonstrated good convergent validity with structured interview diagnoses in associations with relevant clinical outcomes (Lejuez et al. 2007). Internal consistency was adequate ($\alpha = .64$).

Emotion Regulation Difficulties Study 2 participants also completed the *Difficulties in Emotion Regulation Scale* (DERS; see Study 1 Methods for more information). Internal consistency for the DERS and its subscales was as follows for Study 2: overall composite score ($\alpha = .93$), acceptance ($\alpha = .88$), goal-directed behavior ($\alpha = .87$), impulsive behavior ($\alpha = .68$), awareness ($\alpha = .79$), strategies ($\alpha = .89$), and clarity ($\alpha = .78$).

Procedure

All procedures were reviewed and approved by the institution's Institutional Review Board. Data for this study were collected as part of a larger ongoing study examining predictors of risk-taking and impulsive behaviors among substance use disorder patients. To be eligible for inclusion in this larger study, participants were required to have obtained a mini-mental status exam (Folstein et al. 1975) score of ≥ 24 . Eligible participants were recruited no sooner than 72 h after entry into the facility (to limit the potential interference of withdrawal symptoms on study engagement). Those who met inclusion criteria were

Table 3 Least square means and standard errors for emotion regulation difficulties across subgroups

Dependent variables	Study 1				Study 2			
	Neither <i>n</i> = 91 Mean (SE)	DE only <i>n</i> = 8 Mean (SE)	DSH only <i>n</i> = 12 Mean (SE)	DE + DSH <i>n</i> = 8 Mean (SE)	SM only <i>n</i> = 60 Mean (SE)	DE + SM <i>n</i> = 5 Mean (SE)	DSH + SM <i>n</i> = 15 Mean (SE)	DE + DSH + SM <i>n</i> = 2 Mean (SE)
Total ER difficulties	74.71 (2.26)	86.38 (7.58)	91.50 (6.19)	99.00 ^a (7.58)	83.43 (2.73)	114.06 ^b (10.41)	115.55 ^b (5.49)	130.13 ^b (14.92)
Strategies	15.27 (.72)	17.63 (2.42)	19.58 (1.98)	26.00 ^a (2.42)	17.24 (.92)	22.25 (3.50)	26.52 ^b (1.85)	31.12 ^b (5.02)
Awareness	12.99 (.46)	13.36 (1.54)	13.67 (1.26)	12.38 (1.54)	15.35 (.56)	21.27 (2.19)	20.85 ^b (1.15)	24.36 ^b (3.14)
Goals	13.51 (.49)	17.13 (1.64)	17.83 ^a (1.34)	18.75 ^a (1.64)	13.91 (.67)	17.49 (2.55)	18.72 ^b (1.34)	18.31 (3.65)
Clarity	10.17 (.42)	12.44 (1.40)	10.90 (1.14)	9.86 (1.40)	10.84 (.52)	16.02 (1.97)	14.92 ^b (1.04)	17.21 (2.83)
Impulse control	11.28 (.40)	13.50 (1.35)	13.33 (1.11)	15.38 ^a (1.35)	13.88 (.64)	17.00 (2.45)	18.59 ^b (1.29)	20.13 (3.51)
Nonacceptance	11.52 (.57)	12.75 (1.90)	16.00 ^a (1.55)	16.25 (1.90)	12.22 (.69)	20.01 ^b (2.64)	15.95 (1.39)	18.99 (3.79)

Least square means are shown. Significant differences at $p < .05$ are indicated with superscript letters

DE disordered eating, DSH deliberate self harm, SM substance misuse, ER Emotion regulation

^a Different than none

^b Different than SM only

provided with information about study procedures and associated risks. After providing written informed consent, participants completed a series of interviews and self-report questionnaires. Participants were not provided with compensation for their involvement in Study 2.

Data Analytic Strategy

Analyses in Study 2 were comparable to those used in Study 1. First, preliminary analyses explored the impact of demographic characteristics on maladaptive behaviors and emotion regulation difficulties to identify potential covariates. Next, ANCOVAs or ANOVAs (if no covariates were identified) were conducted using the PROC GLM in SAS 9.1 for each of the emotion regulation difficulties (i.e., the overall score and six subscale scores), with post hoc analyses exploring specific subgroup differences using least squares means with a Bonferroni adjustment for multiple comparisons.

Results

Preliminary Results

As described for Study 1, participants in Study 2 were given scores of “0” (i.e., does not meet criteria for clinically-

relevant levels of the behavior) or “1” (i.e., meets criteria for clinically-relevant levels of the behavior) for each of three maladaptive behaviors. Participation in a residential treatment program for substance use disorders was considered indicative of clinically-relevant substance misuse; thus, all participants in Study 2 received a “1” for substance misuse.

Thirty-five percent of participants in Study 2 reported at least one instance of DSH, with 21 % reporting clinically-relevant levels of DSH (i.e., at least 5 instances or two forms of DSH). Cutting was the most common form of DSH reported (20 %), followed by carving (9 %). Five percent of participants endorsed clinically-relevant levels of disordered eating (i.e., ≥ 1.5 SD above the sample mean). In terms of substance use, 6 % of individuals reported past-year use of only one substance, 57 % reported past-year use of 2–5 substances, and 37 % reported past-year use of more than five substances. The most commonly used substances were alcohol (91 %), marijuana (70 %), and cocaine (55 %). Based on the previously-described cutoffs for clinically-relevant levels of all three maladaptive behaviors, four subgroups were created within this sample, with 73 % meeting criteria for clinically-relevant levels of substance misuse only, 6 % for clinically-relevant levels of both substance misuse and disordered eating, 18 % for both substance misuse and DSH, and 2 % for all three behaviors.

Neither gender nor racial/ethnic background was significantly associated with any of the variables of interest (i.e., maladaptive behaviors or emotion regulation difficulties). However, results revealed significant negative associations between age and past-year frequency of substance use ($r = -.25$, $p < .05$), frequency of DSH ($r = -.30$, $p > .01$), and number of DSH behaviors ($r = -.24$, $p < .05$). Thus, age was included as a covariate in all primary analyses in Study 2.

Correlations between continuous measures of maladaptive behaviors and emotion regulation variables are provided in Table 2.

Primary Analyses

Emotion Regulation Difficulties Total Score Individuals with clinically-relevant levels of both two co-occurring behaviors (i.e., disordered eating + substance misuse and DSH + substance misuse) and all three co-occurring behaviors reported significantly greater emotion regulation difficulties than those with only substance misuse, $F(4, 75) = 9.54$, $p < .001$ (see Fig. 1).

Dimensions of Emotion Regulation Difficulties Individuals with clinically-relevant levels of all three behaviors and those with clinically relevant levels of both DSH and SM reported greater difficulties accessing effective emotion regulation strategies when upset [$F(4, 75) = 6.74$, $p < .001$ (see Fig. 2a)], as well as greater difficulties with emotional awareness [$F(4, 75) = 6.86$, $p < .001$ (see Fig. 2b)], than individuals with only substance misuse. Individuals with clinically-relevant levels of both DSH and SM also reported significantly greater difficulties in the emotion regulation dimensions involving emotional clarity [$F(4, 75) = 4.92$, $p < .01$ (see Fig. 2d)], the ability to engage in goal-directed behaviors when distressed [$F(4, 75) = 3.29$, $p < .05$ (see Fig. 2c)], and the control of impulsive behaviors when distressed [$F(4, 75) = 3.40$, $p < .01$ (see Fig. 2e)] compared to those with only substance misuse. Individuals with clinically-relevant levels of both disordered eating and substance misuse reported greater difficulties with emotional acceptance [$F(4, 75) = 3.56$, $p < .01$ (see Fig. 2f)] than those with only substance misuse.

Discussion

Results of the current research revealed that (a) greater emotion regulation difficulties were associated with co-occurrence of maladaptive behaviors and (b) these associations differed across dimensions of emotion regulation. Within the nonclinical sample in Study 1, results revealed multiple instances in which individuals who reported

clinically relevant levels of both DSH and disordered eating (or, in fewer instances, DSH only) reported greater emotion regulation difficulties than individuals without clinically-relevant levels of either of these behaviors. Notably, there were no instances in which individuals with clinically-relevant levels of only disordered eating reported greater emotion regulation difficulties than individuals without clinically-relevant levels of either DSH or disordered eating. Moreover, there was no evidence of significant differences in emotion regulation difficulties when comparing individuals with single maladaptive behaviors (i.e., disordered eating compared to DSH).

In Study 2, there were multiple instances in which individuals who reported clinically-relevant levels of two or three maladaptive behaviors (i.e., DSH or disordered eating, in addition to substance misuse) reported significantly greater emotion regulation difficulties than individuals with substance misuse alone. However, results revealed no significant differences between individuals with all three maladaptive behaviors and those with only two maladaptive behaviors (i.e., DSH or disordered eating in addition to substance misuse). Moreover, consistent with the results of Study 1, there were also no significant differences in emotion regulation difficulties when comparing individuals with two maladaptive behaviors. This pattern of findings supports our hypothesis that the co-occurrence of clinically-relevant maladaptive behaviors is associated with greater difficulties regulating emotions than the presence of only one maladaptive behavior (or no maladaptive behaviors). It is possible that individuals with greater difficulties regulating emotions may turn to a variety of maladaptive behaviors in an effort to try to escape or eliminate unwanted emotional experiences. Although the use of these behaviors may initially result in reduced distress (thereby negatively reinforcing these behaviors), the chronic use of maladaptive behaviors to avoid emotional distress may have paradoxical effects, resulting in increased distress and dysregulation in the long-term (Hayes et al. 1996).

Beyond emphasizing the importance of co-occurring maladaptive behaviors in general, findings highlight the particular importance of co-occurring DSH and substance misuse for levels of emotion regulation difficulties. First, the co-occurrence of clinically-relevant levels of DSH and substance misuse was repeatedly associated with greater emotion regulation difficulties (overall and across five of the six emotion regulation dimensions), compared to the difficulties reported by individuals with clinically-relevant levels of substance misuse alone. These findings are consistent with past research indicating greater difficulties accessing emotion regulation strategies and controlling impulsive behaviors when distressed among individuals with co-occurring DSH and substance misuse (vs.

substance misuse alone; see Gratz and Tull 2010b; Martin et al. 2011). Conversely, findings suggest that the co-occurrence of disordered eating with substance misuse is associated with difficulties in emotional acceptance in particular (a dimension of emotion regulation that was not associated with co-occurring DSH and substance misuse). The relevance of emotional nonacceptance to the co-occurrence of substance use with disordered eating in particular is consistent with past research indicating that emotional avoidance accounts for the association between other forms of psychopathology (e.g., anxiety and depression) and eating disorder symptoms (Wildes et al. 2010).

Limitations and Future Directions

Findings should be interpreted in light of several limitations. First, the relatively small sample sizes in each of the studies, particularly for some of the subgroups, may have limited our statistical power and ability to detect between-group differences (particularly those associated with a small effect size). Replication of these findings in larger samples is therefore needed.

Additionally, the use of two distinct (and demographically different) samples, along with the absence of a measure of substance misuse in Study 1, precludes cross-study comparisons examining differences in emotion regulation difficulties as a function of the presence and co-occurrence of all possible combinations of maladaptive behaviors (vs. none of these behaviors). Given the mean levels of emotion regulation difficulties observed within the various subgroups across samples (which suggest increasing emotion regulation difficulties as a function of a greater number of co-occurring maladaptive behaviors), results of analyses examining differences in emotion regulation difficulties across individuals with three, two, one, or none of these behaviors would likely produce interesting and informative results. Future research is needed to examine this question.

Furthermore, although there is utility in examining subthreshold maladaptive behaviors (Harrop and Marlatt 2010), the current study did not include diagnostic interviews of eating disorders or nonsuicidal self-injury disorder; thus, it is unclear to what extent the current findings would apply to relevant full-threshold clinical samples. Assessment methods other than self-report questionnaires may also reduce reporting bias. Moreover, the measures used here assessed current disordered eating and lifetime DSH; thus, the extent to which these behaviors co-occurred in the past versus at the time of the studies is unclear. Future studies may benefit from examining the timeline of the development of these maladaptive behaviors. In particular, determining current versus lifetime co-occurrence would help clarify the extent to which individuals display multiple maladaptive behaviors with emotion regulating

functions simultaneously, as well as address the possibility that certain behaviors may precede and/or contribute to the onset of others. Furthermore, longitudinal studies would elucidate how levels of emotion regulation difficulties change with the onset and discontinuation of these maladaptive behaviors.

It also warrants mention that differences in emotion regulation across the specific groups examined here may have been influenced by factors that were not measured, such as co-occurring disorders. For example, individuals with borderline personality disorder exhibit heightened levels of both emotion regulation difficulties and the maladaptive behaviors examined here (Dobbs 2011; Linehan 1993). Thus, future studies would benefit from taking into account the potential role of borderline personality disorder and other disorders characterized by elevated emotion regulation difficulties and maladaptive behaviors (e.g., posttraumatic stress disorder; Boden et al. 2013). Finally, this study focused exclusively on intrapersonal emotion regulation in relation to the maladaptive behaviors of interest. However, given increasing interest in interpersonal emotion regulation and its theorized relevance to mood and anxiety disorders (Hofmann 2014; Zaki and Williams 2013), future research should examine the relation of interpersonal emotion regulation to these maladaptive behaviors, as well as the relative and unique contributions of both intrapersonal and interpersonal emotion regulation processes to various maladaptive behaviors. Such research has the potential to extend extant research on the role of emotion regulation difficulties in maladaptive behaviors and elucidate the precise difficulties most relevant to specific behaviors.

Implications

The co-occurrence of maladaptive behaviors has been found to be associated with worse prognosis and greater clinical severity and functional impairment (Fichter et al. 1994; Harrop and Marlatt 2010; Lacey and Evans 1986; Lavania et al. 2012). Thus, research elucidating the underlying mechanisms of these co-occurring behaviors has important treatment implications. Given evidence that emotion regulation difficulties may be a shared risk and/or maintenance factor across multiple forms of maladaptive behaviors and psychiatric disorders, treatments developed to target emotion regulation (e.g., dialectical behavior therapy and emotion regulation group therapy; see Linehan 1993; Gratz et al. 2014) may be particularly beneficial for individuals with multiple maladaptive behaviors (see Courbasson et al. 2012; Gratz and Tull 2011; Gratz et al. 2014; Linehan et al. 2006). Future studies will be needed to further examine the efficacy of interventions addressing emotion regulation and related factors in the treatment of co-occurring maladaptive behaviors.

Conflict of Interest Kelly E. Buckholdt, Gilbert R. Parra, Michael D. Anestis, Jason M. Lavender, Lisa E. Jobe-Shields, Matthew T. Tull, and Kim L. Gratz declare that they have no conflicts of interest. Procedures were reviewed and approved by the Institutional Review Boards at the University of Memphis (Study 1), the University of Mississippi Medical Center (Study 2), and Mississippi State Hospital (Study 2).

Informed Consent All procedures followed were in accordance with the ethical standards of the aforementioned committees. Informed consent was obtained from all individual subjects participating in the study, prior to completion of study measures.

Animal Rights No animal studies were carried out by the authors for this article.

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