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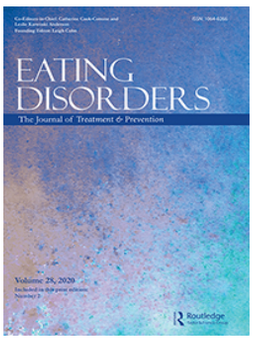

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Correlates of co-occurring eating disorders and substance use disorders: a case for dialectical behavior therapy

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ABSTRACT

Given the high rates of comorbidity between eating disorders (EDs) and substance use disorders (SUDs), it is important to develop effective treatment approaches for individuals with both an ED and SUD (ED-SUD). To date, there is limited information guiding the concurrent treatment of these disorders. To build on existing research, the present study compared adult patients with ED-SUD ($n = 36$) to patients with ED-only ($n = 62$) in terms of demographics, psychiatric comorbidity, and self-reported eating disorder and related psychopathology. Results indicated that ED-SUD patients had a higher number of psychiatric comorbidities, were more likely to be prescribed mood stabilizers, and were more sensitive to reward. They also reported greater difficulty with emotion regulation, including more difficulty engaging in goal-directed activity, higher impulsivity, and more limited access to emotion regulation strategies. These differences highlight the importance of targeting emotion dysregulation for ED-SUD, and provide evidence for the importance of integrated, transdiagnostic treatment to simultaneously address the SUD, ED, and other psychiatric comorbidities. Implications for tailoring treatment are discussed with a focus on Dialectical Behavior Therapy (DBT).

Clinical implications

- Compared to patients with only an eating disorder, those with both an eating disorder and substance use disorder had a higher number of psychiatric comorbidities, were more likely to be prescribed mood stabilizers, and were more sensitive to reward.
- Eating disorder and substance use disorder patients also reported greater difficulty with emotion regulation, including more difficulty engaging in goal directed activity, higher impulsivity, and more limited access to emotion regulation strategies.

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- These findings highlight the importance of targeting emotion dysregulation for ED-SUD, and provide evidence for the importance of addressing substance use, eating behaviors, and other psychiatric comorbidities with an integrated, transdiagnostic treatment approach such as Dialectical Behavior Therapy.

Substance use disorders (SUDs) and eating disorders (EDs) commonly co-occur (CASA, 2003). Indeed, a recent meta-analysis indicated that among those with ED, the lifetime prevalence rate of a comorbid SUD was 21.9% (Bahji et al., 2019). Tobacco, caffeine, and alcohol are reported as the most prevalent SUDs for individuals with EDs (Bahji et al., 2019). Sedatives, cannabis, stimulants, and over-the-counter products such as laxatives, diuretics, and diet pills are also commonly abused (Fouladi et al., 2015; Roerig et al., 2003; Steffen et al., 2007). Research suggests that ED patients with co-occurring SUDs experience lower rates of treatment response, higher relapse rates, more severe medical complications, greater impairment, poorer long-term outcome, and are at higher risk of early mortality (Glasner-Edwards et al., 2011; Harrop & Marlatt, 2010; Keel et al., 1999; Lindblad et al., 2016).

Given the high-risk nature of individuals with co-occurring EDs and SUDs (ED-SUD), and poor outcomes associated with their treatment, it is important to identify whether effective treatment interventions for this population. A major barrier to identifying treatment targets for ED-SUD is the paucity of research comprehensively characterizing the treatment-seeking ED-SUD patient population. Below, we outline the existing literature characterizing ED-SUD and associated features.

Severity of illness and psychiatric comorbidity

Separately, EDs and SUDs have the highest and second-highest mortality rates of all psychological disorders (Harris & Barraclough, 1998; Preti et al., 2009). Both EDs and SUDs often present with comorbid mood disorders, anxiety disorders, posttraumatic stress disorder (PTSD), and borderline personality disorder (BPD; Blinder et al., 2006; Compton et al., 2007; Courbasson et al., 2005; Pennay et al., 2011). Becker and Grilo (2015) found that among patients with binge eating disorder (BED), those with both mood and substance use disorders had the most severe ED symptoms, and higher rates of personality disorders. In a retrospective chart review, Kirkpatrick et al. (2019) found that for adolescents with ED, those with comorbid SUD had higher rates of self-harm and purging, and had a higher BMI at intake. Finally, a small study of an inpatient sample showed that those with ED-SUD were more likely to be diagnosed with a Cluster B personality disorder compared with those with ED alone (Grilo et al., 1995).

ED Diagnosis. Several studies have investigated whether co-occurring SUD is more common in anorexia nervosa-restricting type (AN-R), anorexia nervosa-

binge-purge type (AN-BP), or bulimia nervosa (BN). Theoretically, it is believed that binge-purge behaviors are more closely linked to substance abuse, as there is evidence for an increased association between these behaviors and impulsivity and emotion regulation difficulties (e.g., Kober, 2014; Lavender et al., 2015). One large study found that within ED patients, BN, and AN-BP patients had the highest prevalence of comorbid substance use, whereas AN-R participants generally had the lowest (Krug et al., 2009). Root et al. (2010) found that across eating disorder groups, the BN and AN-BP groups were more likely to report alcohol abuse and diet pill use relative to the AN group, and the AN-BP group was more likely than the AN-R group to have alcohol abuse, use diet pills, stimulants, and engage in polysubstance abuse. Along the same lines, Fouladi et al. (2015) found patients with BN used substances with higher frequencies compared to patients with AN-R, BED, and EDNOS, and those with AN-BP were more likely to use substances than those with AN-R. Moreover, higher frequencies of binge eating and purging were associated with higher frequencies of substance use. Finally, a meta-analysis on this topic by Bahji et al. (2019) revealed that prevalence rates of SUD were significantly higher among individuals with binge-purge behaviors than those with only restrictive behaviors.

Temperament and emotion dysregulation

Temperament (reward sensitivity, impulsivity, novelty seeking) and underlying emotion regulation difficulties serve as common risk and maintenance factors for EDs and SUDs. Recent research provides compelling support for theories of emotion regulation to explain the co-occurrence of disordered eating and substance abuse (e.g., Dir et al., 2013). Specifically, these theories posit that individuals engage in these maladaptive coping strategies to alleviate negative affect (Anestis et al., 2009). In support of this, existing findings indicate that affective instability, impulsivity, negative urgency, and novelty seeking are common in individuals with EDs who engage in substance abuse (e.g., Dawe & Loxton, 2004; Fischer et al., 2012). For example, a study investigating temperament found that binge eating was associated with increased impulsivity and risky decision-making (Mobbs et al., 2011). Similarly, in a study of undergraduate men and women, researchers found that negative urgency, a component of emotion dysregulation that includes the tendency to act rashly when distressed, was significantly associated with problematic alcohol use and disordered eating (Dir et al., 2013). Finally, Loxton and Dawe (2001) found that adolescent girls who abused alcohol and engaged in disordered eating were more sensitive to reward than adolescent girls who did not engage in any of these behaviors.

Overall, extant literature highlights the complex nature of ED-SUD presentations. Thus, traditional treatment programs have targeted EDs and SUDs sequentially. However, interest in integrated treatment approaches

has grown (Dennis et al., 2014), and research indicates that patients who do not receive integrated treatment have poorer treatment outcomes (e.g., Drake et al., 2001). Nevertheless, there is limited research on what such an integrated approach should optimally target, and there is no consensus in the field about the best treatment modality for the ED-SUD population.

One potentially promising intervention for ED-SUD is Dialectical Behavior Therapy (DBT), which is a treatment based on an emotion regulation model (Neacsiu et al., 2014). In DBT, psychoeducation on this model is provided, and patients are encouraged to accept and learn to tolerate their emotional experiences, while also learning alternative methods of coping with their emotions. DBT is a well-established treatment for individuals with multiple and severe psychological disorders (Linehan, 1993), and has been adapted for use with EDs (Safer et al., 2001; Telch et al., 2001). Its further adaptation and testing for individuals with co-occurring SUDs and BPD (Dimeff & Linehan, 2008) support its use to target multiple problem areas in an integrated manner. Only one study has investigated the application of DBT for co-occurring EDs and substance use. Findings from this study are promising, suggesting that integrated DBT for ED-SUD treatment is associated with decreased substance use severity and frequency, decreased emotional eating, and increased levels of confidence in ability to resist urges for substance use (Courbasson et al., 2012). Given the limited research on DBT for ED-SUD, a better understanding of factors associated with ED-SUD compared to ED or SUD alone may be helpful in identifying potential treatment targets to address both disorders simultaneously.

The impetus for the current study was to add to this limited literature by reproducing previous research findings in a treatment-seeking ED population and discussing how these empirical findings can guide treatment recommendations for ED-SUD. Consequently, the present study examined differences between patients with EDs only to patients with ED-SUD on demographics, psychiatric comorbidity, and self-reported eating disorder and related psychopathology. Given previous research findings, we hypothesized that individuals with ED-SUD would be more likely than ED only to engage in binge eating/purging, and to have a bulimic-spectrum eating disorder, BPD symptoms, higher rates of psychiatric comorbidities, self-harm, and suicidality, greater difficulties with emotion regulation, and more reward sensitivity.

Methods

Participants & procedures

Participants were 98 adult patients admitted to a partial hospital program for EDs between August 2016 and November 2018. Participants completed clinical interviews and survey measures within 14 days of treatment admission. Eating disorder and comorbidities were diagnosed using either the Mini Neuropsychiatric Interview (MINI; Sheehan et al., 1998) or the Structured

Clinical Interview for DSM-5 Disorder (SCID-5; First et al., 2015) administered by trained, bachelor's-level research assistants. Suicidality risk was assessed using the MINI suicidality module. Thirty-six patients were diagnosed with a SUD. Of those, 19.4% were diagnosed with an alcohol use disorder (n = 19) and 25.5% were diagnosed with a non-alcohol SUD (n = 25). Of the 25 patients with a non-alcohol SUD, 20% had a sedative-hypnotic-anxiolytic use disorder (n = 5), 52% had a cannabis use disorder (n = 13), 20% had a stimulant use disorder (n = 5), 8% had an opioid use disorder (n = 2), and 4% had a hallucinogen use disorder (n = 4).

Measures

Eating Disorder Symptoms were assessed using the Eating Disorder Examination–Questionnaire (EDE-Q; Fairburn & Beglin, 1994). The Global score was used to assess eating disorder symptoms during the previous 28 days. Internal consistency for the EDE-Q Global score in the present study was excellent (α =.96).

Trait Anxiety was assessed using the self-report State-Trait Anxiety Inventory—Trait Subscale (STAI-T; Spielberger et al., 1970). Items (e.g., "I feel pleasant") are rated on a 4-point scale reflecting how often participants generally feel, and are scored so that higher scores reflect higher anxiety. Internal consistency for the STAI-T subscale was α = .90.

Depressive symptoms were assessed using the Beck Depression Inventory (BDI-II; Beck et al., 1996). The BDI-II includes 21-item self-report items to evaluate the severity of depressive symptoms on a 4-point scale, with higher scores indicating greater depression. Internal consistency within the present sample was excellent (α = .93).

Emotion Regulation Difficulties were assessed using the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a 36-item self-report questionnaire that includes six subscales: Nonacceptance of Emotional Responses (Nonacceptance), Difficulties Engaging in Goal-Directed Behaviors (Goals), Impulse Control Difficulties (Impulse), Lack of Emotional Awareness (Awareness), Limited Access to Emotion Regulation Strategies (Strategies), and Lack of Emotional Clarity (Clarity). Items (e.g., "I experience my emotions as overwhelming and out of control") are rated on a 5-point scale (1 = almost never to 5 = almost always). The internal consistency of the DERS and its subscales ranged from good to excellent in the present sample (Total α = .95, Nonacceptance α = .91, Goals α = .89, Impulse α = .89, Awareness α = .86, Strategies α = .91, Clarity α = .85).

Sensitivity to Punishment/Reward was assessed using the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (SPSRQ; Torrubia et al., 2001). The SPSRQ includes 44 items assessing sensitivity to punishment (e.g., "Are you often afraid of new or unexpected situations?") and reward (e.g., "Does

the good prospect of obtaining money motivate you strongly to do some things?") and has demonstrated strong psychometric properties (Torrubia et al., 2001). Internal consistency within the present sample was excellent for the reward (α = .82) and punishment subscales (α = .88)

Borderline Personality Disorder Symptoms were assessed using the Borderline Evaluation of Severity over Time (BEST; Pfohl et al., 2009). BEST is a 15-item, self-report the measure of past-month BPD symptom severity and has demonstrated adequate psychometric properties (Pfohl et al., 2009). Items (e.g., "feelings of emptiness") are rated on a 5-point scale based on the level of distress/impairment (1 = none/slight to 5 = extreme). Internal consistency in the present sample was acceptable (α = .76).

Data analyses

Participants with ED only and ED-SUD were compared on demographic variables, comorbidities, psychotropic medications, and self-report measures at treatment admission. Categorical variables were compared using chi-square analyses and continuous variables were compared using one-way analyses of variance. To control for multiple comparisons, the threshold for significance was set at $p = .01$. Values below the threshold of $p < .05$ are discussed as trends, given the exploratory nature of the analyses and limited data on this topic to date.

Results

Table 1 presents demographic differences between ED and ED-SUD patients. There were no significant differences in age, BMI, length of illness, history of previous treatment, gender, ethnicity, diagnosis, or engagement in purging behaviors between groups, and only trend-level differences in racial background and the likelihood of engaging in objective binge eating episodes.

Table 2 presents differences in comorbidity and psychotropic medication use at admission between ED and ED-SUD patients. ED-SUD patients had a significantly greater number of psychiatric comorbidities and were more likely to be taking a mood stabilizer at treatment admission compared to ED patients. There was a trend towards ED-SUD patients being more likely to be diagnosed with panic disorder and posttraumatic stress disorder compared to ED patients.

Table 3 presents the differences between ED and ED-SUD patients on self-reported measures of eating disorder and related psychopathology. ED-SUD patients had higher scores on multiple subscales of the DERS—DERS Goals, DERS Impulse, and DERS Strategies—compared to ED patients. Additionally, ED-SUD patients reported significantly greater SPSRQ-Reward scores than those without a SUD. There was a trend towards individuals with a SUD reporting greater STAI-Trait, DERS Total, and SPSRQ-Punishment scores.

Table 1. Comparing patients with and without alcohol or substance use disorders on demographics.

Variable	SUD (n = 36) M(SD)/n(%)	No SUD (n = 62) M(SD)/n(%)	F/x	p
Age	25.49 (6.63)	24.082 (6.21)	1.12	.29
Admit BMI	20.78 (3.33)	21.01 (5.13)	0.06	.81
Length of Illness	10.88 (7.00)	9.25 (7.93)	1.02	.32
Previous ED treatment	20 (55.6)	43 (69.4)	1.89	.17
Gender			0.95	.62
Female	30 (83.3)	55 (90.2)		
Male	5 (13.9)	5 (8.2)		
Genderqueer/Non-conforming/Non-binary	1 (2.8)	1 (1.6)		
Race			10.91	.03
Caucasian	31 (86.1)	50 (83.3)		
Asian	3 (8.3)	3 (5.0)		
African American	0 (0.0)	2 (3.3)		
Native American/Alaskan Native	2 (5.6)	0 (0.0)		
Other	0 (0.0)	5 (8.3)		
Ethnicity			2.14	.14
Hispanic	2 (5.6)	11 (18.3)		
Non-Hispanic	34 (94.4)	49 (81.6)		
Diagnosis			5.38	.25
Anorexia Nervosa—Restricting	11 (30.6)	22 (35.5)		
Anorexia Nervosa—Binge/Purge	4 (11.1)	8 (12.9)		
Bulimia Nervosa	13 (36.1)	10 (16.1)		
Avoidant Restrictive Food Intake Disorder	1 (2.8)	2 (3.2)		
Other Specified Feeding or Eating Disorder	7 (19.4)	20 (32.3)		
Eating Disorder Behaviors Endorsed				
Objective Binge Episodes	18 (50.0)	17 (27.4)	5.06	.03
Purging	19 (52.8)	30 (48.4)	0.18	.68

Note. SUD = Alcohol or Substance Use Disorder; BMI = Body Mass Index

Discussion

The present study sought to describe differences between ED patients with and without a SUD at treatment admission. Results demonstrated that ED-SUD patients reported a greater number of comorbid psychiatric diagnoses and were more likely to be prescribed mood stabilizers. They also reported greater difficulty engaging in goal-directed activity, higher impulsivity, more limited access to emotion regulation strategies, and higher reward sensitivity. There were trend-level differences suggesting that individuals with ED-SUD were more likely to engage in objective binge episodes, be diagnosed with panic disorder and posttraumatic stress disorder, and to report higher trait anxiety, global emotion dysregulation, and sensitivity to punishment.

Results are largely consistent with our hypotheses and previous research demonstrating higher rates of psychiatric comorbidity (Compton et al., 2007), emotion regulation difficulties, and reward sensitivity (Loxton & Dawe, 2001) in ED-SUD samples. Partially consistent with previous research (e.g., Bahji et al., 2019), our results suggested a trend towards a higher frequency of binge eating

Table 2. Comparing patients with and without alcohol or substance use disorders on comorbidity.

Variable	SUD (n = 36*) M(SD)/n(%)	No SUD (n = 62) M(SD)/n(%)	F/x	p
Comorbid Diagnoses				
Number of Comorbidities	**2.56 (1.70)**	**1.52 (1.36)**	**11.02**	**.001**
Major Depressive Disorder, Current	21 (58.3)	24 (38.7)	3.53	.06
Bipolar Disorder I or II, Current	3 (8.3)	2 (3.2)	1.23	.27
Panic Disorder, Current	11 (30.6)	7 (11.3)	5.64	.02
Agoraphobia, Current	5 (13.9)	4 (6.5)	1.51	.22
Social Anxiety Disorder, Current	13 (36.1)	16 (25.8)	1.16	.28
Specific Phobia, Current	1 (2.8)	2 (3.2)	0.02	.90
Generalized Anxiety Disorder, Current	17 (47.2)	22 (35.5)	1.31	.25
Obsessive Compulsive Disorder, Current	9 (25.0)	7 (11.3)	3.38	.07
Posttraumatic Stress Disorder, Current	12 (33.3)	8 (12.9)	5.85	.02
Alcohol Use Disorder, Current	19 (52.8)	–		
Substance Use Disorder, Current	25 (69.4)	–		
Suicidality/Self-Harm				
Suicidality Risk			6.76	.08
Low	6 (16.7)	11 (17.7)		
Moderate	2 (5.6)	8 (12.9)		
High	20 (55.6)	19 (30.6)		
Past Suicide Attempt	7 (19.4)	13 (21.0)	0.03	.86
Current Self-Harm	2 (5.6)	3 (4.8)	0.02	.88
Medication at Admission				
Antidepressant Medication	20 (60.0)	38 (70.3)	0.88	.35
Atypical Antipsychotics	11 (33.3)	10 (18.5)	2.46	.12
Mood Stabilizer	**16 (48.5)**	**12 (22.2)**	**6.47**	**.01**

Note. SUD = Alcohol or Substance Use Disorder; Diagnoses were assessed using the Mini Neuropsychiatric Interview (MINI) or the Structured Clinical Interview for DSM-5 Disorders. Suicidality risk and self-harm were assessed using the MINI. *Due to missing data, participants ranged from n = 33–36 for the SUD group and n = 54–62 for the non-SUD group. Bolded values represent significant differences at p <.01.

in ED-SUD, although there were no differences between ED and ED-SUD groups on purging. Furthermore, patients with bulimic syndromes were not significantly more likely to have a SUD. While this is somewhat inconsistent with previous research (Krug et al., 2009; Root et al., 2010), results support examining substance use across ED diagnoses. In contrast, with previous research, we did not find evidence for higher levels of self-harm or BPD symptoms in the ED-SUD group. Previous research supporting increased self-harm in ED-SUD has been in adolescent samples (Kirkpatrick et al., 2019), which may also explain this discrepancy. While previous research has found higher cluster B symptoms in ED-SUD (Grilo et al., 1995), the lack of significant differences between ED and ED-SUD in our sample may be due to the relatively high scores on the BEST in both groups. Indeed, both groups scored similarly to patient samples with BPD (Pfohl et al., 2009).

Table 3. Comparing patients with and without alcohol and substance use disorders on self-report measures of eating disorder and related psychopathology.

	SUD (n = 36)	No SUD (n = 62)			
Variable	M(SD)/n(%)	M(SD)/n(%)	F/x	p	d
EDE-Q Global Score	4.29 (1.22)	3.92 (1.55)	1.47	.23	.27
STAI-Trait	64.34 (9.31)	59.03 (10.75)	5.99	.02	.53
BDI-II	36.89 (11.02)	32.26 (13.42)	3.08	.08	.38
DERS Total	132.38 (24.08)	119.11 (27.43)	5.79	.02	.51
DERS Nonacceptance	21.83 (5.54)	20.56 (6.61)	0.95	.33	.21
DERS Goals	**20.36 (3.94)**	**17.85 (5.03)**	**6.58**	**.01**	**.56**
DERS Impulse	**21.39 (5.74)**	**17.11 (6.73)**	**10.16**	**.002**	**.68**
DERS Strategies	**30.08 (6.89)**	**25.81 (8.21)**	**6.89**	**.01**	**.56**
DERS Awareness	21.67 (5.60)	21.41 (4.91)	0.10	.81	.05
DERS Clarity	17.06 (4.56)	16.36 (4.55)	0.53	.47	.15
SPSRQ Punishment	18.50 (3.42)	15.50 (5.52)	4.41	.04	.65
SPSRQ Reward	**15.17 (5.16)**	**10.87 (3.84)**	**11.56**	**.001**	**.95**
BEST	38.63 (10.41)	33.63 (10.65)	2.50	.12	.47

SUD = Alcohol or Substance Use Disorder; EDE-Q = Eating Disorder Examination—Questionnaire; STAI—Trait = State-Trait Anxiety Inventory, Trait Subscale; BDI-II = Beck Depression Inventory—II; DERS Total = Difficulties in Emotion Regulation Scale; Nonacceptance = DERS Nonacceptance of Emotional Responses; Goals = DERS Difficulties Engaging in Goal-Directed Behavior; Impulse = DERS Impulse Control Difficulties; Strategies = DERS Limited Access to Emotion Regulation Strategies; Awareness = DERS Lack of Emotional Awareness; Clarity = DERS Lack of Emotional Clarity; SPSRQ = Sensitivity to Punishment/Sensitivity to Reward Scale; BEST = Borderline Symptoms over Time. *Due to missing data, participants ranged from n = 15–36 for the SUD group and n = 24–64 for the non-SUD group. Bolded values represent significant differences at p <.01.

Clinical implications

Taken together with previous research, several of these findings have important implications for developing a treatment approach for the ED-SUD population, and provide a rationale for the usefulness of DBT to target these disorders concurrently.

Psychiatric comorbidity

Overall, results demonstrating a greater number of comorbid diagnoses for the ED-SUD group support the need for integrated treatment, which is consistent with recent calls from experts within the field (Dennis et al., 2014). DBT takes a behavioral approach, treating behaviors, regardless of their diagnostic association, according to a specific hierarchy. Given the complexity of ED-SUD cases and the tendency for these patients to vacillate between ED and substance use behaviors over time (Dennis & Helfman, 2010), an integrated, transdiagnostic approach may be useful in treating both behavioral presentations. Importantly, we did not find evidence for ED diagnostic differences between ED-SUD and ED only groups, lending further support for a transdiagnostic approach to ED-SUD treatment.

DBT provides a comprehensive framework for effectively working with the multiple comorbidities observed in ED-SUD patients. In particular, the focus on

the DBT hierarchy may help address vacillation between ED-SUD and other comorbid symptoms. The DBT hierarchy systematically addresses the most severe and life-threatening symptoms first, to help avoid shifting treatment targets throughout treatment. Additionally, skills generalization may be particularly important in this population. Phone coaching, which is a part of DBT, may be useful in helping patients to generalize skills to multiple behaviors across environments.

Regarding specific disorders, the non-statistically significant elevation in the likelihood of PTSD in the ED-SUD group compared to the ED alone group suggests that trauma symptoms may be a relevant treatment target for ED patients generally. Indeed, groups are working to develop protocols for the concurrent treatment of ED and PTSD (e.g., Trottier & MacDonald, 2017), while existing trauma protocols are commonly used to treat PTSD in these populations such as the DBT/Prolonged Exposure protocol (Harned et al., 2012).

Heightened emotion dysregulation

Our study shows that ED-SUD patients report significantly greater difficulties with emotion regulation. More specifically, ED-SUD patients in our sample endorsed difficulties with regulating behavior when distressed, engaging in goal-directed behavior when distressed, and accessing strategies for feeling better when distressed. Moreover, ED-SUD patients were more likely to already be prescribed a mood stabilizer; thus, despite previous treatment for emotion dysregulation they continued to have difficulty in this area. This is consistent with our hypothesis and points to emotion regulation as a critical treatment target. As previously discussed, DBT was specifically developed to provide education on emotion dysregulation and provide individuals with adaptive emotion regulation skills. Several skills were added to the DBT for SUD model to specifically address the heightened impulsivity reported by ED-SUD patients. These skills include Burning Bridges to persons, places, and things associated with substance abuse and Adaptive Denial of urges for substance use.

Reward sensitivity and punishment

The present findings that patients with ED-SUD report higher reward sensitivity to highlight the importance of assessing for and addressing temperament in this treatment population. Reward sensitivity may be an underlying mechanism that drives an individual's substance use and ED behaviors. For instance, substance use and ED behaviors may be highly rewarding in the moment; hence, patients seek the short-term rewards of addictive behaviors despite their long-term, negative consequences. Furthermore, a potential obstacle to abstinence from ED behaviors and substances of abuse is the non-rewarding aspect of abstinence (e.g., physiological discomfort associated with withdrawal, increased emotional discomfort, finding activities less enjoyable). Several skills taught in DBT for SUDs target these barriers. Contingency management strategies to reduce cues

and access to substances and behaviors (e.g., Burning Bridges), as well as reinforcement of adaptive behavior, are essential to treatment. Specifically, Community Reinforcement (e.g., mindfully observing positives in relationships when abstinent, generally seeking environments that support and reinforce abstinence), and Abstinence Sampling (committing to shorter periods of sobriety to reach rewarding milestones) focus on the reinforcement of healthy behaviors.

In conjunction with findings on reward sensitivity, the trend towards the significance of increased punishment sensitivity in this ED-SUD population suggests that for some patients, holding patients accountable to treatment goals and implementing consequences and rewards accordingly may be important for behavior change. For example, using behavioral contracts and administering drug analysis screens to monitor substance use may be helpful. The DBT skill of Pros and Cons may help patients to identifying negative consequences of substance use.

Strengths and limitations

The present study has several strengths, including the use of structured clinical interviews to assess diagnoses and an examination of a broad range of constructs theoretically relevant to eating and substance use disorders. As such, this study adds to the limited literature investigating factors characterizing the ED-SUD population. However, there are several limitations worth noting. First, participants were drawn from a treatment-seeking sample presenting at a higher level of care. As such, results may not be representative of individuals with ED-SUD in the broader community. The modest ED-SUD sample size may have limited our ability to detect significant differences between groups. Additionally, the present study did not assess tobacco use or caffeine use disorders, which may also be relevant substances for ED groups, given their association with appetite suppression. Further, although the present sample included males and non-binary individuals, the smaller numbers in these groups limits the generalizability of the results beyond females. Importantly, we did not assess the past history of SUD, so the relative influences of active substance use versus traits underlying substance use on our findings cannot be determined. Finally, this study reviewed factors that provide a rationale for the applicability of DBT to treat EDs and co-occurring substance use in a cross-sectional study; however, future longitudinal studies and randomized controlled trials are needed to examine outcomes to determine the efficacy of DBT to treat ED-SUDs.

Conclusions

In summary, the present study found significant differences between patients with co-occurring ED-SUD and ED alone in the areas of temperament, psychiatric

comorbidities, prescribed medications, and emotion regulation abilities. These significant differences may be important in guiding attempts to tailor treatment for this complex patient population and provide further evidence for the importance of integrated treatment to comprehensively address presenting problems. DBT for SUDs is a promising treatment to concurrently treat SUDs and EDs, but more research on its efficacy in the treatment of ED-SUD will be essential for establishing guidelines for treatment protocols with this patient population.

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