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Dialectical behavioral therapy for the treatment of adolescent eating disorders: a review of existing work and proposed future directions

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ABSTRACT

Over the past several decades, Dialectical Behavior Therapy (DBT) has been adapted for a range of presenting problems related to emotion dysregulation. Considerable enthusiasm exists regarding the use of DBT for treating eating disorders; however, to date, there have been no reviews summarizing empirical efforts to adapt DBT for eating disorders in youth. Accordingly, in the present narrative review, we provide a comprehensive summary of existing work testing DBT for adolescent eating disorders. First, we briefly review existing work applying DBT to eating disorders in adults and general adolescent samples. We then review research focused specifically on the use of DBT for adolescent eating disorders, including both those studies applying DBT as the primary treatment and investigations of DBT as an adjunctive treatment. Overall, initial results for DBT-based approaches are promising. However, rigorous empirical work testing DBT for treating adolescent eating disorders remains limited; the majority of existing research is comprised of case series and small-scale studies. Therefore, we close with specific recommendations for future research testing this approach.

Introduction

Eating disorders, including anorexia nervosa (AN) and bulimia nervosa (BN), commonly begin in adolescence and are associated with marked functional impairment, serious medical consequences, and increased risk of death (Arcelus et al., 2011; Mitchell & Crow, 2006). For adolescent AN, Family-Based Treatment (FBT; Lock, Le Grange, Agras & Dare, 2001) has demonstrated efficacy in randomized controlled trials (RCTs) and effectiveness in naturalistic research designs (Couturier et al., 2013). However, up to 50% of adolescents with AN who receive FBT do not experience full remission of symptoms (J. Lock et al., 2010). Further, outcome data on FBT for the treatment of BN are somewhat mixed (Le Grange et al., 2007, 2015). Therefore, in light of the well-

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documented burden associated with eating disorders and their consequences in children, adolescents, and their families (e.g., Zabala et al., 2009), there remains a pressing need to identify adjunctive or alternative treatments.

Dialectical Behavior Therapy (DBT) has received attention in the literature as one promising alternative treatment option for adolescent eating disorders. Originally developed for use in chronically suicidal individuals with Borderline Personality Disorder (BPD), DBT outlines a clear framework for treating emotional and behavioral dysregulation common in multi-problem, complex patients, using a combination of individual therapy, skills groups, phone coaching, and therapist consultation (Linehan, 1991). Skills conferred in therapy are grouped into four modules, including distress tolerance, emotion regulation, mindfulness, and interpersonal effectiveness (Linehan, 1991). Several RCTs have documented the efficacy of DBT for treating individuals with chronic suicidal behaviors and BPD (e.g., M. M. Linehan et al., 2006, 2015). Over the past 30 years, DBT has been adapted for a number of populations, including adolescents with emotion dysregulation and their families (Miller et al., 2009) and adults with eating disorders (e.g., Telch et al., 2001). Those who support the application of DBT to eating disorders highlight data suggesting that eating disorders are associated with high levels of emotion dysregulation (Haynos & Fruzzetti, 2011; Lavender et al., 2015) and often present in conjunction with other impulsive, dysregulated behaviors, such as substance use and non-suicidal self-injury (NSSI; Fischer & Grange, 2007; Peebles et al., 2011).

Moreover, in theory, DBT may be well suited to target several adolescent populations who have a poor response to FBT. For instance, higher levels of parental expressed emotion and criticism are associated with worse FBT outcome (e.g., Rienecke et al., 2016, 2017). Elevated familial expressed emotion and invalidation have also been implicated in adolescent suicidal behaviors and emotion dysregulation (Sim et al., 2009); accordingly, DBT for adolescents includes a focus on increasing validation and effective family communication (Miller et al., 2009), which may also be helpful for patients with eating disorders. While there has been increasing interest in adapting DBT for eating disorders, to our knowledge, there are no existing empirical reviews of DBT for eating disorders in youth.

Thus, we aim to (a) summarize existing work exploring the usefulness of DBT for the treatment of adolescent eating disorders, both as a stand-alone and an adjunctive treatment, and (b) delineate a roadmap for future research in this domain. To achieve these goals, we place existing work in context by briefly outlining research on DBT for adult eating disorders and adolescents with emotion regulation difficulties and suicidality. Next, we provide a comprehensive narrative review of work testing the effectiveness of DBT, alone and in conjunction with FBT, for adolescent eating disorders. Finally, we highlight the limitations of existing knowledge and propose next steps for

this area of research. Of note, throughout the current paper, we will use the term "adapted" when significant changes were made to the treatment delivery or content and the term "modified" when minor changes were made to the treatment.

DBT for eating disorders: findings from adult samples

Efforts to implement DBT with adolescents with eating disorders have drawn significantly upon initial attempts to apply this treatment with adult eating disorder patients. Given the initial development of DBT for adults with BPD, several studies have evaluated full-package DBT for eating disorders comorbid with BPD (Palmer et al., 2003; Navarro-Haro et al., 2018). Most of the research on DBT for adult eating disorders without BPD has focused on bulimia and binge eating disorder (Rahmani, Omidi, Asemi, & Akbari, 2018; Safer & Jo, 2010; Telch et al., 2000). However, recent research has also evaluated DBT as a treatment approach for eating disorders characterized by emotional and behavioral overcontrol, such as the restricting subtype of AN (AN-R) using Radically Open-DBT (RO-DBT) (Lynch, Gray, Hempel, Titley, Chen, & O'Mahen, 2013). Various adaptations and modifications of DBT have also been evaluated in adult samples, including DBT integrated with appetite awareness training (Hill et al., 2011), DBT for obese emotional eaters (Roosen, Safer, Cebolla, & van Strien, 2012), and modified DBT for women with full or sub-threshold Binge Eating Disorder (BED) or BN (Klein et al., 2013). To help increase the accessibility of DBT, research has begun to examine guided self-help DBT for adult BED (Masson et al., 2013).

Overall, eight studies have tested DBT for adult eating disorders using randomized designs (Ben-Porath et al., this issue), most often using wait-list control groups and focusing on bulimic spectrum eating disorders. To date, two meta-analyses have examined DBT for adults with eating disorders. Linardon et al. (2017) conducted a meta-analysis on RCTs of third-wave behavioral therapies, including DBT, and concluded that DBT was "possibly efficacious" for the treatment of BN and BED. With slightly more broad inclusion criteria, Lenz et al. (2014) evaluated nine studies utilizing between- and within-subjects designs, and results indicated a large effect size for DBT. These preliminary findings in support of DBT for adults with eating disorders provide compelling rationale for evaluating the applicability of DBT to adolescent eating disorders.

General adaptation of DBT for adolescents

The first adaptation of DBT for adolescents (Miller et al., 1997) included family members and teens, changed the length of treatment to 12 weeks, used simplified, teen-appropriate language to describe skills, and reduced the total

number of skills taught compared to adult DBT. Following an initial promising quasi-experimental test of this modified program in suicidal adolescents with features of BPD (Rathus & Miller, 2002), Miller and colleagues published the first manual describing DBT for suicidal adolescents (Miller et al., 2009), which has subsequently been updated (Rather & Miller, 2015). This manual includes 24 weeks of treatment, individual therapy, multi-family skills groups, phone coaching for both adolescent patients and their family members, family sessions as needed, an as-needed graduate group with other treatment modes, and one additional skills training module called "walking the middle path" that focuses on validation, behavioral principles, and adolescent-family dialectical dilemmas. Currently, two RCTs have tested full-package DBT for adolescents with NSSI and features of BPD (McCauley et al., 2018; Mehlum et al., 2014). Results indicate that DBT is associated with significant reductions in NSSI, suicide attempts, suicidal ideation, and depression scores. Follow-up data suggest that DBT remained superior to enhanced usual care in reducing NSSI at one-year post-treatment (Mehlum et al., 2016).

Most studies on adolescent DBT have focused on BPD features and NSSI. As a result, the first, and currently only, meta-analysis of DBT for adolescents focuses on depressive symptoms and NSSI (Cook & Gorraiz, 2016). Twelve studies were included in the final analysis, and results indicate that DBT has a large effect on NSSI and a small effect on depression. Of note, these studies differed in terms of elements of DBT used (e.g., skills group only, individual therapy and skills group, alternating sessions of family skills training and individual therapy, use of phone coaching and diary cards). Additionally, none of the studies included in this meta-analysis were RCTs, only five included control groups, and few reported on therapist adherence.

Although the only existing meta-analysis of adolescent DBT focuses on depressive symptoms and NSSI, two comprehensive narrative reviews have included adolescent-focused adaptations of DBT that have targeted a wide range of symptom presentations. Groves et al. (2012) reviewed findings from 12 studies, and MacPherson et al. (2013) reviewed the results of 18 studies across differing presenting problems. Overall, these reviews suggest DBT for adolescents is acceptable and associated with relatively high rates of retention. Moreover, the authors conclude that the reviewed studies provide some empirical support for DBT in reducing hospitalizations, suicidality, and NSSI behavior in adolescents, as well as reducing symptoms of depression, bipolar disorder, eating disorders, and other impulsive behaviors. Given that studies through 2013 included a broad range of milieus, patient populations, and modalities, but no RCTs, Groves et al. (2012) and MacPherson et al. (2013) all conclude that there is evidence for the practical effectiveness of DBT for adolescents, particularly those that struggle with emotion dysregulation and impulsivity. These authors also underscore the utility of DBT-based

approaches in community outpatient, school, or residential settings that treat youth with multiple problems. These assertions have since been further supported by effectiveness studies of DBT for high-risk adolescents in community clinic settings (e.g., Berk et al., 2019).

Taken together, the majority of existing work examining DBT for adolescents has focused on youth with features of BPD, including NSSI and suicide attempts, and suggests that DBT effectively targets these symptoms. However, reviews also indicate that DBT approaches adapted and modified for other adolescent populations characterized by emotion dysregulation (e.g., incarcerated populations, community mental health patients) show considerable, albeit tentative, promise and warrant further investigation.

DBT for adolescent eating disorders

The success of DBT for adolescents and initial evidence documenting efficacy in adult populations with eating disorders (e.g., Bankoff et al., 2012; MacPherson et al., 2013) has laid the groundwork for incorporating this intervention into adolescent eating disorder treatments. However, the manner in which DBT has been included in these treatments varies considerably. In the current review, we chose to include all studies that have tested DBT as either the primary or an adjunctive intervention and included adolescents (<18 years old) who presented with eating disorders as a primary treatment target. Given that this area of research remains limited, we were broad in our inclusion of study designs (e.g., open trials; case studies). We separate our review of existing literature into two sections (see Table 1): studies using DBT as the main treatment approach for adolescent eating disorders and studies exploring the use of DBT as an adjunctive treatment.

DBT for adolescents as the primary protocol

To date, four studies have tested DBT as the main protocol for adolescent eating disorders. These studies are heterogeneous in their design (e.g., pilot studies, case reports), level of care (e.g., outpatient, inpatient), and sample characteristics (e.g., AN, BN, BED), and are detailed below.

Salbach-Andrae et al. (2007, 2008) published a pilot study and case series examining the effectiveness of DBT for adolescent eating disorders. The authors' (2007) pilot included 31 adolescent girls diagnosed with AN (n = 23) or BN (n = 8) who were enrolled in an inpatient program. Participants received DBT treatment based on the existing adolescent DBT manual (Miller et al., 2009, 1997), with several adaptations. Specifically, the treatment was shorter in duration, but included more frequent sessions, was delivered by both therapists and nurses, and included eating disorder-specific content (e.g., weight- and eating-focused groups). Results indicated that, from pre- to post-treatment, the full sample evidenced significant decreases in eating disorder behaviors and

Table 1. Existing studies: DBT for adolescent eating disorders.

Study	Sample	Follow-Up?	Setting	Treatment Approach	Adaptations	Findings
DBT as Primary Treatment						
Salbach-Andrae et al. (2008)	N = 31; Adolescents with AN, BN	No	Inpatient	DBT program including individual and group-based sessions	Modifications to Miller's treatment model; shortened duration of treatment, increased frequency of sessions; utilized therapists and nurse staff to deliver treatment; addition of weekly groups focused on eating and weight	97.4% retention; increase in BMI in AN patients; decrease in depression symptoms, eating disorder behavior, and use of weight-loss substances
Salbach-Andrae et al. (2008)	N = 12 Adolescents with AN, BN	No	Outpatient	25-week program: individual sessions; phone coaching, weekly skills group; family members attend 8 skills groups; therapist consultation	Shortened Miller's protocol; addition of eating disorder-specific module and adolescent general DBT module (Walking the Middle Path); family component for skills group	92% retention; decreases in eating disorder symptoms, associated symptoms (EDI-II subscales), and improvements in functional impairment
Safer et al., 2007	N = 1; Adolescent with BED	Yes	Outpatient	21-week program including individual sessions focusing on DBT skills, diary card review, and behavioral chains of binge eating behaviors; 4 family sessions; phone coaching	No group component; increased emphasis on homework in sessions; scheduling calls if patient reticent to use phone coaching; family component for sessions if indicated by chains	Reduction from 22 OBEs in month before treatment to 4 OBEs in final month of treatment; reductions in EDE scores; at 3-month follow-up, 1 OBE reported in last 3 months
Fischer & Peterson (2015)	10 adolescents with BN or EDNOS & suicidal behaviors	Yes	Outpatient	6-month treatment program; weekly skills training, individual session, weekly therapist consultation telephone coaching between sessions; parents attended 1 session every month; parent-specific skills groups made available	Included psychoeducation on eating disorders; family component in the form of attending individual sessions and option for family skills sessions (only 3/7 attended)	70% retention; significant reductions in eating disorder behaviors and cognitive symptoms (as measured by EDE); significant decreases in self-injury; these effects maintained at 6-month follow-up

(*Continued*)

Table 1. (Continued).

Study	Sample	Follow-Up?	Setting	Treatment Approach	Adaptations	Findings
DBT as Adjunctive Treatment						
Johnston et al. (2015)	51 adolescents with AN, BN, EDNOS	Yes	Intensive Outpatient	7-8-week program, comprised of 3 hours a day, 3 days/week; DBT skills groups; parents skill group (1x/week); group/family meals; other adjunctive groups; family sessions focused on FBT interventions	Skills groups organized in 8-week curriculum; separated into "DBT Skills Integration," "Multi-Family Group for Walking the Middle Path," "Emotion Regulation/Mindfulness," "Distress Tolerance/Interpersonal Effectiveness," "DBT Problem Solving," and "Parent DBT"	71% treatment retention; significant increases in IBW during treatment, continued to increase at 3-, 6- and 12-month follow-up; significant decreases in EDE-Q scores, continued to improve at 6- and 12-month follow-up; no significant changes in binge/purge symptoms in treatment or at follow-up.
Murray et al. (2015)	35 adolescents with BN	No	Partial Hospital/ Intensive Outpatient	Interventions delivered up to 6 days a week between 3–10 hours daily; individual sessions followed DBT protocol; family sessions followed FBT protocol; parent-only group focused on behavioral management; multi-family DBT component	DBT groups adapted to include all family members and extended into multi-family meals.	Only evaluated completers; decreases in EDE-Q scores for 1) shape concerns, 2) weight concerns, and 3) global scores; significant reductions in frequency of 1) secretive eating, 2) objective binges, 3) self-induced vomiting; significant improvement in emotion regulation strategies and parents' report of self-efficacy in treating the eating disorder
Pennell et al. (2019)	24 adolescents with AN-R, AN-BP, BN, OSFED, ARFID	Yes	Partial Hospital Program	Contracted 6 weeks minimum; 5 day/week program, with attendance being 10 hours 4x/week and 7 hours 1x/week; patient skills groups 2-3x/day focused on DBT modules; completion of diary cards, chain analyses, skills homework; other adjunctive groups; daily family meals; weekend planning family group; family session focused on FBT interventions	DBT modules split into 1) Distress Tolerance Skills, 2) Emotion Regulation and Interpersonal Skills, 3) Mindfulness, 4) Distress Tolerance/Weekend Family Planning; Patients in separate "skills practice" and "coping skills" groups daily	79.2% retention; significant increases in weight at discharge; Reports of reduction or abstinence of B/P behaviors at discharge; 79.2% remained out of the hospital at 2-year follow up

(*Continued*)

Table 1. (Continued).

Study	Sample	Follow-Up?	Setting	Treatment Approach	Adaptations	Findings
Peterson et al. (2019)	18 adolescents with AN-R, AN-BP, OSFED	No	Outpatient	6-month program; DBT skills groups for adolescents followed 24-week Standard Adult DBT Skills Training Schedule (2 weeks mindfulness, 6 weeks distress tolerance, 2 weeks mindfulness, 7 week emotion regulation, 2 weeks mindfulness, 5 weeks interpersonal effectiveness); additional elements of traditional DBT: mindfulness activity, diary card, homework review, etc.	No adaptation to traditional DBT skills group	66.6% retention; large effect size for increase in adaptive skills, decrease in dysfunctional coping strategies, small to medium effect sizes for decrease in objective binge episodes and in percentage of expected body weight; small effect sizes in decreases in global and restraint scores on the EDE-Q; diary cards indicated a decreasing trend in target behaviors at week 9 and increase at week 17 and an overall increase in skill usage

cognitive symptoms, and individuals with AN demonstrated significant increases in body mass index (BMI).

The second study by Salbach-Andrae et al. (2008) evaluated DBT for adolescent eating disorders (AN-R; AN-BP; BN) in an outpatient setting (N = 12). Adaptations to Miller, Rathus and Linehan's (2009) protocol for DBT with adolescents included the addition of a module focused specifically on eating, weight, and body image, entitled "Dealing with Food and Body Image." Treatment goals were established following the traditional DBT hierarchy. Results supported reductions in eating disorder symptoms including binge eating, vomiting, other compensatory behaviors, and restriction, as well as general psychopathology, pre- to post-treatment. Of the 11 adolescents who completed treatment, five (four AN-R and one AN-BP) did not meet criteria for an eating disorder at the end of 25-week treatment, two BN patients had diagnostic crossover and met criteria for Eating Disorder Not Otherwise Specified (EDNOS), and the remaining four retained their initial diagnosis, one with AN-BP and three with BN.

One case study explored the use of DBT for the treatment of a 16-year-old adolescent with BED (Safer et al., 2007). Safer and colleagues presented a 21-week individual treatment protocol that closely mirrored the existing DBT protocol for adult BED. Sessions using this model included a review of diary cards, behavioral chains, between-session phone coaching, and acquisition and practice of skills covering the four modules. Parental involvement was based on feedback from patient diary cards and behavioral chains. Case study results suggested a decrease in binge eating episodes from pre-treatment to follow-up, with 28 episodes at pre-treatment, 4 at post-treatment, and 1 at follow-up.

Fischer and Peterson (2015) published the most recent 6-month pilot study of DBT in an outpatient setting for adolescents with BN and also engaged in NSSI. Notably, this duration of treatment aligns with that of Salbach's outpatient case series, which was 25 weeks. Patients received psychoeducation on eating disorders, as an adjunct to the traditional psychoeducation on the biosocial model of emotion dysregulation employed during traditional DBT (Linehan, 1991). Elements of traditional Cognitive-Behavioral Therapy (CBT) were also included in the first two psychoeducation sessions. In addition, adolescents enrolled in the study attended weekly individual sessions, participated in weekly skills training groups, received phone coaching, and identified treatment goals based on the DBT hierarchy. However, unlike Miller's model and Salbach's (2007) DBT adaptation, families in this pilot were involved in a systematic fashion, such that parents and/or legal guardians attended the initial assessment, one monthly joint family session, and were able to attend a parent skills group. The sample studied were adolescent females (n = 10) with a diagnosis of BN or EDNOS and suicidal behavior. Unlike the samples studied by Salbach-Andrae et al. (2008, 2008), the majority of participants were overweight or obese at intake. Seven of the ten participants completed treatment; results suggested a decrease in cognitive eating disorder symptoms, binge eating, purging, and NSSI at post-

treatment and at 6-month follow-up. Three individuals reported complete absence of binge eating behaviors at 6-month follow-up.

The limited data on DBT as the primary intervention for eating disorders in an adolescent population tentatively supports potential benefits. However, given the large variability in the sample characteristics, treatment settings, manner in which DBT was implemented, and lack of generalizable treatment designs (i.e., primarily use of case series), the definitive conclusions that can be drawn from the existing work are limited.

DBT as an adjunct to FBT

Given the status of FBT as the first-line treatment for adolescent eating disorders, it is not surprising that interest in DBT as an adjunctive treatment for adolescents has focused primarily on pairing DBT with FBT. Although evidence suggests that emotion dysregulation and impulsive behaviors are common in adolescent eating disorders (Fischer & Peterson, 2015), the standard FBT protocol does not provide any guidance regarding targeting these behaviors in family sessions. Accordingly, researchers have proposed that an integration of FBT and DBT may provide a framework for targeting eating disorder behaviors and associated emotional features (Anderson et al., 2015; Federici & Wisniewski, 2012). Exploration of theoretically merging these two treatment approaches has highlighted the overlap in key aspects of treatment, such as a non-judgmental stance, encouraging separation between the patient and the illness, a focus on decreasing maladaptive behaviors, and facilitating an environment of validation and acceptance during the refeeding process (Anderson et al., 2015; Federici & Wisniewski, 2012). On the other hand, there are several notable philosophical differences between the treatments, including the conceptualization of eating pathology from an agnostic versus biosocial perspective, the role of the therapist in session, level of family involvement, and overall theorized mechanisms of change. Indeed, FBT posits eating disorder behaviors emerge from ambivalence and neurobiological vulnerabilities, while DBT maintains that behaviors are in response to a lack of skill in managing one's affective states (Anderson et al., 2015; Federici & Wisniewski, 2012). Nonetheless, these authors outline ways that these differences may be resolved and propose that the two approaches can be complementary in comprehensively targeting adolescent eating disorders.

Several research teams have presented preliminary data on the integration of FBT and DBT (Johnston et al., 2015; Murray et al., 2015; Pennell et al., 2019; Peterson et al., 2019). First, Murray and colleagues (2015) tested the short-term outcomes associated with a blended FBT and DBT approach in a sample of adolescents with BN (n = 35). Participants were enrolled in a combined partial hospital and intensive outpatient program and received weekly FBT alongside individual, family, multi-family, and parent-only DBT, as outlined by Anderson et al. (2015). The length of treatment varied across

participants and was determined by illness severity and progress toward therapeutic targets. Results at post-treatment indicated a decrease in cognitive eating disorder symptoms, decreased shape and weight concerns, and overall improvement in emotion regulation strategies. Parents also reported an increase in efficacy in assisting their child with their eating disorder symptoms.

Johnston et al. (2015) explored the outcomes associated with a blended FBT-DBT approach administered in an intensive-outpatient setting but extended this work by evaluating outcomes of this program at one-year follow-up. Adolescents (n = 51) diagnosed with either AN, BN, or EDNOS received weekly FBT sessions and DBT groups in both separated adolescent/parent and multi-family formats. The DBT groups (both individual and multi-family format) utilized a combination of traditional DBT modules (M. M. Linehan, 1993; Miller et al., 2009) and DBT-based didactics adapted for eating disorders. Results from the open trial suggested significant improvement in BMI and cognitive symptoms, post-treatment. Follow-up data suggested that eating disorder symptoms continued to decrease through 6-month follow-up, and BMI continued to increase at 1-year follow-up. Of note, while it has been hypothesized that DBT skills would be effective in interrupting the pattern of dysregulation and maladaptive behaviors (Anderson et al., 2015) related to BN, results indicated no significant changes in binge eating and purging frequency throughout treatment or at 1-year follow-up.

Third, Peterson et al. (2019) conducted an open trial of manualized weekly FBT for AN with adjunctive weekly DBT skills training groups for a sample of 18 adolescents with AN-R over the course of 24 weeks. Results indicated that participants reported an increase in adaptive skills, decreases in cognitive eating disorder symptoms, decreases in levels of restraint, and decreases in depressive symptomatology. Data from weekly diary cards indicated a decrease in behavioral targets at week 9, but a rebound of behaviors at week 17. Despite this rebound, which is hypothesized to be due to the module being covered at that time (interpersonal effectiveness) not providing skills to directly target behaviors, there was an overall reduction in eating disorder behaviors at post-treatment (Peterson et al., 2019).

Finally, Pennell et al. (2019) outlined the outcomes of another FBT-DBT blended approach, implemented in a partial hospitalization sample (n = 24, 83% received FBT and DBT). The sample was comprised of adolescents diagnosed with AN-R, AN-BP, BN, Other Specified Eating Disorder, and Avoidant/Restrictive Food Intake Disorder (ARFID). In terms of the treatment approach, FBT was implemented as outlined by Lock and LeGrange (2013), with Phase I or Phase II treatment techniques used depending on the severity of illness (Lock & LeGrange, 2013). DBT interventions included daily skills groups, skills practice, diary card completion, and behavioral analysis. Results

at discharge indicated significant increases in weight among low-weight eating disorders and significant decreases in binge eating and purging behaviors. The authors also noted that readmission rates during the study period were low.

Altogether, studies exploring the integration of DBT and FBT suggest that this adjunctive approach is both feasible and may provide benefit. However, these studies are few in number and have several major limitations, including lack of follow-up data, small sample sizes, and non-randomized designs.

Summary of existing work and future directions

Despite the fact that DBT or its components (e.g., skills groups) are commonly offered as part of treatment packages delivered in higher levels of care for eating disorders, our review of existing literature indicates that there remain few studies exploring the empirical basis of DBT for adolescent eating disorders. In the following sections, we offer recommendations for future research exploring the efficacy and effectiveness of this approach and attempting to characterize the individuals for whom and the contexts in which DBT provides maximal utility.

Recommendations for future research on DBT for adolescent eating disorders

First and foremost, given that existing studies of DBT for eating disorders have been conducted in small samples and have employed naturalistic designs, it is critical that researchers conduct RCTs of DBT for eating disorders in youth. Further, given the significant lack of consistency in the nuances of DBT applications in existing adolescent work, it is recommended that efforts to test DBT for adolescent eating disorders standardize treatment application and choice of outcome assessment whenever possible to facilitate comparisons across studies. Finally, in light of recent meta-scientific inquiry highlighting quality-related issues with many existing empirical reports for evidence-based treatments (e.g., Sakaluk et al., 2019), we recommend that future research make use of multi-site or multi-lab designs to increase statistical power and follow proposed open science guidelines to increase the evidentiary quality of treatment-related research (e.g., preregistering projects and analyses; increasing transparency in reporting; e.g., Tackett et al., 2017).

Moderators: for whom is DBT most effective?

Following the initial determination of efficacy and effectiveness of DBT for adolescent eating disorders, it will be important to determine for whom DBT may be best suited. We recommend that researchers and clinicians use existing moderator research in DBT for other presenting problems (e.g., Sahin et al., 2018) as a starting point for determining for whom DBT is most effective. We also recommend that researchers and clinicians consider a range of clinical

characteristics—diagnostic, demographic, developmental, or psychological—that may indicate or contraindicate the use of DBT or influence outcome. When considering potential moderators of treatment, existing work in adolescents has explored the application of DBT across different eating disorder diagnoses (AN, BN, BED). Although there is a theoretical reason to believe that emotion dysregulation may be implicated across diagnostic presentations (e.g., Haynos & Fruzzetti, 2011; Lavender et al., 2015), future work should directly test whether DBT is best suited to target eating disorder presentations characterized by affective lability and negative urgency (Anestis et al., 2009; Waxman, 2009), as has been implicated in more general adaptations of DBT (Zapolski & Smith, 2017), or whether eating disorders characterized by over-controlled temperamental characteristics and restricting behaviors (i.e., AN-R) also derive benefit.

Relatedly, specific to adolescent and family-based implementations of DBT, future work should consider developmental or family-based factors that could influence the appropriateness or effects of DBT. For instance, given the emphasis on improving emotion-related communication and validation in adolescent adaptations of DBT (e.g., Miller et al., 2009), it may be that families with dysfunction in these domains (e.g., high levels of expressed emotion and criticism) would benefit most from DBT.

With regard to developmental characteristics, studies of DBT for adolescents with eating disorders have included patients as young as 12, but research suggests that earlier intervention is associated with improved outcome in eating disorders (e.g., Treasure & Russell, 2011). Preliminary data from an RCT for Disruptive Mood Dysregulation Disorder indicate that DBT adapted for preadolescent patients (DBT-C; Perepletchikova et al., 2011) is nearly twice as acceptable and efficacious as an active psychosocial and medication management control condition for children as young as 7 years old (Perepletchikova et al., 2017). Preadolescents with NSSI, suicidality, and severe emotional and behavioral dysregulation were included in the study. Given that these comorbidities can also characterize children with eating disorders, future work investigating DBT-C for pediatric AN, BN, ARFID, and BED is also needed.

Finally, almost all existing work on DBT has included predominantly white, female samples. It will be critical for future work to explore the usefulness of DBT for varying demographic groups and test any efforts to adapt the administration of DBT to include considerations specific to these adolescent groups and their families.

Cost-effectiveness analyses

Because DBT is a multi-faceted and comprehensive treatment approach that requires extensive therapist training, cost-effective analyses are also helpful to evaluate its effects relative to other treatments (Wilkinson, 2018). Economic analyses have been conducted for adult DBT (M. M. Linehan et al., 1999), but not for adolescent DBT. Particularly given the high cost of eating disorder

treatment (Striegel-Moore et al., 2000) and the added cost for adolescent treatment if family members travel to participate in treatment, we suggest that future research explore questions related to cost-effectiveness of adolescent DBT for eating disorders.

Component analysis

Although adherent DBT takes a multi-pronged approach to treatment, including individual therapy sessions, group sessions, telephone coaching, and therapist consultation, it is common for adaptations of DBT to exclude one or more of these components for theoretical or logistical reasons. For this reason, it is critical that future research conduct component analyses of DBT that explore the utility of these different components across differing presenting problems. Recent component analyses of DBT for adult BPD suggest that a range of DBT formats are associated with overall benefit, but that skills groups may be particularly important for the outcome (M. M. Linehan et al., 2015). Of note, these questions may be particularly useful in extending past work for DBT in adult eating disorders and adolescents, as the majority of existing work in DBT for adult eating disorders has used group-only formats and adolescent DBT protocols often add additional elements related to family involvement (e.g., family sessions). We recommend that future research on DBT for adolescents explore the effectiveness of each component, as this will be useful in streamlining dissemination.

Mechanisms of change in DBT

A more general question of interest to both DBT for adolescent eating disorders and DBT more broadly concerns the mechanisms of treatment change. In particular, few existing studies have empirically tested mediators of treatment change in DBT, or mechanisms through which the treatment achieves its positive effects. Identifying mechanisms of change is an important priority for research on psychological treatments and can guide intervention delivery in a manner that maximizes efficacy (Kazdin, 2007). Lynch et al. (2006) proposed a number of potential mechanisms theoretically relevant to DBT, including exposure and response prevention, enhanced learning of new effective responses to emotionally salient cues, enhanced attentional control, memory, and stimulus discrimination. The authors highlight that the majority of proposed mechanisms can be summarized as relating to the promotion of new learning and shifting from ineffective to effective action tendencies in response to strong emotions (Lynch et al., 2006). To date, few studies have empirically tested these proposed mechanisms; one RCT of DBT for women with BPD suggested that increases in effective skills use was a mechanism of change for a range of outcomes (Neacsiu et al., 2010). Two recent studies in adult eating disorders supported a similar role of skills use in accounting for eating disorder-related treatment outcome (Brown et al., 2018) and changes in affect regulation over the course of group-based DBT for eating disorders (Ben-Porath et al., 2014), providing some initial support for the hypothesized

mechanisms outlined by Lynch et al. (2006). Overall, the literature exploring proposed mechanisms of change in DBT is sparse; we recommend that efforts to provide empirical backing of DBT for adolescent eating disorders include assessments gauging proposed mechanisms of change, including both processes implicated in general delivery of DBT, as well as family-related processes that may be implicated in adolescent-specific adaptations of DBT.

Conclusions

In the 30 years since DBT was first outlined by Marsha Linehan (M. M. Linehan, 1987), there has been widespread interest in applying its theoretical model and intervention strategies to treat a wide range of presenting problems linked to emotion dysregulation (Dimeff, & Koerner, 2007), including eating disorders (e.g., Safer & Jo, 2010). Although initial RCTs in adults and pilot tests in adolescent samples support the promise of DBT for the treatment of eating disordered behaviors, ongoing research is necessary to provide rigorous evidence for the use of this approach and explore the populations and contexts for which it is best suited.

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