



RESEARCH ARTICLE

Motivational Enhancement as a Pretreatment to a Transdiagnostic Intervention for Emerging Adults with Emotion Dysregulation: A Pilot Randomized Controlled Trial

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Abstract

Objective: New approaches are needed to help the large number of emerging adults (EA) presenting with early-stage mental health problems. The goal of this pilot study was to carry out a randomized controlled trial to investigate whether motivational enhancement therapy (MET) improved the treatment effects of a 12-week psychological intervention, Dialectical Behaviour Therapy Skills Training (DBT-ST), for EA presenting in the early stages of mental health difficulties. Participants were recruited from the Youth Wellness Centre at St. Joseph's Healthcare Hamilton and McMaster University's Student Wellness Centre in Hamilton, Canada. **Methods:** Seventy-five participants were randomized to receive MET followed by DBT-ST or to DBT-ST alone. We assessed psychological distress, emotion dysregulation, and depression and anxiety symptoms as outcomes. **Results:** We found that both treatment groups had significant reductions in emotional dysregulation, psychological distress, depression, and anxiety at post-treatment and at the three-month follow-up. Participants assigned to MET pre-treatment experienced greater improvement in psychological distress at the end of treatment. **Conclusion:** This pilot study provides preliminary evidence of the potential augmentation of DBT-ST using MET in a real-world setting. Future studies should examine whether MET uniquely augments DBT-ST through the use of a comparable pre-treatment control group.

Key Words: *brief psychotherapy; group psychotherapy, outcome research, dialectical behavior therapy, youth mental health*

Résumé

Objectif: De nouvelles approches sont nécessaires pour aider le grand nombre d'adultes émergents (AE) qui présentent des problèmes de santé mentale au stade précoce. La présente étude pilote avait pour but d'exécuter un essai randomisé contrôlé afin de rechercher si la thérapie d'amélioration motivationnelle (TAM) améliorerait les effets du traitement d'une intervention psychologique de 12 semaines, soit la formation technique à la thérapie comportementale dialectique (FT-TCD), pour les AE qui présentent les premiers stades de difficultés de santé mentale. Les participants ont été recrutés au centre Youth Wellness de St. Joseph's Healthcare Hamilton et au centre Student Wellness de l'Université McMaster, à Hamilton, Canada. **Méthodes:** Soixante-quinze participants ont reçu au hasard la TAM suivie de la FT-TCD ou uniquement

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la FT-TCD. Nous avons évalué la détresse psychologique, la dérégulation émotionnelle, et les symptômes dépressifs et anxieux comme résultats. **Résultats:** Nous avons constaté que les deux groupes du traitement avaient des réductions significatives de la dérégulation émotionnelle, de la détresse psychologique, de la dépression et de l'anxiété au post-traitement et au suivi de 3 mois. Les participants affectés à la TAM de prétraitement ont eu une plus grande amélioration de la détresse psychologique en fin de traitement. **Conclusion:** Cette étude pilote offre des données probantes préliminaires de l'augmentation potentielle de la FT-TCD utilisant la TAM dans une situation réelle. Les futures études devraient examiner si la TAM n'augmente seulement la FT-TCD que par le recours à un groupe témoin prétraitement comparable.

Mots clés: *psychothérapie abrégée, psychothérapie de groupe, recherche de résultat, thérapie comportementale dialectique, santé mentale des jeunes*

Introduction

Mental and substance use disorders are the leading cause of years lived with disability worldwide (Vos et al., 2012). One in four adults will develop a psychological disorder in their lifetime with 75% having an onset by age 24 (Kessler et al., 2005), while fewer than 50% of children and youth with mental illness receive treatment (Merikangas, Nakamura, & Kessler, 2009). Adult psychiatry has traditionally focused on advanced stages of psychiatric disorder, with specialized psychiatric services provided exclusively to a subgroup of people who meet highly restrictive criteria (McGorry, Bates, & Birchwood, 2013). This model does not address the high levels of unmet need for young adults with diverse and emerging mental disorders, who face barriers to accessing appropriate services, including restrictive criteria, wait lists, and lack of youth-focused care (McGorry et al., 2007). Effective treatment of these problems among emerging adults (EA) may divert their trajectory before they become chronic and impact the critical developmental milestones of this life stage, such as completing education, gaining employment, and achieving greater independence (Berndt et al., 2000; Kessler, Foster, Saunders, & Stang, 1995; Zivin, Eisenberg, Gollust, & Golberstein, 2009).

Dialectical Behaviour Therapy (DBT) is an empirically supported treatment that was developed to treat adults with high suicide risk and borderline personality disorder (BPD) (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991) and has been demonstrated to provide long-term gains in BPD symptoms, depression, suicide ideation and attempts, and to enhance social functioning (see Kliem, Kröger, & Kosfelder, 2010 for a recent meta-analysis). Standard DBT is quite resource intensive, consisting of an hour of weekly individual therapy, a two-hour weekly skills training (DBT-ST) component, telephone coaching and a weekly consultation group for therapists. Although the intensity of standard DBT does not lend itself to applications in many settings where resources are limited, such as college counselling centres or community treatment centres, the skills training component alone (DBT-ST) is an abbreviated therapy that has been demonstrated to be effective across a range of populations and may be more easily delivered in these settings.

Emerging evidence supports DBT-ST as a stand-alone treatment for adults (McMain, Guimond, Barnhart, Habinski, &

Streiner, 2017; Soler et al., 2009; Valentine, Bankoff, Poulin, Reidler, & Pantalone, 2015), adolescents (Nelson-Gray et al., 2006), EA (Lyng, Swales, Hastings, Millar, & Duffy, 2019), as well as in college counseling centers (Chugani, Ghali, & Brunner, 2013; Panepinto, Uschold, Olandese, & Linn, 2015; Pistorello, Fruzzetti, Maclane, Gallop, & Iverson, 2012; Rizvi & Steffel, 2014; Uliaszek, Hamdullahpur, Chugani, & Rashid, 2018). Moreover, the DBT-ST component has been demonstrated to be an essential component of treatment that fully mediated suicide attempts and changes in depression and anger control (Linehan et al., 2015; Neacsiu, Rizvi, & Linehan, 2010).

There are several reasons to investigate the implementation of DBT-ST as a transdiagnostic treatment of EAs in real-world settings with limited resources. First, the rationale for implementing DBT-ST with early stage EA rests with evidence linking emotional dysregulation to the development of psychopathology including internalizing, externalizing, and thought disorders (Caspi et al., 2014; McLaughlin, Hatzenbuehler, Mennin, & Nolen-Hoeksema, 2011). Emotion dysregulation involves difficulties within the following dimensions of emotion regulation: “(a) awareness and understanding of emotions; (b) acceptance of emotions; (c) the ability to engage in goal-directed behavior, and refrain from impulsive behavior, when experiencing negative emotions; and (d) access to emotion regulation strategies perceived as effective” (Gratz & Roemer, 2004, p.43). DBT skills target the emotional, interpersonal, behavioural, and cognitive dysregulation (Neacsiu, Eberle, Kramer, Wiesmann, & Linehan, 2014), which maintains symptoms and is shared across psychological disorders (Caspi et al., 2014; Harvey, Watkins, Mansell, & Shafran, 2004; McLaughlin et al., 2011). Second, these skills, such as emotion regulation, distress tolerance, and interpersonal effectiveness, that directly target these areas of dysregulation are developmentally relevant to EA (e.g., Pistorello et al., 2012). Finally, the didactic nature of the skills training and the modular nature of the skills components can be easily integrated into college and community treatment settings focused on EA with a range of presenting concerns.

One challenge with any patient population, but with emerging adults (EA) in particular, is motivation for change and engagement with treatment (Kim, Munson, & McKay, 2012; Munson et al., 2012). The use of pre-treatment

motivational interviewing (MI) to increase motivation and decrease ambivalence (Miller & Rollnick, 2012) has increased, particularly in substance use (Burke, Arkowitz, & Menchola, 2003). There have been fewer studies in mental health, but evidence suggests that MI may increase mental health outcomes for depression and anxiety (Arkowitz et al., 2015; Dean, Britt, Bell, Stanley, & Collings, 2016), as well as for eating disorders and dual diagnosis (i.e., comorbid psychosis and substance use disorder; Westra, Aviram, & Doell, 2011). In particular, brief MI pre-treatment has been shown to benefit treatment response to Cognitive Behavioural Therapy (CBT) for anxiety (Westra, Arkowitz, & Dozois, 2009; Westra & Dozois, 2006). A recent meta-analysis of MI+CBT for anxiety found that MI interventions increased treatment efficacy (with effect size Hedges $g = .56$) but did not decrease drop-out rates (Marker & Norton, 2018), suggesting that the mechanism of this change may not be through increased attendance. Although standard DBT includes a pre-commitment phase involving getting ready for treatment before formally commencing therapy (Linehan, 2015), studies of DBT-ST to date have not included this component, likely because it is more resource intensive.

MI has typically been delivered as an individual intervention and only recently have studies examined it in a group setting with youth (D'Amico et al., 2011; Wagner & Ingersoll, 2013), which is less resource intensive than individual treatment. One RCT examined a group motivational enhancement therapy (MET) among at-risk youth to augment an intervention targeting risky sexual behavior (Schmiege et al., 2009). MET is an adaptation of MI in which normative feedback is given to the client in one or more sessions and discussed in a non-confrontational manner (Miller, 2000). Youth who received one session of MET had greater reductions in sexual risk behavior compared to those in the control group who only received the sexual risk reduction intervention (Schmiege et al., 2009). Another quasi-experimental study examined group MET using the First Contact program among youth ages 14-20 receiving treatment for substance abuse or dependence (Breslin, Li, Sdao-Jarvie, Tupker, & Ittig-Deland, 2002). First Contact consists of four group sessions that address the costs and benefits of change; identify high-risk situations (triggers) associated with substance use, as well as consequences and alternatives; discuss values and achieving life goals; and teach the stages of change. They found that 6 months after the intervention, youth who had sought additional help (First Contact) had reduced use and consequences compared to youth who did not seek additional help (Breslin et al., 2002).

In this study, we set out to test a group MET pre-treatment in two real-world settings (a hospital clinic and a post-secondary institution), where EA present with a range of concerns and where resources are limited. The goal of this pilot study was to investigate whether a pre-treatment MET group for EA with mild to moderate mental health

difficulties improved the treatment effects of a 12-week DBT-ST protocol. Given the central role of ST in DBT outcomes (Linehan et al., 2015; Neacsiu et al., 2010), as well as the role of skills in directly targeting areas of dysregulation that are shared across psychological disorders (Caspi et al., 2014; McLaughlin et al., 2011), we examined coping skills as a potential mediator of this change. The receipt of psychotropic medication and ancillary psychotherapy were examined as possible confounding variables. We hypothesized that MET would enhance treatment outcomes and that coping skills would mediate this change.

Methods

Setting

Participants were recruited from two sites in Hamilton, Canada: 1) The Youth Wellness Centre (YWC) at St. Joseph's Healthcare Hamilton (SJHH), which facilitates rapid assessment, treatment, and recovery for 17-25-year-olds experiencing early stage mental health difficulties (Wang et al., 2019); and 2) McMaster University's Student Wellness Centre (SWC), a university counseling center. The YWC is an innovative service that focuses on incipient illness and delivers treatment in a community-based setting.

Participants and design

Clinicians at both sites referred potentially eligible EA to the study. Students at SWC could also self-refer in response to flyers and posters. Study inclusion criteria were: 1) ages 17-25 years; 2) English literacy; and 3) difficulty managing emotions as reported by a referring clinician or self-identified (based on response to posters for a research study on how a "skills group might help you to: Understand and manage your emotions"; "Choose skillful behaviors"; "Improve the quality of your life" and "Reduce your substance use"). Exclusion criteria ensured that people with more severe symptoms or disorders were referred to the appropriate evidence-based treatment, rather than to an experimental transdiagnostic early intervention treatment. These criteria were: 1) developmental or intellectual limitations that would interfere with group participation; 2) presence of borderline personality disorder (BPD), anorexia nervosa or bulimia nervosa (past or current), post-traumatic stress disorder (current), moderate to severe depression (current), bipolar disorder, schizophrenia, and/or moderate to severe substance use disorder (current), based on DSM-5 criteria; and 3) current and/or recent behavioural dysregulation indicated by: suicide attempt in past 12 months; or cutting, burning, strangling or head banging in past week or ≥ 14 times in past 90 days; or induced vomiting or laxative use in past week or ≥ 14 times in past 90 days, as measured by the BSL-23 supplement (see Measures). The rationale for exclusion criterion 2 (e.g., people with moderate to severe depression) was an ethical one. We decided to offer EA with more severe symptoms evidence-based treatments through

existing specialized services in this community, rather than subject them to an experimental pilot study.

Procedures

After providing informed consent, participants completed computerized self-report measures to ensure that they scored below 2.5 on the Borderline Symptom List-23 (BSL-23) and that they met the behavioural regulation criterion (using BSL-23 supplement). This cut-off was chosen based on the criterion of ≥ 2.5 that is used in the local DBT Program at SJHH and is a more conservative cut-off than other studies (e.g., < 2.0 (Meaney, Hasking, & Reupert, 2016) to be more inclusive at screening. A licensed psychologist (JIT) or Clinical Psychology graduate student under her supervision assessed for self-injury, BPD, and other psychiatric diagnoses, using in-person structured interviews. Eligible participants were reviewed with a psychiatrist (RBZ) prior to inclusion in the study.

Measures were completed at pre-treatment (T_0), during the first week of DBT-ST (T_1), and on weeks 5 (T_5), 9 (T_9), 12 at post-treatment (T_{12}), and 24 at follow-up (T_{24} ; see Table 1). Participants were compensated financially at each stage of the study. This study was approved by the Research Ethics Board and pre-registered in clinicaltrials.gov.

All eligible participants were randomly assigned to either DBT-ST only or MET followed by DBT-ST. Seventy-six EA met eligibility criteria and were randomized (See Fig. 1 for CONSORT diagram) by the research coordinator in blocks

with a minimum of two eligible participants, using a random number generator.

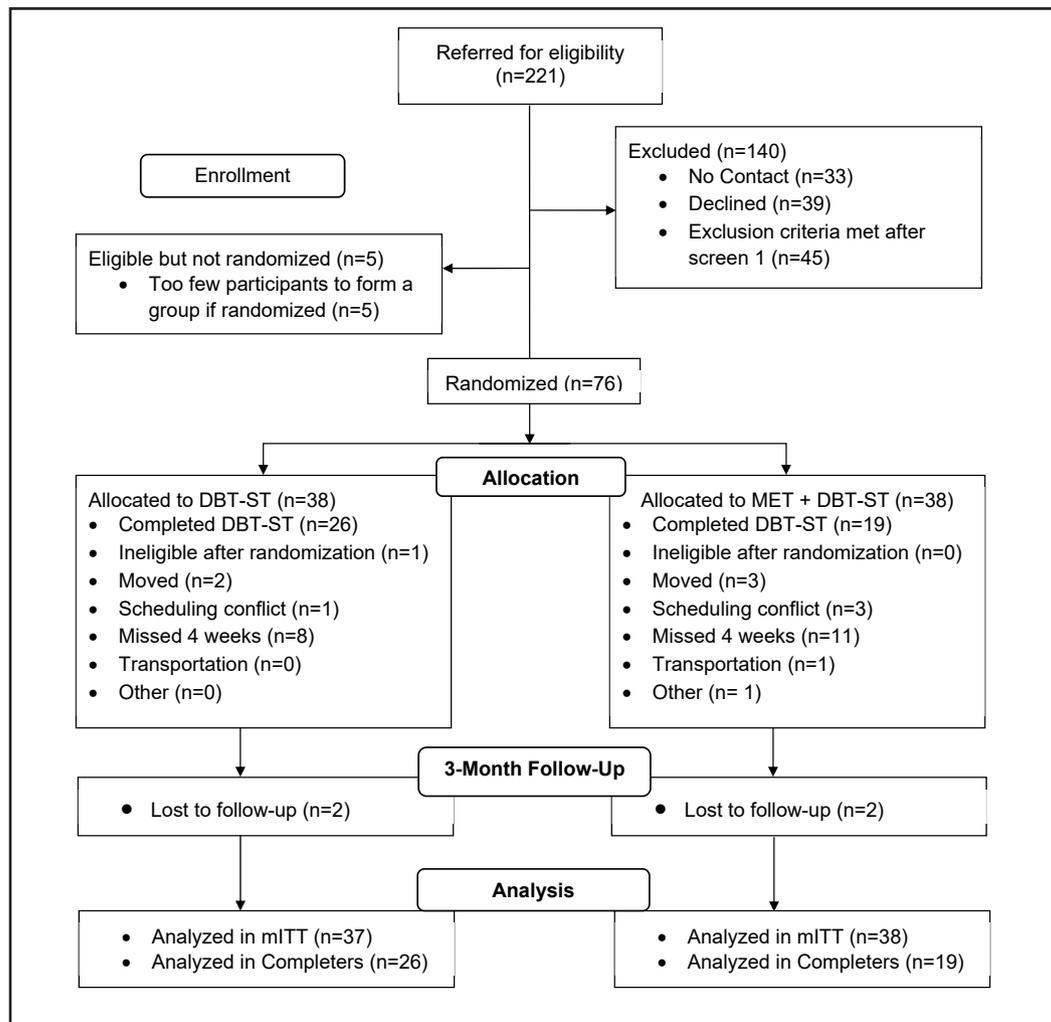
Intervention conditions

The MET pre-treatment (Rollnick & Miller, 1995) consisted of four weekly 1.5-hour group sessions (see Table 2). This manualized group treatment is based on First Contact (Tupker, 2004), a four-session treatment based on MET (Miller, 1999) designed for youth with concurrent disorders. The manual was used with slight modifications to the language to increase applicability of the MET principles to EA with and without concurrent disorders (e.g., replacing “substance use” with “problem behavior”).

DBT-ST consisted of 12 weekly two-hour sessions with 4-12 EAs per group. The groups were modular, such that new participants could join every four weeks (see Table 2). Participants received a binder with all handouts and worksheets during the first group session. Homework and diary cards (only skills side) were assigned and reviewed weekly. Skills leaders attended weekly DBT Consultation team meetings (Linehan, 2015). No modifications were made based on the (Linehan, 2015) manual except for condensing the treatment to 12 sessions versus 14 (sample schedule in manual) in order to better fit in a university semester. Such a modification has similarly been made in other DBT-ST studies in college populations (e.g., 11 weeks in Chugani et al., 2013; and 6-12 weeks in Panepinto et al., 2015).

Table 1. Administration schedule for all measures (including screening tools)						
Measure	Time (Week#) ¹					
	T ₀	T ₁	T ₅	T ₉	T ₁₂	T ₂₄
Screening only						
IPDE DSM-IV BPD section	✓					
BSL-23 + Supplement	✓				✓	✓
Descriptives						
GAIN-Q3	✓					
Service Use History	✓				✓	✓
M.I.N.I.	✓				✓	
Primary Outcome Measures						
K10	✓	✓	✓	✓	✓	✓
DERS	✓	✓	✓	✓	✓	✓
Secondary Outcome Measures						
PHQ	✓				✓	✓
DBT – Ways of Coping Checklist	✓	✓	✓	✓	✓	✓

¹ Recruitment commenced September 2015 and concluded August 2017

Figure 1. Transdiagnostic Early Intervention Pilot Treatment Study Flow Diagram

Treatment implementation and fidelity

Ten therapists (psychologist, registered nurses, and social workers) were trained in a one-day workshop (MI), and in DBT-ST via a five-day training program by the Treatment Implementation Collaborative (TIC) by DBT-Linehan Board-Certified clinicians. Supervision was provided for each of the interventions. A clinical lead of the DBT program (LB) provided further training and support. A DBT expert from TIC reviewed nine videotaped sessions to monitor fidelity and provide feedback, which was discussed in a teleconference with the expert for each tape reviewed. The purpose was not to rate adherence, but rather to enhance the training received through constructive feedback.

Measures

The Borderline Symptom List-23 (BSL-23; Bohus et al., 2007; Bohus et al., 2009) was used to assess for BPD symptoms and self-injurious behaviours (using a modified BSL supplement). The BSL-23 demonstrated evidence of good test-retest reliability over a one-week period, ($r = .82$; $p < .0001$; Bohus et al., 2009), and high internal consistency

(Cronbach's $\alpha = .93 - .97$; Bohus et al., 2007). Participants who remained eligible following scoring of the BSL-23 and supplement were assessed for self-injury, BPD, and other psychiatric diagnoses, using in-person structured interviews to ensure that exclusion criteria were not met.

The Mini-International Neuropsychiatric Interview (MINI 6.0.0) is a brief structured interview for the major psychiatric disorders in the DSM-IV (Sheehan et al., 1998). Because this study began before the MINI for DSM-5 was available, we used the MINI for DSM-IV. However, we used the DSM-5 diagnostic criteria to assess for clinical diagnoses and inclusion vs. exclusion criteria, including classifications of mild, moderate, and severe for major depressive disorder and substance use disorders.

The International Personality Disorder Examination (IPDE; Loranger, 1997) is a semi-structured interview used to determine if participants met full criteria for BPD. It is generally regarded as a conservative diagnostic instrument that generates few false positives. Short-term test-retest reliability has been shown to be good and interrater reliability has

Table 2. Motivational Enhancement and dialectical behaviour therapy skills training curriculum

Motivational Enhancement 4-week curriculum		
1	• Decision to change exercise • The decision to change • Weekly goal setting	
2	• Check-in • Triggers, consequences, and alternatives • Triggers, consequences and alternatives exercise • Weekly goal setting	
3	• Check-in • Things that are important to me • Values exercise • Weekly goal setting	
4	• Check-in • Stages of change • Stages of change exercise • Weekly goal setting	
DBT-ST 12-week curriculum		
Distress Tolerance Skills		
1	Orientation and Mindfulness	• Goal of Skills Training • Guidelines for Skills Training • Wise Mind – States of Mind
2	Crisis Survival Skills	• Goals of Distress Tolerance • The STOP Skill • Pros and Cons of Acting on Crisis Urges
3	Crisis Survival Skills	• TIP Skills: Changing Your Body Chemistry • Distracting • Self-Soothing • Improving the Moment
4	Reality Acceptance Skills	• Radical Acceptance • Turning the Mind • Willingness • Half-Smiling and Willing Hands
Emotion Regulation Skills		
5	Orientation and Mindfulness	• Taking Hold of Your Mind—“What” Skills
6	Understanding and Naming Emotions	• Goals of Emotion Regulation • What Emotions Do for You • What Makes It Hard to Regulate Your Emotions • Describing Emotions
7	Changing Emotional Responses	• Checking the Facts • Opposite Action and Problem Solving

8	Reducing Vulnerability to Emotion Mind	• Accumulating Positive Emotions in the Short Term • Pleasant Events List • Values and Priorities List • Building Mastery and Cope Ahead • Taking Care of Your Mind by Taking Care of Your Body
Distress Tolerance for Addiction and Interpersonal Effectiveness Skills		
9	Orientation and Mindfulness	• Taking Hold of Your Mind—“How” Skills
10	Skills When the Crisis is Addiction	• When the Crisis is Addiction • Common Addictions • Clear Mind • Burning Bridges and Building New Ones
11	Interpersonal Effectiveness	• Goals of Interpersonal Effectiveness • Factors in the Way of Interpersonal Effectiveness
12	Interpersonal Effectiveness	• Objective Effectiveness (DEAR MAN) • Relationship Effectiveness (GIVE) • Self-respect Effectiveness (FAST)

been shown to be excellent (Loranger, 1997). See Table 3 for sample characteristics.

We used the clinician-administered Global Appraisal of Individual Need (Titus & Dennis, 2003) to collect demographic information. We selected questions from the Brief Treatment History Interview (B-THI; Linehan & Heard, 1987) to assess for psychotropic medication use (i.e. whether participants took medications at any point during the study) and ancillary psychotherapy (i.e. whether participants received any additional sessions of psychotherapy during the study).

Primary outcome measures

The Kessler Psychological Distress Scale (K10) is a 10-item well-validated self-report instrument with good internal consistency (Cronbach’s $\alpha = .93$), discriminant validity, and consistent psychometric properties across wide sociodemographic samples (Kessler et al., 2002). The K10 demonstrated a good internal consistency ($\alpha = .85$) within our sample.

The Difficulties in Emotion Regulation Scale (DERS) is a well-validated 36-item self-report measure of emotion dysregulation with good internal consistency (Cronbach’s $\alpha = .93$), test-retest reliability ($r = .88$), and construct and predictive validity (Gratz & Roemer, 2004). The DERS demonstrated an excellent internal consistency ($\alpha = .94$) within our sample.

Table 3. Descriptive data of randomized participants (modified intent-to-treat)

Descriptive variable	Total (n = 75)	MET (n = 38)	DBT-ST (n = 37)	Inferential statistic	<i>p</i>
Drop-out, n (%)	30 (40.0%)	19 (50.0%)	11 (29.7%)	$\chi^2(1) = 3.21$	.07
Female, n (%)	56 (77.8%)	27 (71.1%)	29 (85.3%)	$\chi^2(2) = 2.19$	.36
Age, mean (SD)	19.35 (2.11)	19.18 (2.14)	19.55 (2.10)	$t(63) = 0.71$	.48
Heterosexual, n (%)	46 (62.2%)	25 (65.8%)	21 (58.3%)	$\chi^2(1) = 0.44$	.51
White, n (%)	57 (77.0%)	26 (68.4%)	31 (86.1%)	$\chi^2(1) = 3.27$	.07
PHQ-9 score at T ₀ , mean (SD)	12.38 (5.92)	12.46 (6.00)	12.30 (5.93)	$t(72) = 0.12$	.91
GAD-7 score at T ₀ , mean (SD)	7.20 (3.63)	7.03 (3.72)	7.38 (3.58)	$t(72) = 0.41$	.68
DERS score at T ₀ , mean (SD)	118.75 (20.46)	117.27 (24.7)	120.24 (15.4)	$t(72) = 0.62$	.54
K-10 score at T ₀ , mean (SD)	26.81 (5.39)	27.03 (5.48)	26.56 (5.36)	$t(70) = 0.37$	.72
ERG Attendance, mean (SD)	6.01 (3.87)	5.58 (4.20)	6.47 (3.49)	$t(72) = .99$	.33
Ancillary psychotherapy (T ₁₂), n (%)	13 (17.3%)	6 (15.8%)	7 (18.9%)	$\chi^2(1) = 0.13$	.72
Current medication (T ₁₂), n (%)	12 (16.0%)	8 (21.1%)	4 (10.8%)	$\chi^2(1) = 1.46$	.23
Psychiatric diagnoses (T ₀), n (%)					
Major depressive disorder current	6 (8.0%)	2 (5.3%)	4 (10.8%)	$\chi^2(1) = 0.78$	.38
Major depressive disorder past	32 (42.7%)	18 (47.4%)	14 (37.8%)	$\chi^2(1) = 0.70$	.40
Cannabis abuse	1 (1.3%)	1 (2.6%)	0 (0.0%)	$\chi^2(1) = 0.99$	.32
Cannabis dependence	4 (5.3%)	3 (7.9%)	1 (2.7%)	$\chi^2(1) = 1.00$	.32
Alcohol abuse	1 (1.3%)	1 (2.6%)	0 (0.0%)	$\chi^2(1) = 0.99$	.32
Panic disorder	7 (9.3%)	3 (7.9%)	4 (10.8%)	$\chi^2(1) = 0.19$	.66
Social anxiety disorder	14 (18.7%)	4 (10.5%)	10 (27.0%)	$\chi^2(1) = 3.36$	.07
Obsessive compulsive disorder	4 (5.3%)	0 (0.0%)	4 (10.8%)	$\chi^2(1) = 4.34^*$	.04
Generalized anxiety disorder	16 (21.3%)	7 (18.4%)	9 (24.3%)	$\chi^2(1) = 0.39$	.53
Number of diagnoses, mean (SD)	0.91 (1.55)	0.58 (1.15)	1.24 (1.83)	$t(73) = 1.88$	.06

**p* < .05

Secondary Outcome Measures

The DBT Skills subscale of the DBT Ways of Coping Checklist was used; the full scale has excellent internal consistency ($\alpha \geq .92$), good test-retest reliability ($r = .71$) and criterion validity (Neacsiu, Rizvi, Vitaliano, Lynch, & Linehan, 2010). The DBT Ways of Coping Checklist demonstrated an excellent internal consistency ($\alpha = .92$) within our sample.

The well-validated Patient Health Questionnaire (PHQ; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999) includes brief measures of depressive (PHQ-9) and anxious (GAD-7) symptoms. The PHQ-9 demonstrated a good internal consistency ($\alpha = .84$) and GAD-7 demonstrated an adequate internal consistency ($\alpha = .70$) within our sample. We assessed for changes in psychopathology symptoms at pre- and post-treatment (T₁₂), and at follow-up (T₂₄).

Data analysis

We analyzed the data in three ways: 1) modified Intention-to-Treat (mITT); one participant assigned to DBT-ST was found to be ineligible only after randomization and was not included in the final sample; 2) Per Protocol, examining all participants who followed the protocol, thus excluding participants who did not complete at least one MET session if randomized to this condition; and 3) Completers, examining only those who completed DBT-ST and did not miss four DBT-ST sessions in a row. Baseline characteristics for the mITT and Completers, as well as sites (YWC versus SWC), were compared using chi-square analyses for categorical variables and *t*-tests for continuous variables.

As our design included a multilevel data structure (i.e., repeated measures nested within individuals and sorted by group), we used Hierarchical Linear Modelling (HLM) to assess the impact of DBT-ST, with and without MET, on EA distress and emotion dysregulation, as well as on

anxiety and depressive symptoms. HLM accounts for missing data using full estimation maximum likelihood and accounts for differences in the number of observations across participants. For anxiety and depressive symptoms, only follow-up (T_{24}) outcomes were examined, as we had fewer data points (see Table 1) and could therefore not examine T_{12} outcomes using HLM. We present only the mITT and Completer results as the Per Protocol and Completer results were virtually identical. To account for missing data, we included a restricted estimated maximum likelihood model. Effect sizes were calculated using an online calculator provided by Dr. Lee A. Becker from the University of Colorado. Cohen's d was calculated using the t and df values within our HLM analyses.

We examined coping skills as a potential mediator of this change over time at post-treatment and at 3-month follow-up. We also examined receipt of psychotropic medication and ancillary psychotherapy as possible confounding variables. Four separate bootstrapped multiple mediation models (1,000 samples, 95% confidence interval, bias corrected) were conducted using the PROCESS Macro for SPSS (Hayes, 2013) for Completers only.

Results

Thirty-eight participants were assigned to each condition. Twenty-six completed DBT-ST and 19 completed MET+DBT-ST; two each were lost to follow-up from DBT-ST and MET+DBT-ST (see Fig. 1). There was no significant difference between groups on number of completers, $\chi^2 = 3.21, p = .073$. Site differences are reported in a supplemental table.

MITT participants were primarily White women who presented with high emotional dysregulation and psychological distress (see Table 3).

Chi-square analyses showed that mITT groups did not differ on any demographic or clinical variables at baseline, except for obsessive-compulsive disorder symptoms (OCD; see Table 3). Completers were significantly more likely to have received ancillary psychotherapy and medication, to have met criteria for past MDD, social anxiety disorder, and GAD, and to have had a higher average number of diagnoses ($M = 1.24, SD = 1.83$ vs $M = 0.58, SD = 1.15$). YWC participants were more likely to be younger, White, and to have lower DERS scores at baseline compared to SWC participants; they did not differ on any other variable.

Participants in the DBT-ST+MET condition experienced greater decreases in psychological distress over time (T_0 - T_{24} : Coefficient = $-1.00, SE = 0.38, t = 2.60, p = .01$), and marginally greater decreases in anxiety symptoms over time than those in the DBT-ST condition (T_0 - T_{24} : Coefficient = $-1.00, SE = 0.59, t = 1.70, p = .09$). However, the rate of change for emotional dysregulation and depressive symptomatology was not significantly different between

groups (see Table 4). These findings were consistent across the mITT and completer groups. Pre-post effects were quite large; between conditions effects (i.e., rate of change) were small to medium. See Table 5 and Figures 2-5 for means and standard deviations of outcome measures over time for the mITT sample.

Participants who reported taking medication had significantly lower scores on the GAD-7 at T_{24} compared to those not taking medication (Coefficient = $-2.33, SE = 1.14, t = 2.05, p = .047$); there were no other effects of medication use or ancillary psychotherapy. SWC participants experienced significantly faster declines in DERS scores relative to YWC participants at T_{12} (Coefficient = $-4.87, SE = 1.97, t = 2.47, p = .02$) and T_{24} (Coefficient = $-3.33, SE = 1.53, t = 2.17, p = .04$), and demonstrated significantly lower scores on the K10 at T_{12} (Coefficient = $-5.20, SE = 2.31, t = 2.47, p = .03$) and T_{24} (Coefficient = $-5.02, SE = 2.21, t = 2.27, p = .03$). Change in DBT skills use from T_0 to T_{12} did not account for the relationship between condition and change in scores on the DERS, K10, GAD-7 or PHQ-9 from T_0 to T_{12} , suggesting that skills use did not mediate changes in outcomes.

Discussion

In this study we tested the efficacy of a pre-treatment MET as part of a transdiagnostic intervention for EA with emotional dysregulation. Furthermore, we examined DBT skills use as a potential mechanism of change. Our findings build on existing evidence that DBT skills delivered in a group format is likely effective for young people in these settings (Chugani, 2015; Chugani & Landes, 2016; Uliaszek, Rashid, Williams, & Gulamani, 2016), particularly for EA experiencing emotion dysregulation (Rizvi & Steffel, 2014).

While we found significant improvements from pre- to post-treatment and at the 3-month follow-up on all outcomes (emotional dysregulation, psychological distress, depressive and anxiety symptoms), participants assigned to MET pre-treatment experienced greater improvement in psychological distress at post-treatment and follow-up. This significant improvement in transdiagnostic symptoms is consistent with similar studies examining DBT-ST only (e.g., Neacsiu et al., 2014; Uliaszek et al., 2016). Unlike Neacsiu's (2014) study, however, participants in the current study maintained their gains in emotional dysregulation, anxiety, and depression at follow-up.

Surprisingly, people who received the intervention in the university setting demonstrated larger declines in emotional dysregulation and psychological distress over time, than did those in the community clinic. Given that the university group reported significantly higher baseline emotion dysregulation, larger decreases on this variable may be attributable to regression to the mean. It is also possible that

Table 4. Hierarchical linear modelling results for pre-to post-treatment and pre-treatment to follow-up change

	mITT (n=75)						Completers (n=45)					
	B	SE	t	df	p	d	B	SE	t	df	p	d
Emotional dysregulation (DERS)												
Intercept (T_0 - T_{12})	93.87***	3.16	29.75	73	<.001	6.96	93.26***	3.33	27.97	43	<.001	8.53
Condition (T_0 - T_{24})	91.16***	3.38	27.01	73	<.001	6.32	90.38***	3.52	25.66	43	<.001	7.82
Condition (T_0 - T_{12})	-2.46	6.30	0.39	73	.70		-7.74	6.90	1.14	43	.26	
Condition (T_0 - T_{24})	-2.63	6.79	0.39	73	.70		-7.61	7.09	1.07	43	.29	
Time point, slope												
Intercept (T_0 - T_{12})	-6.49***	0.93	7.02	73	<.001	1.64	-6.68***	1.08	6.34	43	<.001	1.93
Condition (T_0 - T_{24})	-5.55***	0.75	7.42	73	<.001	1.74	-5.70***	0.82	6.93	43	<.001	2.11
Condition (T_0 - T_{12})	0.45	1.85	0.24	73	.81		-0.81	2.18	0.38	43	.71	
Condition (T_0 - T_{24})	0.28	1.49	0.19	73	.85		-0.59	1.71	0.35	43	.73	
Psychological distress (K10)												
Intercept (T_0 - T_{12})	24.98***	1.04	24.12	73	<.001	5.65	25.65***	1.14	22.46	43	<.001	6.85
Condition (T_0 - T_{24})	24.30***	1.03	23.62	73	<.001	5.53	24.75***	1.11	22.48	43	<.001	6.86
Condition (T_0 - T_{12})	-3.86	2.07	1.86	73	.07		-5.43*	2.31	2.35	43	.02	0.72
Condition (T_0 - T_{24})	-4.27*	2.05	2.08	73	.04	0.49	-5.47*	2.25	2.43	43	.02	0.74
Time point, slope												
Intercept (T_0 - T_{12})	-0.76**	0.24	3.22	73	<.01	0.75	-0.51*	-2.26	2.26	43	.03	0.69
Condition (T_0 - T_{24})	-0.74***	0.19	3.84	73	<.001	0.89	-0.62**	0.19	3.26	43	<.01	0.99
Condition (T_0 - T_{12})	-1.19**	0.47	2.53	73	.01	0.59	-1.42**	-3.12	3.12	43	<.01	0.95
Condition (T_0 - T_{24})	-1.00**	0.38	2.60	73	.01	0.61	-1.06**	0.41	2.62	43	.01	0.80
Depression (PHQ-9)												
Intercept (T_0 - T_{24})	7.07***	0.72	9.86	72	<.001	2.32	7.38***	0.75	9.77	43	<.001	2.98
Condition (T_0 - T_{24})	-1.85	1.43	1.29	72	.20		-2.25	1.52	1.48	43	.15	
Time point, slope												
Intercept (T_0 - T_{24})	-2.48***	0.37	6.67	72	<.001	1.57	-2.58***	0.40	6.41	43	<.001	1.96
Condition (T_0 - T_{24})	-0.88	0.74	1.28	72	.24		-0.47	0.88	0.53	43	.60	
Anxiety (GAD-7)												
Intercept (T_0 - T_{24})	5.36***	0.56	9.60	72	<.001	2.26	5.72***	0.58	9.79	43	<.001	2.99
Condition (T_0 - T_{24})	-2.42*	1.11	2.19	72	.03	0.52	-2.71*	1.19	2.28	43	.03	0.70
Time point, slope												
Intercept (T_0 - T_{24})	-0.88**	0.30	2.98	72	<.01	0.72	0.94**	0.32	2.97	43	<.01	0.91
Condition (T_0 - T_{24})	-1.00	0.59	1.70	72	.09		-1.17	0.66	1.77	43	.08	

Note: T_0 = Baseline; T_{12} = Week 12 (post-treatment); T_{24} = Week 24 (3-month follow-up); * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 5. Descriptive data of emotional dysregulation, psychological distress, depressive symptoms and anxiety symptoms across time for mITT

Measure	Group	Time point					
		t0	t1	t5	t9	t12	t24
DERS, Mean (SD)	MET + DBT-ST	117.27 (24.66)	114.43 (21.88)	100.57 (19.84)	95.67 (21.66)	92.52 (25.57)	89.4 (24.87)
	DBT-ST	120.24 (15.36)	118.67 (19.24)	106.56 (21.16)	99.05 (19.38)	95.23 (23.04)	94.85 (25.52)
K10, Mean (SD)	MET + DBT-ST	27.03 (5.48)	30.25 (7.45)	25.62 (9.59)	23.83 (8.15)	22.76 (8.14)	21.85 (8.29)
	DBT-ST	26.56 (5.36)	28.82 (7.04)	26.88 (7.78)	26.64 (7.44)	27.12 (8.16)	26.15 (8.1)
PHQ-9, Mean (SD)	MET + DBT-ST	12.46 (5.99)	---	---	---	7.60 (5.56)	6.80 (4.57)
	DBT-ST	12.30 (5.93)	---	---	---	9.73 (6.03)	8.81 (5.63)
GAD-7, Mean (SD)	MET + DBT-ST	7.02 (3.72)	---	---	---	5.40 (3.63)	4.60 (3.94)
	DBT-ST	7.38 (3.58)	---	---	---	6.88 (4.18)	6.84 (3.67)

because the intervention is structured in a classroom-like environment, with lessons and assigned homework, it was particularly appropriate for a university population that is used to learning in this manner.

Although people across conditions demonstrated the expected significant increase in DBT skills use at post-treatment and follow-up, change in DBT skills use did not mediate the relationship between condition and reductions across outcomes of interest as they did in other studies (Neacsu et al., 2014; Uliaszek et al., 2018). The mechanism of change in this population may be something other than skills use (e.g., engagement in goal-directed behaviors, psychoeducation), which was not directly measured. Alternatively, DBT-ST may have influenced both skills use and clinical outcomes without one change mediating the other.

Ancillary therapies had minimal effects on outcome. The lack of impact of other psychotherapy on outcomes was consistent with previous studies (e.g., Neacsu et al., 2014). Although participants who reported medication use also demonstrated lower follow-up scores on the GAD-7, they represented a very small portion of our sample. Moreover, while controlling for this covariate, participants still improved significantly in their anxiety scores. As such, interpreting the finding that people taking medication improved more, given our sample size, is problematic. Given the common occurrence of concurrent interventions within this population, these results are ecologically valid and suggest

that the effects of the DBT-ST only group are independent of other interventions received.

Our retention rate for DBT-ST only was 68%, for MET 50%, and overall 60%. This retention rate is lower than the DBT-ST condition in Neacsu's (2015) study (71%), but greater than their overall retention rate of 52%. It is lower than reported in a meta-analysis of treatment drop out, which indicates a mean retention of 80% (Swift & Greenberg, 2012). Our Completer, mITT, and Per Protocol analyses resulted in similar findings, suggesting that the treatment effects are robust even when people discontinue treatment. Although the MET condition had the lowest retention rate, it was not statistically significant. Moreover, attrition may have been due to the additional four weeks of treatment, which went beyond the university semester. Participants who dropped out were less severe in many respects (e.g., fewer diagnoses, less ancillary treatment) than were those who completed. Thus, participants may have dropped out because they noticed improvements earlier and chose not to continue.

We must note several study limitations. First, we could not examine the unique effectiveness of DBT-ST because there was no control condition. The study design did not include a waitlist control as one of sites was newly established and did not have a waitlist at study inception. Second, participants in the MET condition received an additional four sessions of treatment, representing 33% more treatment. This is an important limitation, given that we cannot be sure the improved outcomes were due to MET, specifically, rather

Figure 2. Difficulties in Emotion Regulation Group Difference Over Time

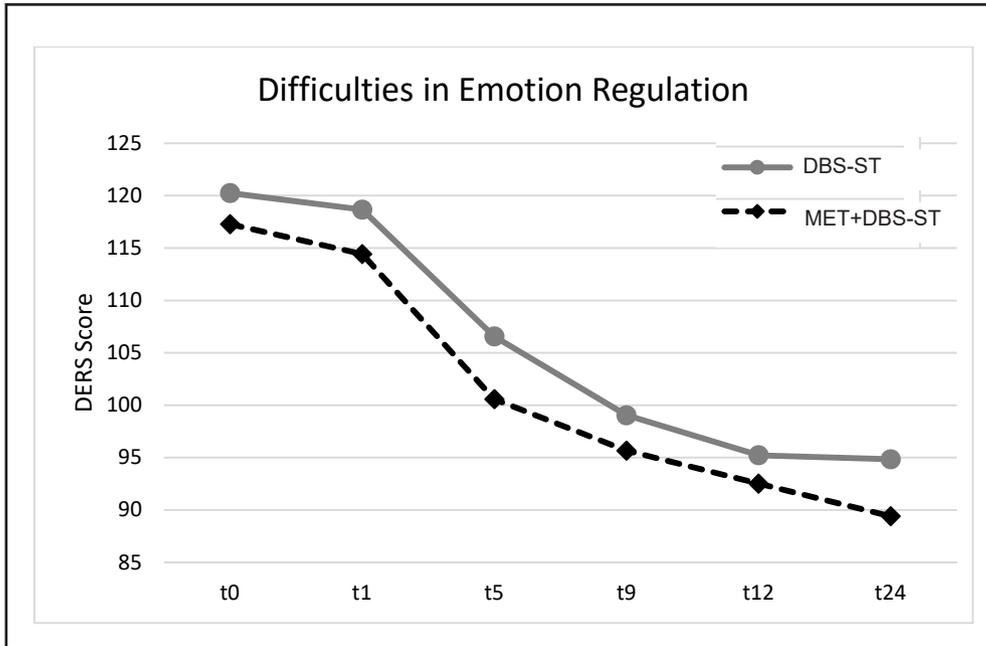
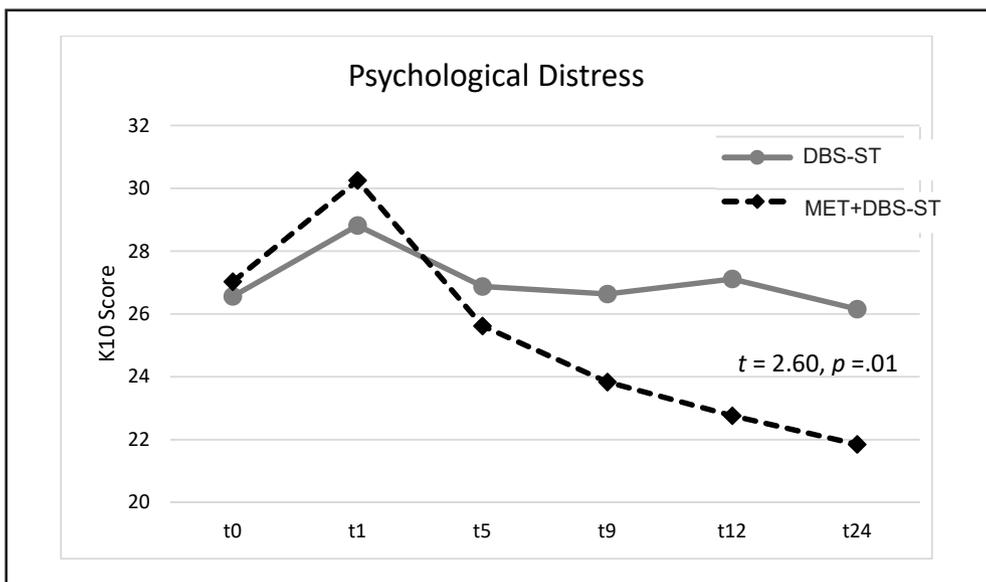


Figure 3. Psychological Distress Group Difference Over Time



than simply receiving additional sessions. To better understand the specific effects of MET as an adjunct to DBT-ST, future studies should include a comparable pre-treatment control. Furthermore, our study did not measure motivational enhancement specifically. Thus, future studies should also include validated measures of ME, such as the University of Rhode Island Change Assessment Scale (Greenstein, Franklin, & McGuffin, 1999) to determine if motivation actually improved in the ME group. Third, significant data were lost to dropout, though there were no significant differences in dropout rates across conditions. Although MITT

analyses helped to account for missing data, the results may have been biased towards treatment completers, especially for those assigned to MET pre-treatment. Fourth, although we consulted with a DBT expert, we did not formally assess fidelity to DBT-ST and MET. Fifth, clinicians received a one-day training in Motivational Interviewing, which is limited compared to the DBT-ST training and support. Finally, because we excluded people with more severe disorders, we cannot generalize our findings beyond people with emotional dysregulation and moderate levels of clinical distress.

Figure 4. Depressive Symptoms Group Difference Over Time

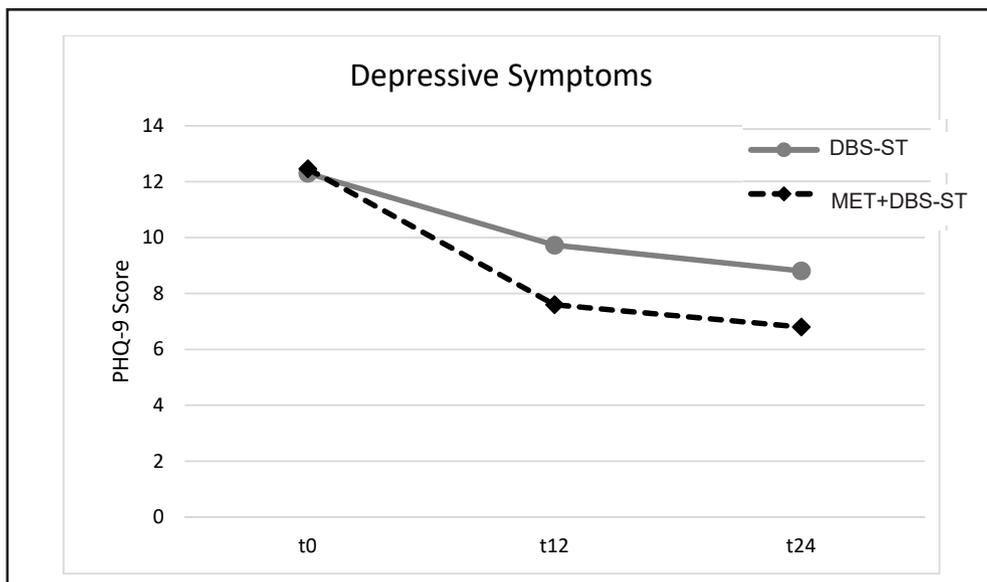
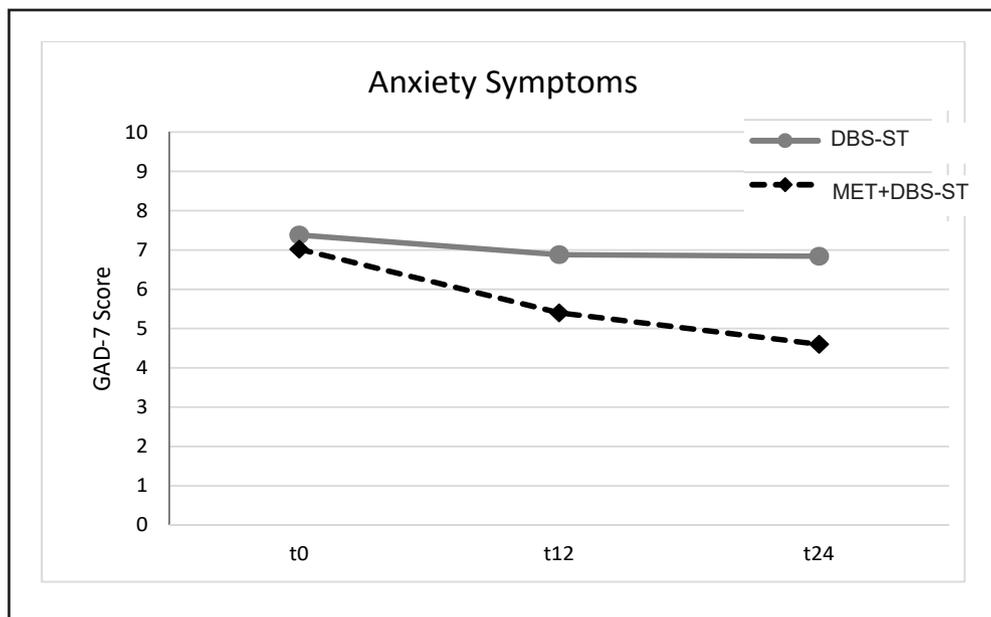


Figure 5. Anxiety Symptoms Group Difference Over Time



Despite these limitations, our study has several strengths that serve to increase our knowledge of the effectiveness of a motivational enhancement pre-treatment delivered as part of a DBT-ST intervention for EA. In particular, it adds to the existing emerging evidence on the effectiveness of DBT-ST for EA (Lyng et al., 2019), and in college counseling centers (Chugani et al., 2013; Panepinto et al., 2015; Pistorello et al., 2012; Rizvi & Steffel, 2014; Uliaszek et al., 2018). We recruited a diagnostically diverse sample of EA across treatment settings presenting with high levels of

emotional dysregulation. The mean emotional dysregulation score on the DERS of 118.75 reflects high levels of emotion dysregulation among our participants. Indeed, it is more than two standard deviations above the pooled grand mean for control samples (GM = 77.33, SD = 19.52) in experimental studies published before July 2010 and is higher than the one SD (M=96) criterion set by Neasciu et al. (2015). We used a randomized controlled design to compare the addition of MET on multiple outcomes at multiple time points, and analyzed our data using HLM, a robust

statistical approach for managing missing data. Finally, we implemented these interventions in busy clinic settings with a population that has traditionally been difficult to engage and treat, strengthening the ecological validity of our findings.

The study is a fundamental first step in implementing a staged approach to mental health intervention, which shifts the focus from later and potentially more severe stages of illness, to early intervention, which is less intensive, restrictive, costly, and may be more effective. The development of an effective early stage intervention that can be widely disseminated will increase system capacity for youth-centered care. In the long-term, it is our hope that this will ultimately prevent unnecessary costs to the health system through untreated illness, which includes reduced use of emergency services, inpatient units, and other costs to the social system as a result of disability and morbidity (Costello, Angold, & Keeler, 1999; Gibb, Fergusson, & Horwood, 2010).

Acknowledgements / Conflicts of Interest

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Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. This trial was registered with clinicaltrials.gov: NCT02540746. The full trial protocol can be accessed by request to the corresponding author.

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Supplementary Table 1. Descriptive data of those who dropped out versus completed

Descriptive variable	Total (n = 75)	Dropped out (n = 30)	Completed (n = 45)	Inferential statistic	p
Female, n (%)	56 (77.8%)	20 (71.4%)	36 (81.8%)	$\chi^2(2) = 2.47$	0.29
Age, range; mean (SD)	19.35 (2.11)	19.19 (1.94)	19.46 (2.23)	$t(63) = 0.50$	0.62
Heterosexual, n (%)	46 (62.2%)	18 (60.0%)	28 (63.6%)	$\chi^2(1) = 0.10$	0.75
White, n (%)	57 (77.0%)	21 (70.0%)	36 (81.8%)	$\chi^2(1) = 1.41$	0.24
PHQ-9 score at T ₀ , mean (SD)	12.38 (5.92)	11.38 (5.51)	13.02 (6.15)	$t(72) = 1.17$	0.25
GAD-7 score at T ₀ , mean (SD)	7.20 (3.63)	6.38 (3.45)	7.73 (3.68)	$t(72) = 1.58$	0.12
DERS score at T ₀ , mean (SD)	118.75 (20.46)	120.17 (18.2)	117.84 (22.0)	$t(72) = 0.48$	0.64
K-10 score at T ₀ , mean (SD)	26.81 (5.39)	27.9 (4.74)	26.02 (5.73)	$t(70) = 1.47$	0.15
Ancillary psychotherapy (T ₁₂), n (%)	13 (17.3%)	0 (0.0%)	13 (28.9%)	$\chi^2(1) = 10.48^{**}$	<.01
Current medication (T ₁₂), n (%)	12 (16.0%)	1 (3.3%)	11 (24.4%)	$\chi^2(1) = 5.969^*$	0.02
Psychiatric diagnoses, n (%)					
Major depressive disorder current	6 (8.0%)	1 (3.3%)	5 (11.1%)	$\chi^2(1) = 1.48$	0.22
Major depressive disorder past	32 (42.7%)	5 (16.7%)	27 (60.0%)	$\chi^2(1) = 13.82^{**}$	<.01
Cannabis abuse	1 (1.3%)	0 (0.0%)	1 (2.2%)	$\chi^2(1) = 0.68$	0.41
Cannabis dependence	4 (5.3%)	1 (3.3%)	3 (6.7%)	$\chi^2(1) = 0.40$	0.53
Alcohol abuse	1 (1.3%)	0 (0.0%)	1 (2.2%)	$\chi^2(1) = 0.68$	0.41
Panic disorder	7 (9.3%)	1 (3.3%)	6 (13.3%)	$\chi^2(1) = 2.13$	0.15
Social anxiety disorder	14 (18.7%)	1 (3.3%)	13 (28.9%)	$\chi^2(1) = 7.74^*$	0.01
Obsessive compulsive disorder	4 (5.3%)	0 (0.0%)	4 (8.9%)	$\chi^2(1) = 2.82$	0.09
Generalized anxiety disorder	16 (21.3%)	3 (10.0%)	13 (28.9%)	$\chi^2(1) = 3.83$	0.05
Number of diagnoses, mean (SD)	0.91 (1.55)	0.23 (0.82)	1.36 (1.76)	$t(73) = 3.16^{**}$	<.01
Note: T ₀ = Baseline; T ₁₂ = Week 12 (post-treatment)					
*p < .05, ** p < .01, ***p < .001					

Supplementary Table 2. Descriptive data of participants by treatment site (modified intent-to-treat).

Descriptive variable	Total (n = 75)	Dropped out (n = 30)	Completed (n = 45)	Inferential statistic	p
Female, n (%)	56 (77.8%)	20 (71.4%)	36 (81.8%)	$\chi^2(2) = 2.47$	0.29
Age, range; mean (SD)	19.35 (2.11)	19.19 (1.94)	19.46 (2.23)	$t(63) = 0.50$	0.62
Heterosexual, n (%)	46 (62.2%)	18 (60.0%)	28 (63.6%)	$\chi^2(1) = 0.10$	0.75
White, n (%)	57 (77.0%)	21 (70.0%)	36 (81.8%)	$\chi^2(1) = 1.41$	0.24
PHQ-9 score at T ₀ , mean (SD)	12.38 (5.92)	11.38 (5.51)	13.02 (6.15)	$t(72) = 1.17$	0.25
GAD-7 score at T ₀ , mean (SD)	7.20 (3.63)	6.38 (3.45)	7.73 (3.68)	$t(72) = 1.58$	0.12
DERS score at T ₀ , mean (SD)	118.75 (20.46)	120.17 (18.2)	117.84 (22.0)	$t(72) = 0.48$	0.64
K-10 score at T ₀ , mean (SD)	26.81 (5.39)	27.9 (4.74)	26.02 (5.73)	$t(70) = 1.47$	0.15
Ancillary psychotherapy (T ₁₂), n (%)	13 (17.3%)	0 (0.0%)	13 (28.9%)	$\chi^2(1) = 10.48^{**}$	<.01
Current medication (T ₁₂), n (%)	12 (16.0%)	1 (3.3%)	11 (24.4%)	$\chi^2(1) = 5.969^*$	0.02
Psychiatric diagnoses, n (%)					
Major depressive disorder current	6 (8.0%)	1 (3.3%)	5 (11.1%)	$\chi^2(1) = 1.48$	0.22
Major depressive disorder past	32 (42.7%)	5 (16.7%)	27 (60.0%)	$\chi^2(1) = 13.82^{**}$	<.01
Cannabis abuse	1 (1.3%)	0 (0.0%)	1 (2.2%)	$\chi^2(1) = 0.68$	0.41
Cannabis dependence	4 (5.3%)	1 (3.3%)	3 (6.7%)	$\chi^2(1) = 0.40$	0.53
Alcohol abuse	1 (1.3%)	0 (0.0%)	1 (2.2%)	$\chi^2(1) = 0.68$	0.41
Panic disorder	7 (9.3%)	1 (3.3%)	6 (13.3%)	$\chi^2(1) = 2.13$	0.15
Social anxiety disorder	14 (18.7%)	1 (3.3%)	13 (28.9%)	$\chi^2(1) = 7.74^*$	0.01
Obsessive compulsive disorder	4 (5.3%)	0 (0.0%)	4 (8.9%)	$\chi^2(1) = 2.82$	0.09
Generalized anxiety disorder	16 (21.3%)	3 (10.0%)	13 (28.9%)	$\chi^2(1) = 3.83$	0.05
Number of diagnoses, mean (SD)	0.91 (1.55)	0.23 (0.82)	1.36 (1.76)	$t(73) = 3.16^{**}$	<.01

**p* < .05