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Abstract

Predictive modeling was used to identify the degree that hypothesized moderators of dialectical behavioral therapy for adolescents (DBT-A) treatment outcomes predicted anxiety and depression symptoms over time. Participants were 66 adolescents (41 girls; 25 boys) with a mean age of 15.38 years (SD = 1.51) who completed a 7-week DBT-A intervention. Analyses revealed convergent models, wherein emotion regulation and interpersonal effectiveness were substantial predictors of change in the symptoms of anxiety, $F(4, 65) = 23.21$, $p < .01$, $R^2 = .60$, and depression, $F(4, 65) = 29.76$, $p < .01$, $R^2 = .66$.

Dialectical behavior therapy (DBT) was originally developed several decades ago for the treatment of borderline personality disorder and is considered one of the most effective interventions for treating this population (Linehan, 2015). Researchers have conducted several randomized controlled trials and found that DBT is effective not only in reducing emotion dysregulation but also in increasing coping skills (e.g., Linehan et al., 2015; Verheul, van, Koeter, de Ridder, Stijnen, van, 2003). Further, one neurologically based study found that participants who engaged in DBT actually experienced noticeable reductions in emotion dysregulation via reduced amygdala reactivity (Goodman et al., 2014). As a result of these positive findings, the application of DBT has grown significantly, and researchers have applied this intervention to transdiagnostic populations, including those afflicted with eating disorders, anxiety disorders, and mood disorders (Lenz, Taylor, Fleming, & Serman, 2014; Lynch, Morse, Mendelson, & Robins, 2003; Neacsiu, Eberle, Kramer, Wiesmann, & Linehan, 2014).

Pervasive emotion dysregulation plays a significant part in the etiology and symptomology of these diagnoses, and therefore researchers have argued that DBT is well suited for the treatment of these disorders (Neacsiu, Bohus, & Linehan, 2013). This reasoning is in accordance with the biosocial theory of DBT (Linehan, 2015), which explains that pervasive emotion dysregulation is the result of two interacting factors—a biological predisposition to emotional vulnerability and a persistently invalidating environment. Linehan and Neacsiu et al. noted that both of these factors promote development of the pervasive emotion dysregulation that is related to numerous mental health disorders. In addition to the use of this modality with different diagnoses, researchers have adapted DBT for use with adolescents (Miller, Rathus, & Linehan, 2007). There is a strong theoretical basis for using this intervention with adolescents, as they have reached the developmental milestone during which they are learning to effectively and independently manage their emotions (MacPhearson, Cheavens, & Fristad, 2013).

Adaptations to standard DBT for adolescents maintain the fidelity of the treatment by retaining all of the original modes and stages of treatment as well as related treatment targets. The changes made by practitioners compliment the specific needs of adolescents. Family members are included in skills groups, and skills modules are often offered for shorter periods of time (session and module length). In addition, developers included family therapy sessions as needed and modified skills for increased comprehension. Finally, an additional skills module, walking the middle path, was added to teach the concept of validation, dialectics, and behaviorism (Miller et al., 2007).

Researchers have found positive results in studies applying these modifications of DBT transdiagnostically to adolescents in addition to those who exhibit suicidality and nonsuicidal self-injury (Ritschel, Miller, & Taylor, 2014). This includes those struggling with bipolar disorder (Goldstein, Alexson, Birmaker, & Brent, 2007), eating disorders (Salbach-Andrea, Bohnekamp, Pfeiffer, Lehmkuhl, & Miller, 2008). Dialectical behavior therapy of anorexia and bulimia nervosa among adolescents: A case series. Cognitive and Behavioral Practice, 15, 415–425. [Google Scholar]), and oppositional defiant disorder (Nelson-Gray et al., 2006). Researchers have also adapted DBT to fit different settings. For example, Ricard, Lerma, and Heard (2013) applied DBT in an alternative school setting and found that participants reported reduced distress compared to those who did not engage in the DBT group. In another study, Wasser, Tyler, McIlhaney, Taplin, and Henderson (2008) examined DBT in a

residential setting and found that DBT resulted in more statistically significant positive changes than the standard therapeutic milieu alone.

Hypothesized Mechanisms of Change Within DBT for Adolescents

There are four treatment targets during the first stage of treatment: decreasing life threatening behaviors, decreasing therapy interfering behaviors, decreasing quality of life interfering behaviors, and increasing behavioral skills (Miller et al., 2007). These targets are addressed through the implementation of several modes of treatment, including skills groups and individual sessions. However, researchers (Linehan & Wilks, 2015; Valentine, Bankoff, Poulin, Reidler, & Pantalone, 2015) have found that treatment targets can be addressed through the intentional application of select modes of treatment, as opposed to all of them. In order for DBT to be effective, treatment should be flexible enough to allow for changes to content and clinical focus as needed but also structured with a hierarchy of skills development occurring across DBT-A modules. Clinicians most often address the treatment target *increasing behavioral skills* through the implementation of the psychoeducational skills group. There are five modules outlined in the adolescent skills training manual that are hypothesized as mechanisms of change within a DBT framework, specifically for adolescents (DBT-A): mindfulness, distress tolerance, interpersonal effectiveness, emotion regulation, and walking the middle path (Rathus & Miller, 2015).

Mindfulness

Drawn from Zen practices that are compatible with Eastern meditation, mindfulness practice is considered by Linehan and colleagues to be one of the core skills in DBT. Mindfulness is often the first module taught, and it is then reviewed again at the beginning of each of the other modules. Individuals practicing mindfulness skills effectively observe, describe, and participate in the present moment without judgment and with the intent to be both effective and one mindful. The purpose of mindfulness in DBT is to cultivate nonjudgmental attention to the present moment for the purpose of activating and maintaining *wise mind*. Wise mind is a core DBT-A concept that is used in the service of helping adolescents control their state of mind by repeatedly seeking a dialectical synthesis between reason and emotion (Linehan, 2015).

Distress Tolerance

The goal of this module is to teach adolescents how to tolerate strong dysregulated emotions when immediate solutions to prompting events are not readily available. This includes learning how to bear pain in a skillful way, without making matters worse. These skills are a natural progression from the mindfulness module and are grouped into two components during treatment. The first component focuses on tolerating short-term crisis and relying on distracting or self-soothing activities. The second component involves a more conceptual skill set that teaches the ideas of willingness and radical acceptance for more enduring life challenges like the loss of a loved one (Linehan, 2015).

Interpersonal Effectiveness

This module focuses on teaching adolescents relationship skills and is divided into three sections: reaching goals, making and maintaining relationships, and maintaining self-respect. The core skills, included in the first section, include teaching effective strategies for setting boundaries and making assertive requests. In the second section, individuals learn how to develop and maintain positive family, friend, and community relationships. Finally, in the third section, adolescents learn to cultivate self-respect by being fair, truthful, and faithful to their values. These skills teach individuals to consider the complexity of relationships and cultivate awareness of acceptance, flexibility, and change while improving collaboration and communication (Rathus & Miller, 2015).

Emotion Regulation

Emotion regulation skills are taught in the context of self-validation of emotions and require the application of mindfulness skills. In this module, adolescents learn how to name and identify emotions, learn how emotions are triggered, and become aware of the associated bodily sensations that give rise to various thoughts and action tendencies. Individuals learn tactics to problem solve and change both emotions using skills like *cope ahead*, *opposite action*, and *riding the wave* ([Linehan, 2015](#)).

Walking the Middle Path

This module was developed specifically for adolescents and includes didactic information about dialectical thinking and problem-solving strategies, principles of behaviorism that promote changes of their behavior, and use of validation to improve communication and strengthen relationships ([Miller et al., 2007](#)). Throughout this module, adolescents learn to replace either-or thinking and dichotomous appraisals of choice options with a more pluralistic view of possible reactions to the problems they encounter. In outpatient adolescent treatment, the middle path skills may be taught as a separate module either in multifamily group or in parallel adolescent and parent groups. However, developers of DBT-A have posited that skills can be taught in different formats and arrangements as the clinician sees fit to help the adolescents best learn the skills ([Rathus & Miller, 2015](#)). In the current study, the middle path skills were included as a subcomponent of the interpersonal effectiveness module utilizing parallel adolescent and parent groups. This was done to increase the generalization of the skills in both modules.

Purpose of the Study

There have been very promising initial results regarding treatment outcomes with adolescents; however, researchers have called for further research on the use of DBT with this population ([Del Conte, Lenz, Hollenbaugh, & Callendar, in press](#); [MacPhearson et al., 2013](#)). Little evidence has emerged identifying the degree that supposed mechanisms of change appear to predict treatment outcomes for adolescents, especially in affiliation with transdiagnostic applications. Therefore, we implemented regression modeling to depict the degree that changes among hypothesized mechanisms of changes within DBT-A were associated with treatment gains among a transdiagnostic population over time. As a result, we undertook this analysis to answer two research questions: (a) to what degree do changes among the hypothesized mechanisms of change within a DBT framework (emotional regulation, interpersonal effectiveness, distress tolerance, and mindfulness) predict changes in ANX symptoms following a 7-week DBT-A program? and (b) to what degree do changes among the hypothesized mechanisms of change within a DBT framework (emotional regulation, interpersonal effectiveness, distress tolerance, and mindfulness) predict changes in depression (DEP) symptoms following a 7-week DBT-A program? We selected therapeutic criterion related to ANX and DEP based on participant characteristics of this transdiagnostic sample whose diagnoses included behavioral criterion representative of DEP and ANX either independently or concurrently. Constructs related to walking the middle path were not included in our predictive model due to the absence of related assessments within the research protocol.

Method

We implemented a secondary analysis of data from a single group, open trial of DBT-A ([Del Conte et al., in press](#)) to identify the degree that the intervention's hypothesized mechanisms of change were associated with treatment gains across ANX and DEP symptom domains.

Participant Characteristics

Participants were 66 adolescents (41 girls, 62%; 25 boys, 38%) referred from their community with a mean age of 15.38 years (*SD* = 1.51) who were completing a 7-week manualized DBT-A intervention at a partial hospitalization program (PHP) located in the mid-southern region of the United States. Participants were predominately White/Caucasian (*n* = 58; 89%) with others identifying as either Black/African American (*n* = 2;

3%) or *Other* (*n* = 6; 9%) ethnic identities. Participants met the *Diagnostic Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* ([American Psychiatric Association, 2000](#)) diagnostic criteria for a primary diagnosis of a depressive disorder (*n* = 17, 35%); bipolar disorder (*n* = 11, 23%); and mood disorder, not otherwise specified (*n*= 10, 21%); ANX disorder, not otherwise specified (*n* = 3; 6%); disruptive mood dysregulation disorder (*n* = 3; 6%); attention deficit hyperactivity disorder (*n* = 3; 6%); and obsessive-compulsive disorder (*n* = 1; 2%).

Measurement of Constructs

ANX and DEP

We used scores on the ANX and DEP subscales of the Symptom Checklist 90-revised (SCL; [Derogatis, 1994](#)) to identify participants' subjective perceptions of ANX and DEP. ANX and DEP subscale items are administered in a self-reported, Likert-type format that assess frequency and severity of symptoms along a continuum ranging from 0 (*not at all*) to 4 (*extremely*).

The ANX subscale is comprised of 10 items that evaluate general markers of ANX including nervousness, tension, apprehension, dread, and somatic correlates that are appraised with prompts that include "the feeling that something bad is going to happen to you" and "nervousness or shakiness inside" with higher scores indicating greater subjective ANX. [Derogatis (1994)](#) reported robust internal consistency (α = .88) and test–retest (r_{tt} = .86) reliability coefficients for scores on the ANX subscale as well as acceptable convergent validity with other related measures. Within our sample, internal consistency was within the excellent range (α = .94). The DEP subscale includes 13 items that evaluate markers of DEP including dysphoric mood, social withdrawal, lack of motivation, and hopelessness that are assessed using items such as "feeling hopeless about the future" and "feeling no interest in things" with higher scores indicating greater subjective DEP. [Derogatis (1994)](#) reported robust internal consistency (α = .90) and test–retest (r_{tt} = .82) reliability coefficients for scores on the DEP subscale as well as satisfactory convergent validity with other associated measures. Within our sample, internal consistency was within the excellent range (α = .93).

Emotion regulation

The Difficulties in Emotional Regulation Scale (DERS; [Gratz & Roemer, 2004](#)) was developed to assess degrees of emotional dysregulation across six domains including nonacceptance of emotions, difficulties engaging in goal directive behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. The 36-item DERS provides a self-reported, Likert-type format with responses to items such as "when I'm upset, I lose control over my behaviors" and "I am attentive to my feelings" ranging from 1 (*almost never*) to 5 (*almost always*). The mean score within each domain is totaled to provide an overall metric of participants' degree of emotional regulation with higher scores indicating greater ability to regulate emotions. Gratz and Roemer reported excellent internal consistency for total DERS scores (α = .92) which was corroborated within our sample (α = .90) and substantial construct validity with the Negative Mood Regulation Scale ([Catanzaro & Mearns, 1990](#)).

Interpersonal effectiveness

We used the Interpersonal Sensitivity (INT; [Derogatis, 1994](#)) Scale from the SCL to assess participants' abilities to manage relationships via processes associated with interpersonal effectiveness. The INT subscale is comprised of 10 items that evaluate general markers of interpersonal behavior including self-doubt, discomfort when interacting with others, and negative expectations when interacting with others that are appraised with prompts that include "feeling inferior to others" and "feeling very self-conscious with others" with higher scores indicating greater interpersonal sensitivity. Derogatis reported good internal consistency (α = .86) and test–retest (r_{tt} = .83) reliability coefficients for scores on the INT subscale as well as satisfactory convergent validity with other associated measures. Internal consistency within our sample was within the excellent range (α = .91).
Distress tolerance

The DBT Ways of Coping Checklist (WCCL; Neacsiu, Rizvi, Vitaliano, Lynch, & Linehan, 2010) was developed to provide an objective measure of DBT skills use as distress tolerance activities and is composed of three subscales: Skills Use, General Dysfunctional Coping, and Blaming Others. For our study, we used scores on the Skills Use subscale as an indication of participant actions to accept and mitigate distressing events. The Skills Use subscale (WCCL-Skills Use) is composed of 38 items presented in a self-reported, Likert-type format with responses to items such as "came up with a couple of different solutions to my problem" and "concentrated on something good that could come out of the whole thing" ranging from 0 (*never used*) to 3 (*regularly used*). Neacsiu et al. reported excellent internal consistency for the WCCL-Skills Use across multiple studies (α = .92–.96) and good convergent validity with related measures. Internal consistency within our sample was within the excellent range (α = .94).

Mindfulness

The Freiburg Mindfulness Inventory (FMI; Walach, Buchheld, Buttenmuller, Kleinnecht, & Schmidt, 2006) was developed to estimate an individual's ability to experience moments accurately without the influence of emotional or intellectual distortion. The 14-item FMI provides a self-report, Likert-type format for responses to items such as "I feel connected to my experience in the here-and-now" and "I watch my feelings without getting lost in them" ranging from 1 (*rarely*) to 4 (*almost always*) with higher scores indicating greater mindfulness. Walach, Buchheld, Buttenmuller, Kleinnecht, and Schmidt (2006) reported good internal consistency for scores on the FMI across studies (α = .86) and strong convergent validity with other related measures. Internal consistency within our sample was within the good range (α = .85).

Intervention

A complete description of milieu-based partial hospital DBT for adolescents (DBT-A) is provided in Del Conte et al. (in press). Within this framework, planned group modalities include a daily opening and closing group, problem-solving process group, and DBT skills training group. A regular DBT family skills group compliments individual DBT psychotherapy once or twice weekly during the program. Participants also simultaneously complete course curriculum in a state-approved educational program, and a psychiatrist supervised all medical aspects of care including psychotropic medication management when indicated.

Teachers implemented DBT strategies and coaching skill use to address common learning processes during educational activities. When completing the DBT-A program, participants reviewed daily goal sheets and reported on skill use, DBT homework, and diary card completion during an opening group. Within problem-solving groups, problematic behaviors were reviewed, and the group leader supported participants to use behavioral assessment, chain and missing link analyses, and solution analysis. The 7-week DBT skills curriculum is based on Rathus and Miller's (2015) recommendations and included Schedule 6: Adolescent Multifamily Skills, Schedule 9: DBT Parenting Skills Behaviors, and selections from Schedule 8: DBT Skills for Addictive Behaviors. During the 7-week program, all participants completed skills training across all five DBT modules (mindfulness, emotion regulation, distress tolerance, interpersonal effectiveness, and walking the middle path). Participants completed home tasks with their parents that taught skills to foster a protreatment atmosphere at home and provided an opportunity to demonstrate skillful behavior in the presence of their parents. During daily closure groups, participants developed a goal sheet for the following 24-hr period and set a behavioral objective for that evening.

Procedure

The current data are associated with the primary analysis of a DBT-A PHP evaluation described by Del Conte, Lenz, Hollenbaugh, and Callendar (in press). All participants completed treatment in the 7-week PHP during which the admission process required completion of SCL, DERS, WCCL, and FMI which was again completed during a discharge interview. The 7-week duration of the program was established based on clinical experience of the program coordinator and the assumption that a minimum of 35 DBT-A lessons were required to achieve desired therapeutic effect. PHP staff entered all data and participant information into a secure, encrypted,

password-protected database using procedures consistent with the *Health Insurance Portability and Accountability Act* and *The Joint Commission* accreditation requirements.

Data Analysis

Statistical power analysis

We conducted an a priori power analysis to identify the number of participants required to establish statistical power for our research design at the .80 level based on α = .05 using the G*Power 3 statistical power analysis program (Faul, Erdfelder, Lang, & Buchner, 2007). This analysis revealed that a sample size of 55 was necessary to detect a medium effect between our four predictor variables for estimating change among scores on the ANX and DEP Scales. Given our sample of 66 participants, we regard our results as defensible for extrapolating relationships between predictor and criterion variables within our sample.

Preliminary analysis

We used the series mean function in the Statistical Package for the Social Sciences, Version 22 (IBM Corporation, 2013), to impute missing values (116 of the 13,132; 0.008%) within the raw data (see Haukoos & Newgard, 2007). Values for predictor and criterion variables were computed by calculating the degree of treatment gain for each construct from admission to termination using the intended therapeutic change to determine directionality. For example, the intent of treatment was to decrease scores on the ANX Scale; therefore, a participant's admission score was subtracted from their discharge score to yield a value representing change in ANX symptoms. This procedure was followed for all constructs to represent how changes in constructs hypothesized as mechanisms of change influence clinical criterion variables. Multicollinearity among predictor variables was evaluated by inspecting bivariate correlations and variance inflation factors (see Table 1). Low to moderate intercorrelations among predictor variables and acceptable variance inflation factors emerging from our analysis suggested that predictive modeling with these variables was prudent.

Table 1. Means, Standard Deviations, Reliability Coefficients, and Bivariate Correlations for Scores Among Scales Used as Predictor and Criterion Variables to Indicate Treatment Gains Over Time.

Variable	M	SD	α	1	2	3	4
1. DERS	1.67	3.48	.90	**	−.61	.47	−.18
2. INT	−4.95	7.42	.91		**	−.30	.09
3. FMI	5.57	8.10	.85			**	.24
4. WCCL	10.66	27.31	.94				**
Anxiety	−4.53	9.13	.94				
Depression	−8.85	12.71	.93				

Note. DERS = Difficulties in Emotional Regulation Scale; INT = interpersonal sensitivity; FMI = Freiburg Mindfulness Inventory; WCCL = Ways of Coping Checklist.

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4. WCCL	10.66	27.31	.94				**
Anxiety	−4.53	9.13	.94				
Depression	−8.85	12.71	.93				

Note. DERS ¼ Difficulties in Emotional Regulation Scale; INT ¼ interpersonal sensitivity; FMI ¼ Freiburg Mindfulness Inventory; WCCL ¼ Ways of Coping Checklist.

Primary analysis

We modeled relationships between our predictor and criterion variables using a simultaneous multiple regression strategy that evaluated the degree that constructs associated with emotion regulation, interpersonal effectiveness, mindfulness, and distress tolerance were predictive of changes in ANX and DEP symptoms among our sample. We selected this strategy in favor of other regression approaches based on the assumption that although these skills modules are taught sequentially within DBT-A protocols, they are interdependent upon one another for successful mitigation of psychological distress ([Rathus & Miller, 2015](#)). The four predictor variables (DERS, INT, FMI, and WCCL Skills) in this model were regressed independently onto scores on the ANX and DEP Scales. Following, we evaluated percentage of explained variance associated with each model by inspecting R^2 values, regression coefficients, $p$values, and indices estimating practice significance (sr^2).

Results

Change Mechanisms for Symptoms of Anxiety

Means and standard deviations for predictor and criterion variables are depicted in Table 1. The regression analysis estimating the influence of predictor variables on ANX Scale scores yielded a statistically significant model, $F(4, 65) = 23.21$, $p < .01$, $R^2 = .60$, indicative of a very large effect size in which model predictors account for approximately 60% of the change among scores estimating subjective ANX (see Table 2). Within the model, scores associated with the degree that participants perceived their abilities to regulate their emotions yielded a strong predictive relationship, $\beta = -.41$, $p < .01$, 95% CI [-1.69, $-.47$], $sr^2 = .17$, indicative of a medium effect size. This finding accounted for approximately 17% of change among participants' scores on the ANX subscale and can be attributed to the fact that participants who perceived greater gains in their ability to regulate emotions following treatment also tended to report fewer symptoms of ANX. Degree of sensitivity to interpersonal interactions was also identified as a statistically significant predictor of participant ratings of ANX, $\beta = .40$, $p < .01$, 95% CI [.24, .74], $sr^2 = .20$, indicative of a medium effect size. This finding accounted for approximately 20% of change among participants' scores on the ANX subscale and can be attributed to the fact that participants who perceived greater gains in their self-consciousness, levels of comfort, and expectations about interacting with others also tended to report fewer symptoms of ANX. Nonsignificant findings were detected for scores related to mindfulness, $\beta = -.10$, $p = .31$, 95% CI [$-.33$, .10], $sr^2 = .02$, and use of coping skills, $\beta = -.03$, $p = .75$, 95% CI [$-.06$, .05], $sr^2 < .01$.

Table 2. Summary of Regression Models for Emotion Regulation, Interpersonal Sensitivity, Mindfulness, and Use of DBT Coping Skills as Predictors of Therapeutic Change in Anxiety and Depression Symptoms.

Variable	B	SE B	β	t	sr^2	F	R^2
Change in anxiety symptoms						23.21	.60
DERS	−1.08	.30	−.41	−3.55*	.17		
INT	.49	.12	.39	3.89*	.20		
FMI	−.11	.11	−.10	−1.02	.02		
WCCL-Skills Use	< −.01	.03	−.02	−.31	<.01		
Change in depression symptoms						29.76	.66
DERS	−1.45	.39	−.40	3.70*	.18		
INT	.87	.16	.51	5.41*	.32		
FMI	−.02	.14	< −.01	−0.01	<.01		
WCCL-Skills Use	−.03	.03	−.07	−0.84	.01		

Note. DERS = Difficulties in Emotional Regulation Scale; INT = interpersonal sensitivity subscale of the SCL-90R; FMI = Freiburg Mindfulness Scale; WCCL-Skills Use = skill use subscale on the Ways of Coping Checklist; SCL-90R = Symptom Checklist 90-revised.
*Significant at the .01 level.

Table 2. Summary of Regression Models for Emotion Regulation, Interpersonal Sensitivity, Mindfulness, and Use of DBT Coping Skills as Predictors of Therapeutic Change in Anxiety and Depression Symptoms.

Variable	B	SE B	β	t	sr2	F	R2
Change in anxiety symptoms						23.21	.60
DERS	-1.08	.30	-.41	-3.55*	.17		
INT	.49	.12	.39	3.89*	.20		
FMI	-.11	.11	-.10	-1.02	.02		
WCCL-Skills Use	< -.01	.03	-.02	-.31	<.01		
Change in depression symptoms						29.76	.66
DERS	-1.45	.39	-.40	3.70*	.18		
INT	.87	.16	.51	5.41*	.32		
FMI	-.02	.14	<-.01	-0.01	<.01		
WCCL-Skills Use	-.03	.03	-.07	-0.84	.01		

Note. DERS ¼ Difficulties in Emotional Regulation Scale; INT ¼ interpersonal sensitivity subscale of the SCL-90R; FMI ¼ Freiburg Mindfulness Scale; WCCL-Skills Use ¼ skill use subscale on the Ways of Coping Checklist; SCL-90R ¼ Symptom Checklist 90-revised.
*Significant at the .01 level.

Change Mechanisms for Symptoms of Depression

The regression analysis estimating the influence of predictor variables on DEP Scale scores yielded a statistically significant model, $F(4, 65) = 29.76$, $p < .01$, $R^2 = .66$, indicative of a very large effect size in which model predictors account for approximately 66% of the change among scores estimating subjective DEP (see Table 2). Within the model, scores associated with the degree that participants perceived an ability to regulate their emotions yielded a robust predictive relationship, $β = −.40$, $p < .01$, 95% CI [−2.23, −.66], $sr^2 = .18$, indicative of a medium effect size. This finding accounted for approximately 18% of change among participants' scores on the DEP subscale and can be attributed to the fact that participants who perceived greater gains in their ability to regulate emotions following treatment also tended to report fewer symptoms of DEP. Degree of sensitivity to interpersonal interactions was also identified as a statistically significant predictor of participant ratings of DEP, $β = .51$, $p < .01$, 95% CI [.55, 1.02], $sr^2 = .32$, indicative of a large effect size. This finding accounted for approximately 32% of change among participants' scores on the DEP subscale and can be attributed to the fact that participants who perceived greater gains in their self-consciousness, levels of comfort, and expectations about interacting with others also tended to report fewer symptoms of DEP. Nonsignificant findings were detected for scores related to mindfulness, $β < −.01$, $p = .99$, 95% CI [−.28, .28], $sr^2 < .01$, and use of coping skills, $β < −.07$, $p = .40$, 95% CI [−.10, .04], $sr^2 = .01$.

Discussion

Both models indicated that emotion regulation and sensitivity to interpersonal interactions were statistical and practical predictors of changes within DEP and ANX symptom severity following DBT-A programming. These findings revealed that the more participants were able to manage their emotions during stressful times, the lower their symptoms of DEP and ANX were at the conclusion of treatment. These findings are consistent with previous research by Valentine, Bankoff, Poulin, Reidler, and Pantalone (2015) regarding the increase of DBT skills acquisition and the decrease of mental health symptoms related to emotion dysregulation. This seems reasonable when considering that one arm of the DBT biosocial model (Linehan, 2015) rests on the proposition that nonadaptive responses are, in part, a function of the degree that someone is biologically vulnerable to experiencing dysregulated emotions. Taken together, it is plausible that skill acquisition and application learned by our participants during treatment were able to establish a mitigating effect to emotional vulnerability. Furthermore, we conjecture that with continued mastery of emotion regulation strategies, adolescents completing DBT-A programming may develop skills to manage emotional crises that promote adjustment and developmental trajectory into young adulthood.

Our analyses also detected a strong association between decreases in INT during treatment and the likelihood that participants would report fewer symptoms of ANX and DEP at discharge. These findings revealed that the degree which participants were able to be confident and comfortable while interacting with others, the lower their symptoms of DEP and ANX were at the conclusion of treatment. This finding is consistent with Rathus and Miller's (2015) supposition that positive adjustment is a function of the ways that individuals accept the dynamics within relationships while also acting to improve collaborative communication. We also suggest that this finding is supportive of Linehan's (1993, 2015) biosocial conceptualization of pathology in which invalidation promotes clinically significant impairments in functioning and challenges adaptive functioning. It is possible that interpersonal effectiveness behaviors learned by our participants during treatment functioned as a second pathway to mitigating effects of environments that our participants perceived as invalidating. Similar to strategies associated with emotional regulation, we suggest that with continued mastery of interpersonal effectiveness strategies, adolescents completing DBT-A programming may be better suited to transcend the social complexities that characterize adolescence and young adulthood in a way that promotes well-being over the life span.

Interestingly, our analyses did not find support for mindfulness and use of DBT coping skills to tolerate distress as predictors of decreased DEP and ANX following DBT-A programming. We found this finding curious, given that these modules represent core features of DBT and DBT-A protocols. A number of possibilities might account for these findings. Our chosen measure of mindfulness (FMI) may not be sensitive to discerning the skills learned. Additionally, the approach to teaching mindfulness skills may not provide sufficient understanding of concepts and related activities that promote subsequent application and generalization. Alternatively, skill use as measured the WCCL may be confounded by the wording of the instructions, which asks for assessment of skill use during the preceding 4 weeks. Reevaluation and amendment of the instructions to make the WCCL more conducive to our 7-week treatment setting might be indicated and create a more accurate depiction of the degree that these skills contribute to treatment effect.

It is also possible that these findings may be related to the type of social and lifestyle characteristics of adolescence rather than the inherent utility associated with mastering these skills. For example, the typical social context of a teenager within our sample was one that was characterized by the stigma of mental health concerns requiring PHP, attempting to maintain relationships with peers at their home school, and finding a center of self within the treatment process. It is reasonable that the convergence of these factors, along with ever-present distractions and self-other comparisons moderated through social media, may have limited mindfulness outcomes measured by the FMI (Walach et al., 2006) such as "I feel connected to my experience in the here-and-now" and "I watch my feelings without getting lost in them" to a degree that contributed meaningful variance in psychiatric symptoms. Similarly, we suggest that although learning and using distress tolerance skills are an important features of DBT-A treatment and recovery, treatment gains associated with this module may have been superseded by the ability to regulate emotions and be interpersonally effective when distressed. Regardless, these findings merit future research to ascertain treatment strategies that measure and increase the treatment effects that mindfulness and distress tolerance may have within the applications of DBT-A.

Implications for Counselors

In this specific application of DBT-A, the implications for practice and in particular for skills training are manifold. Counselors will benefit from maintaining a developmental perspective in the application of skills originally developed for an adult population. How adolescents learn, creating concrete opportunities for learning the more abstract skills and identifying those preferred skills that speak to pressing developmental demands of this age-group, will all benefit the counselor in providing a strategic application of the entire skills package. Consistent with this perspective, counselors should consider the influence of mental health stigma within the social context that an adolescent completing a partial hospitalization day program may be experiencing. It may not be possible to control for the influence of this external factor within treatment, but attempting to account for it during treatment planning, family sessions, and discharge planning may be a helpful approach.

When considering the predictive relationships between emotion regulation and interpersonal effectiveness skills and decreased ANX and DEP symptoms, our clinical observation has been that the adolescent population appears to learn and apply skills more effectively when the learning requires action and concrete exercises. It is our impression that action-oriented, hands-on learning activities are easier to implement and more varied in scope in the emotion regulation and interpersonal effectiveness modules when compared to some others. For example, skills trainers can devise endless role-plays for learning interpersonal effectiveness; by contrast, the distress tolerance skill of *radical acceptance* requires a degree of conceptual development and awareness that may be beyond the capacity of some adolescents, particularly those in the earliest period of adolescence. The activities for mindfulness and the accepting reality component of distress tolerance tend more to thinking than doing, and acquisition of these skills may be more readily realized during the later adolescent period.

Finally, both interpersonal effectiveness skills and emotion regulation skills may be more attuned to pressing developmental tasks of adolescence related to identity formation and social competence. Interpersonal effectiveness skills are easily linked directly to increasing success in navigating peer and family relations, while emotion regulation teaches a nomenclature and understanding of emotional life that would be of benefit in the critical adolescent process of identity formation. These developmental imperatives may make these two skills more meaningful and pertinent to the adolescent, and thus, it is worthwhile to consider ways to highlight these modules as features within a treatment program.

Limitations of the Study and Recommendations for Future Research

Although this study has provided some insight into the degree that hypothesized mechanisms of change within DBT-A are associated with therapeutic change, we concede some important limitations to our study. Foremost, despite our design being adequately powered for statistical analysis, our sample size was modest in nature ($N = 66$) and only represented the therapeutic experiences of adolescents within one region of the United States. Therefore, interpretations of our findings should be approached with caution because they may not be generalized to the broader population of adolescents receiving DBT-A programming. We encourage future researchers to complete similar analyses and encourage replication and extension of our findings with larger, more clinically diverse samples.

Additionally, the strength of our inferences about mechanisms of change within a DBT-A program was dependent on the current availability of related assessments. Currently, the state of the art for measuring DBT change mechanisms is burgeoning but notably limited for nonacademic practitioners who may be interested in exploring constructs such as interpersonal effectiveness, distress tolerance, mindfulness as depicted within DBT-A, and activities inherent within the walking the middle path module. Future scholar-practitioners are encouraged to develop and evaluate related assessments that will promote precision of measurement and accuracy of depicting influences of treatment effect. Finally, the inferences we have made related to the differential influence of DBT-A module content are based on predictive modeling rather than more rigorous randomized trials that systematically dismantle treatment components. We hope that dismantling protocols completed in the future will promote a greater degree of confidence when making inferences about the most efficacious aspects of DBT-A that contribute to desired treatment effect.

Concluding Remarks

We have presented a predictive analysis of DBT-A treatment outcomes that modeled relationships between hypothesized mechanisms of change and decreased psychiatric symptoms among a transdiagnostic sample of adolescents. The indication for treatment gains across emotion regulation and interpersonal effectiveness domains was present for both ANX and DEP models and contributed a significant amount of variance among scores (60% and 66%, respectively). We suggest that although these findings are noteworthy, they may be limited by a number of factors such as a sample size and sensitivity of available assessments. Furthermore, it is plausible that our findings do not reflect inherent limitations of the mindfulness and distress tolerance modules

but instead an interaction between content and the developmental stage of our participants. We hope that future researchers will not only endeavor to replicate our findings but also extend the knowledge base depicting the efficacious components of DBT-A through dismantling treatments and instrument development.

Notes

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