Dialectical Behavior Therapy Is Effective for the Treatment of Suicidal Behavior: A Meta-Analysis

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Dialectical Behavior Therapy (DBT) prioritizes suicidal behavior and other self-directed violence as the primary treatment targets, and has been demonstrated to reduce self-directed violence in clinical trials. This paper synthesizes findings from controlled trials that assessed self-directed violence and suicidality, including suicide attempts, non-suicidal self-injury (NSSI), suicidal ideation, and accessing psychiatric crisis services. Eighteen controlled trials of DBT were identified. Random effects meta-analyses demonstrated that DBT reduced self-directed violence (d = -.324, 95% CI = -.471 to -.176), and reduced frequency of psychiatric crisis services (d = -.379, 95% CI = -.581 to -.176). There was not a significant pooled effect of DBT with regard to suicidal ideation (d = -.229, 95% CI = -.473 to .016). Our findings may reflect the prioritization of behavior over thoughts within DBT, and offer implications for clinical practice and future research concerning the implementation of DBT for acute suicidality.

Keywords: dialectical behavior therapy (DBT); self-directed violence; suicide; suididal ideation; meta-analysis

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MORE THAN 1 MILLION PEOPLE attempt suicide every year in the United States (Piscopo, Lipari, Cooney, & Glasheen, 2016); thus, it is imperative that health care providers are able to effectively identify empirically supported treatment options for clients who have attempted or are thinking of attempting suicide. One treatment that directly addresses suicidal behavior and other self-directed violence is Dialectical Behavior Therapy (DBT; Linehan, 1993). Described in three treatment manuals (Linehan, 1993, 2015a, 2015b), DBT is defined by its philosophical base (dialectics), treatment strategies, and treatment targets. The term *dialectical* conveys both the multiple tensions that co-occur in therapy with clients who are suicidal and have Borderline Personality Disorder as well as the emphasis in DBT of enhancing dialectical thinking patterns to replace rigid, dichotomous thinking. The overriding dialectic is the necessity to fully accept clients as they are while actively helping them to change. DBT theorizes that the underlying problem to treat is pervasive emotion dysregulation, which leads to impulsive and maladaptive behaviors including self-directed violence and behaviors that are interpersonally destructive, as well as the inability to be dialectical and flexible in responding to life events.

There are five sets of treatment strategies in DBT that are used in all four modalities: (a) dialectical strategies; (b) core strategies (validation and problem-solving), including standard CBT procedures (behavioral assessment, psychoeducation,

orienting to treatment rationale, contingency management, skills training, exposure, and cognitive modification strategies); (c) communication strategies (irreverent and reciprocal communication styles); (d) case management strategies (consultation-to-the-patient, environmental intervention, consultation to the therapists); and (e) structural strategies (targeting within sessions, starting and ending therapy). DBT requires each therapist balance use of strategies, from the rapid juxtaposition of change and acceptance to the use of both irreverent and warmly responsive communication styles. Strategy changes in DBT are required to maintain therapeutic progress in the face of a client who at various moments may oscillate between suicidal crises, rigid refusal to collaborate, rapid emotional escalation, and collaborative effort.

DBT is an outpatient treatment provided in four modalities: (a) individual psychotherapy, (b) group skills training, (c) out-of-session coaching, and (d) therapist consultation team meeting. Treatment generally lasts 1 year. DBT individual sessions are organized in a hierarchy of treatment targets, with the top priority being life-threatening behaviors, including self-directed violence and violence toward others. The second target, therapy-interfering behaviors, includes client nonattendance, noncompliance, and noncollaborative behaviors and the therapist falling out of dialectical balance or engaging in disrespectful behaviors. The third target, quality-of-life-interfering behaviors, includes psychiatric disorders, substance abuse, unemployment, interpersonal conflict, etc.—behaviors that reduce quality of life as well as increase reasons for dying and reduce reasons for living. The fourth target is to increase the client's mastery of the DBT skills. DBT group skills training is essentially a class to teach and practice skills critical for overcoming pervasive emotion dysregulation and suicidality. Coaching between sessions assures generalization of the skills to the specific situations in which the client needs them. The therapist consultation team assures that the DBT therapists always know what DBT strategies are needed, how to use them, and remain motivated to use them and to remain connected to the client. Given that DBT prioritizes the cessation of self-directed violence as foundational to engagement in other treatment strategies, it is important to evaluate the effectiveness of DBT for the reduction of suicide-related outcomes.

PRESENT REVIEW

This review sought to synthesize quantitatively existing evidence concerning the effectiveness of DBT for the treatment of suicide-related outcomes in controlled trials. For this review, suicide-related outcomes were categorized into three groups: self-directed violence (i.e., suicidal and nonsuicidal self-injurious [NSSI] behavior), accessing psychiatric crisis services (i.e., inpatient psychiatric care, presentation to the emergency department), and suicidal ideation. Suicide-related outcomes—particularly self-directed violence (formerly called parasuicide)—are the highest priority in the DBT hierarchy of treatment targets and the primary focus of therapy when they are present. Although previous scholarship has asserted the utility of DBT for the reduction of suicide-related behaviors, few previous studies have offered a pooled estimate of this effect across controlled studies. It was hypothesized that DBT would be effective for the treatment (i.e., reduction) of each of these suicide-related outcomes.

Method

SEARCH STRATEGY AND STUDY SELECTION

The authors identified controlled trials of DBT that included suicide-related outcomes via review of bibliographies compiled by subject matter experts (second and third authors), and searching academic databases until May 2017 (i.e., Academic Search Complete: MedLine, PsycINFO, PsycArticles, and PubMed). Suicide-related outcomes were defined to include measurements of self-directed violence, suicidal ideation, and accessing psychiatric crisis services. Search terms were: ("DBT" or "Dialectical Behavior Therapy") and ("suic*"). Authors of papers that reported insufficient statistical data for calculation of effect sizes were contacted for additional information. Articles were excluded, after full-text review, for the following reasons: not including explicit measurement of any suicide-related outcome, not including a control condition, or not reporting original empirical results (e.g., qualitative reviews). In addition, studies that included active comparison conditions (e.g., Collaborative Assessment and Management of Suicidality, Andreasson et al., 2016; General Psychiatric Management, McMain et al., 2009; McMain et al., 2017) were excluded from this meta-analysis, as our focus was on the comparison of DBT with treatment-as-usual and waitlist controls. A flow diagram detailing the search strategy and study selection is presented in Figure 1.

DATA EXTRACTION AND ANALYSES

Outcome data were extracted using a structured coding scheme, and included pre- and postintervention measurements of suicide-related outcomes, and binary proportions for the presence/absence of suicide-related outcomes during the intervention period. The effectiveness of DBT for the treatment of suicide-related outcomes was quantified using
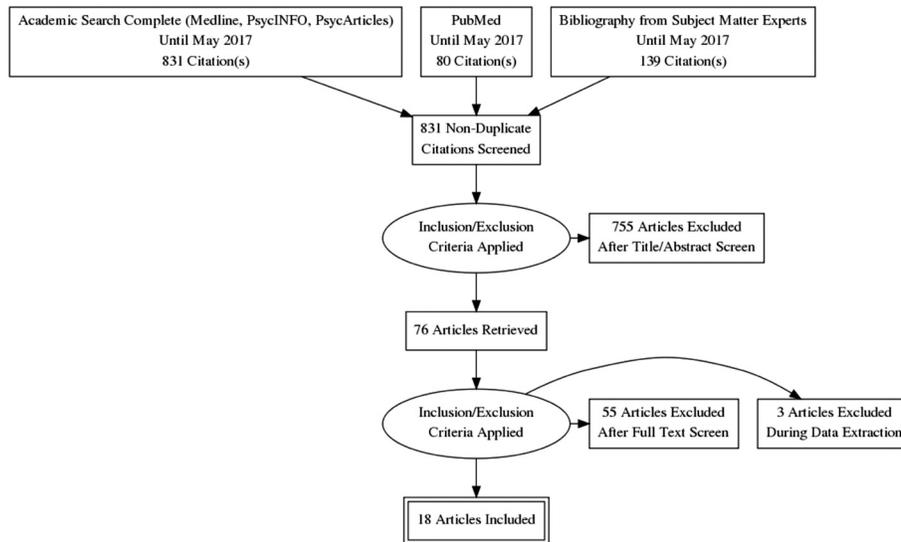
FIGURE 1   PRISMA flow diagram for search strategy and study selection. Diagram constructed using the PRISMA Flow Diagram Generator (Theta Collaborative, n.d.).

Cohen's *d* and associated 95% confidence intervals. For trials that included pre-post measurements of continuous outcomes for DBT and comparison conditions, Cohen's *d* was calculated using the following equation:

$$d = \frac{Mean\ Change\ Score_{DBT} - Mean\ Change\ Score_{Control}}{\sqrt{\dfrac{(N_{Pre-DBT}-1) * SD^2_{Pre-DBT} + (N_{Pre-Control}-1) * SD^2_{Pre-Control}}{N_{Pre-DBT} + N_{Pre-Control}-2}}}$$

This approach was chosen to account for baseline differences in continuous outcomes, and to accurately reflect the change in suicide-related outcomes attributable to DBT interventions, above and beyond discrete differences in outcomes at post-treatment. Effect sizes for binary proportions were calculated using the formulae described by Lipsey and Wilson (2001), and checked for accuracy using the effect size calculator developed by Wilson (n.d.).

Given the variability in study populations, measures employed, and clinical procedures across studies, a random effects approach was chosen a priori. Multiple effect sizes from a single study were averaged together to create one composite effect size per study for each domain of suicide-related outcomes. This conservative approach was chosen to avoid overestimating the pooled effect of DBT interventions due to the dependence of multiple effects from a single study, and may have underestimated the overall pooled effects calculated. However, there was no difference in the direction or significance of meta-analytic findings when calculating meta-analyses that included all effect sizes separately, and thus the authors retained this conservative approach. Random effects meta-analyses were calculated, and forest plots were constructed, in Microsoft Excel using the templates developed by Neyeloff and colleagues (2012). Sensitivity analyses were conducted to assess the impact of including both randomized and nonrandomized controlled trials in our meta-analyses, as well as the influence of specific studies by calculating pooled effect sizes with each study excluded from the analyses (Table 2).

Findings

Eighteen studies were identified for inclusion in this meta-analysis (Bohus et al., 2004; Carter et al., 2010; Clarkin et al., 2007; Feigenbaum et al., 2012; Goldstein et al., 2015; Goodman et al., 2016; Katz et al., 2004; Koons et al., 2001; Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Linehan et al., 1999; Linehan et al., 2002; Linehan et al., 2006; Mehlum et al., 2014; Pasieczny & Connor, 2011; Rathus & Miller, 2002; Soler et al., 2009; Springer et al., 1996; Verheul et al., 2003), including studies that reported on outcomes specific to self-directed violence (*n* = 15), accessing psychiatric crisis services (*n* = 6), and suicidal ideation (*n* = 10). Study information, including specific effect sizes and sample characteristics, is reported in Table 1.

There was a significant pooled effect of DBT compared to control conditions with regard to self-directed violence (Weighted Mean Effect Size, *d* = -.324, 95% CI = -.471 to -.176; Figure 2), and with regard to accessing psychiatric crisis services

Table 1
Sample Characteristics and Effect Size Information for All Included Studies (Listed Alphabetically)

Study	N	Sample Description	Design	Pre-Post Duration	Control Condition	Suicide-Related Outcomes	$d\ (SE_d)$
Bohus et al. (2004)	34	Female Inpatients with BPD, who reported past suicide attempt or 2 acts of NSSI during the 2 years prior to treatment. (Only subsample who "reported self-mutilating behavior within the four weeks immediately before study entry." [p. 492] were included in this meta-analysis) Total Sample (N = 50): DBT: Aged 18 to 44 (M=5.5, SD=5.9) WL: 19-38 (M=29.5, SD=5.4)	CCT	4 months	Waitlist: "Had some form of professional mental health care" (p.491). On average, received 6.1 sessions of outpatient, and 44 days of inpatient treatment.	**_Self-Directed Violence_** i. Proportion that "abstained from self-mutilation at post-assessment"	**_-.71(.41)_** -.71(.41)
Carter et al. (2010)	73	Female Outpatients with BPD, with 3 or more episodes of DSH during 3 months prior to baseline Total Sample: Mean Age = 24.5, SD = 6.10	RCT	6 months	TAU+WL: 6 months of TAU while awaiting DBT enrollment.	**_Self-Directed Violence_** i. "Number of self-harm episodes in previous 3 months," comparison of self-report at baseline and 6 months ii. "Proportion with any self-harm episode" **_Psychiatric Crisis Intervention_** i. "Proportion with at least one admission" to a Psychiatric Hospital ii. "Number of admissions to a psychiatric hospital" iii. "Mean length of stay [days]" in psychiatric hospital iv. "Proportion with at least one admission" to a general hospital for DSH v. "Number of admissions to a general hospital: DSH" vi. "Mean length of stay [days]" in general hospital vii. Presentations to general hospital without admission	**_-.002(.30)_** -.22(.32) .21(.29) **_-.12(.25)_** -.06(.33) -.12(.24) -.16(.23) -.14(.31) -.27(.23) -.27(.23) .22(.24)

Table 1 (*continued*)

Study	N	Sample Description	Design	Pre-Post Duration	Control Condition	Suicide-Related Outcomes	d (SE_d)
						viii. Presentations to psychiatric hospital without admission	-.18(.24)
Clarkin et al. (2007)	39	Outpatients with BPD Total Sample: Aged 18-50 years (M=30.9, SD=7.85), 92.2% Female (Note: this meta-analysis excluded the Transference-Focused Psychotherapy treatment arm).	RCT	9-12 months	Supportive Therapy: Emotional support and advice for daily problems.	**Self-Directed Violence** i. "Overt Aggression Scale-Modified"	**-.36(.32)** -.36(.32)
Feigenbaum et al. (2012)	41	Outpatients with a DSM-IV Cluster B Personality Disorder DBT: Aged 23 to 56 years (M=35.4, SD=7.8), 72% Female TAU: Aged 23-45 (M=34.6, SD=7.4), 75% Female	RCT	12 months	TAU: "consisted of a range of individualized service provisions according to patient need." (p.124)	**Self-Directed Violence** i. "Suicide attempts" ii. "Deliberate Self-Harm" iii. "OAS Suicidality" **Psychiatric Crisis Intervention** i. "Inpatient bed days" ii. "Accident and emergency visits" **Suicidal Ideation** i. CORES-OM Risk Subscale	**.15(.33)** .56(.33) .67(.33) -.78(.33) **.02(.32)** -.15(.32) .20(.32) **-.49(.32)** -.49(.32)
Goldstein et al. (2015)	20	Adolescent Outpatients with Bipolar Affective Disorder (I, II, or NOS); (Aged 12-18) DBT: Mean age = 15.82, SD = 2.1, 79% Female TAU: Mean age = 16.83, SD = 1.4, 67% Female	RCT	12 months	TAU: "eclectic psychotherapy approach" (p.140), on average attended 8.6 sessions.	**Suicidal Ideation** i. Proportion that "showed a decrease in SIQ score"	**-.87(.60)** -.87(.60)
Goodman et al. (2016)	91	Veterans at high risk for suicide, with recent suicide attempt, or suicide-related hospitalization, or identified as high risk by suicide prevention coordinator DBT: Mean age = 36.7, SD = 10.6, 33% Female TAU: Mean age = 40.0, SD = 11.1, 33% Female	RCT	6 months	TAU: Treatment recommended by psychiatrist and case manager, plus monitoring and support via VA Suicide Prevention Coordinator.	**Self-Directed Violence** i. Proportion that attempted suicide ii. "C-SSRS Suicide Attempts" **Suicidal Ideation** i. "Beck Scale for Suicidal Ideation"	**-.15(.31)** .02(.21) -.32(.42) **.26(.21)** .26(.21)
Katz et al. (2004)	62	Adolescent Psychiatric Inpatients who had attempted suicide or reported severe suicidal ideation	CCT	2 weeks	TAU: daily psychodynamic psychotherapy group, weekly psychodynamic individual therapy,	**Suicidal Ideation** i. "Suicidal Ideation Questionnaire-Jr."	**-.10(.25)** -.10(.25)

Study	N	Sample	Design	Duration	Comparison Condition	Outcome	Effect Size (SE)
		Total Sample: Aged 14 to 17 (M=15.4) 83.9% Female			and psychodynamically-oriented milieu.		
Koons et al. (2001)	20	Female Veterans with BPD Total Sample: Aged 21 to 46 (M=35)	RCT	6 months	TAU: Weekly individual therapy at the VA, and supportive and psychoeducational groups. 4 TAU participants "regularly attended groups" (p. 377)	*Self-Directed Violence*	*-.49(.59)*
						i. Proportion "who reported any intentional self-harm"	-.45(.73)
						ii. "Parasuicides past 3 months"	-.53(.46)
						Suicidal Ideation	*-.55(.46)*
						i. "Back Scale for Suicide Ideation"	-.55(.46)
Linehan et al. (1991)	44	Female Outpatients with BPD, with at least 2 episodes of parasuicide since 5 years, and at least one since 8 weeks prior to baseline Aged 18 to 45 years.	RCT	12 months	TAU: "Alternative therapy referrals, usually by the original referral source" (p.1061). 73% of TAU participants started individual therapy.	*Self-Directed Violence*	*-.56(.39)*
						i. "Percentage of subjects with parasuicide"	-1.38(.62)
						ii. "Number of parasuicidal acts"	.20(.30)
						iii. "Medical risk scores"	-.51(.35)
						iv. "Medically treated parasuicidal acts."	-.55(.31)
						Psychiatric Crisis Intervention	*-.43(.34)*
						i. Proportion with "at least one psychiatric inpatient admission"	-.43(.34)
Linehan et al. (1999)	22	Female Outpatients with BPD and current drug-related substance use disorder DBT: Mean age = 30.4, SD = 6.4 TAU: Mean age = 30.4, SD = 7.0	RCT	12 months	TAU: "Alternative substance abuse and/or mental health counselors and programs... or... continue with their individual psychotherapists" (p. 282). 31.6 hours of "individualized treatment-related contact," on average.	*Self-Directed Violence*	*.42(.43)*
						i. Number of non-suicidal self-injury acts	.42(.43)
						ii. Number of suicide attempts	.42(.43)
Linehan et al. (2002)	23	Female Outpatients with BPD and current opiate dependence diagnosis Total Sample: Mean age=36.1 SD=7.3	RCT	12 months	CVT+12S: "Focused on validating the client and her experience in a warm and supportive atmosphere..." and "a 120-min women's Narcotics Anonymous (NA) meeting" (pp. 16-17). Mean of 33.2 individual sessions and 10.8 group sessions.	*Self-Directed Violence*	*-.08(.42)*
						i. Number of non-suicidal self-injury acts	-.04(.42)
						ii. Number of suicide attempts	-.12(.42)
Linehan et al. (2006)	101	Female Outpatients with BPD, and at least 2 episodes of attempted suicide or self-injury since 5 years, and at least one since 8 weeks prior to baseline DBT: Mean age = 29.0, SD = 7.3 CBTE: Mean age = 29.6, SD = 7.8	RCT	12 months	CTBE: "Treatment provided was uncontrolled by the research team" (p. 759). Included expert therapists nominated by community mental health leaders, and a minimum of 1 session per week.	*Self-Directed Violence*	*-.41(.28)*
						i. "Highest medical risk" of suicide attempt and self-injury	-.14(.20)
						ii. "Rate [proportion] of suicide attempts"	-.57(.24)
						iii. Proportion that "made nonambivalent suicide attempts"	-.50(.40)
						Psychiatric Crisis Intervention	*-.72(.29)*
						i. "Emergency Department visits"	-.54(.27)

Table 1 (*continued*)

Study	N	Sample Description	Design	Pre-Post Duration	Control Condition	Suicide-Related Outcomes	$d\ (SE_d)$
						ii. "Hospital admission for suicide ideation"	-.90(.30)
						Suicidal Ideation	***.25(.20)***
						i. Suicidal Behaviors Questionnaire	.25(.20)
Mehlum et al. (2014)	77	Adolescent Outpatients with BPD, and at least 2 self-harm episodes, and 1 episode since 16 weeks prior to baseline; "At least 2 criteria of DSM-IV BPD (plus the self-destructive criterion, or, alternatively at least 1 criterion of DSM-IV BPD plus at least 2 subthreshold-level criteria..." (p.1083). DBT: Mean age = 15.9, SD = 1.4, 87.2% Female EUC: Mean age = 15.3, SD = 1.6, 89.5% Female	RCT	19 weeks	EUC: 19 weeks of standard care... requiring that EUC therapists agree to provide on average no less than 1 weekly treatment session... delivered by therapists... not trained in DBT" (p.1085).	***Self-Directed Violence*** i. "Frequency of self-harming episodes" ***Suicidal Ideation*** i. Suicidal Ideation Questionnaire	***-.26(.23)*** -.26(.23) ***-.60(.23)*** -.60(.23)
Pasieczny and Connor (2011)	81	Public Mental Health Clients Total Sample: Aged 18 to 58 years (M = 33.58, SD = 10.10), 93.3% Female	CCT	6 months	TAU: "Clinical case management" including psychosocial skills, crisis intervention, and psychoeducation (p. 6). Mean of 19.18 face-to-face contacts with case manager.	***Self-Directed Violence*** i. "Suicide Attempts" ii. "Self harm episodes" ***Psychiatric Crisis Intervention*** i. "ED visits" ii. "Psych admissions" iii. "Hospital days" ***Suicidal Ideation*** i. Beck Scale for Suicidal Ideation	***-.69(.23)*** -.96(.23) -.43(.22) ***-.50(.23)*** -.21(.22) -.53(.23) -.76(.23) ***-.40(.33)*** -.40(.33)

Study	N	Sample	Design	Duration	Comparison	Outcome	Effect Size
Rathus and Miller (2002)	111	Adolescent Outpatients with BPD, with a suicide attempt since 16 weeks prior to baseline DBT: Mean age = 16.1, SD = 1.2 93% Female TAU: Mean age = 15.0, SD = 1.7 73% Female	CCT	12 weeks	TAU: "12 weeks of twice weekly individual and family sessions" (p. 150). 40% completed 12 weeks of TAU.	***Self-Directed Violence*** i. Proportion with "suicide attempts during treatment"	***-.54(.60)*** -.54(.60)
Soler et al. (2009)	59	Outpatients with BPD DBT Group Skills Training: Aged 19-41 years (M=28.45, SD=6.55) Standard Group Therapy: Aged 21-39 (M=29.97, SD=5.63)	RCT	13 weeks	Std. Group Therapy: "Oriented to provide a relational experience... led by two experienced psychodynamic-oriented psychotherapists" (p. 356).	***Self-Directed Violence*** i. Mean "self-harm" episodes per week ***Psychiatric Crisis Intervention*** i. Mean "Emergency visits" per week ***Suicidal Ideation*** i. CGI-BPD Subscale	***-.29(.26)*** -.29(.26) ***-.43(.26)*** -.43(.26) ***-.26(.26)*** -.26(.26)
Springer et al. (1996)	31	Inpatients with Personality Disorder Diagnoses Modified DBT: "Creative Coping" Total Sample: Mean age = 31.4, SD = 9.24, 67.7% Female	RCT	11.9-13.3 days on average	Wellness & Lifestyles Group: "Designed to discuss issues of interest to patients and relevant to their lives, but not in a psychotherapeutic manner" (p. 60). On average, attended 5.5 group sessions.	***Suicidal Ideation*** i. Adult Suicidal Ideation Questionnaire	***-.51(.36)*** -.51(.36)
Verheul et al. (2003)	58	Dutch Female Outpatients with BPD Total Sample: Aged 18 to 70 years	RCT	12 months	TAU: "Clinical management from the original referral source... generally no more than two sessions per month with a psychologist, a psychiatrist, or social worker" (p. 136).	***Self-Directed Violence*** i. Proportion that "attempted suicide" ii. Proportion that "engaged in any self-mutilating behavior"	***-.67(.39)*** -.85(.47) -.50(.30)

Note. Composite effect sizes from each study for each meta-analysis are presented in bold and italics. RCT = Randomized Control Trial. CCT = Controlled Clinical Trial. BPD = Borderline Personality Disorder. TAU = Treatment as Usual. EUC = Enhanced Usual Care. WL = Waitlist. CVT+12S = Community Validation Treatment and 12-Step Program. CTBE = Community Treatment by Experts.

| Suicidal/NSSI Behavior	N	d	Lower Limit	Upper Limit
Linehan et al., 1999	22	0.42	-0.42	1.27
Feigenbaum et al., 2012	41	0.15	-0.49	0.79
Carter et al., 2010	73	-0.002	-0.59	0.59
Linehan et al., 2002	23	-0.08	-0.90	0.74
Goodman et al., 2016	91	-0.15	-0.77	0.46
Mehlum et al., 2014	77	-0.26	-0.71	0.18
Soler et al., 2009	59	-0.29	-0.80	0.22
Clarkin et al., 2007	39	-0.36	-0.99	0.28
Linehan et al., 2006	101	-0.41	-0.96	0.14
Koons et al., 2001	20	-0.49	-1.65	0.67
Rathus & Miller, 2002	111	-0.54	-1.73	0.64
Linehan et al., 1991	44	-0.56	-1.33	0.21
Verheul et al., 2003	81	-0.69	-1.14	-0.24
Pasieczny & Connor, 2011	34	-0.71	-1.52	0.10
Bohus et al., 2004	58	-0.67	-1.43	0.08
Weighted Mean Effect Size	874	-0.32	-0.47	-0.18
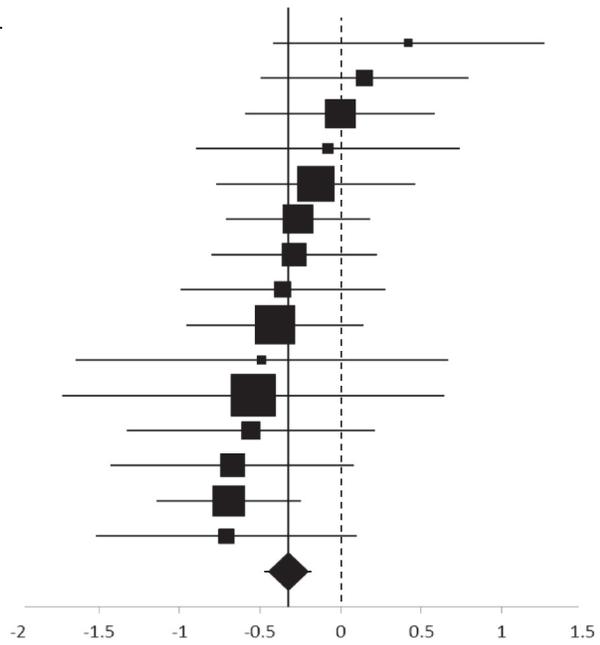
FIGURE 2   Random effects meta-analysis of DBT for self-directed violence outcomes.

(Weighted Mean Effect Size, d = -.379, 95% CI = -.581 to -.176; Figure 3). Overall, DBT clients reported engaging in less self-directed violence compared to controls, and also reported fewer incidents of seeking psychiatric crisis services (i.e., inpatient psychiatric hospitalization, emergency department visits). There was not a significant pooled effect of DBT with regard to suicidal ideation (Weighted Mean Effect Size, d = -.229, 95% CI = -.473 to .016; Figure 4). Between-study heterogeneity was low among studies included in meta-analyses of suicidal and NSSI behaviors (I^2 = 0.00%) and psychiatric crisis services outcomes (I^2 = 0.00%), and was moderate for the meta-analysis that evaluated suicidal ideation outcomes (I^2 = 45.48%).

Random effects meta-analyses were also calculated with controlled clinical trials (i.e., nonrandomized trials; k = 3) excluded. There were no marked differences in the direction, magnitude, or significance of our findings when controlled clinical trials were excluded, including the effectiveness of DBT for suicidal and NSSI behaviors (Weighted Mean Effect Size, d = -.237, 95% CI = -.369 to -.104, I^2 = 0.00), psychiatric crisis services (Weighted Mean Effect Size, d = -.336, 95% CI = -.587 to -.086, I^2 = 0.00), and suicidal ideation (Weighted Mean Effect Size, d = -.247, 95% CI = -.555 to .060, I^2 = 56.07). Weighted mean effects were also calculated with each individual study excluded to assess the influence of specific studies upon estimates of pooled effects. As

Psychiatric Crisis Intervention	N	d	Lower Limit	Upper Limit
Feigenbaum et al., 2012	41	0.02	-0.60	0.65
Carter et al., 2010	73	-0.12	-0.62	0.38
Linehan et al., 1991	44	-0.43	-1.09	0.24
Soler et al., 2009	59	-0.43	-0.94	0.09
Pasieczny & Connor, 2011	81	-0.50	-0.94	-0.06
Linehan et al., 2006	101	-0.72	-1.28	-0.16
Weighted Mean Effect Size	663	-0.38	-.58	-.18
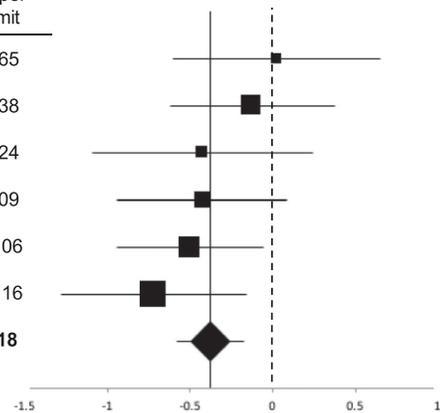
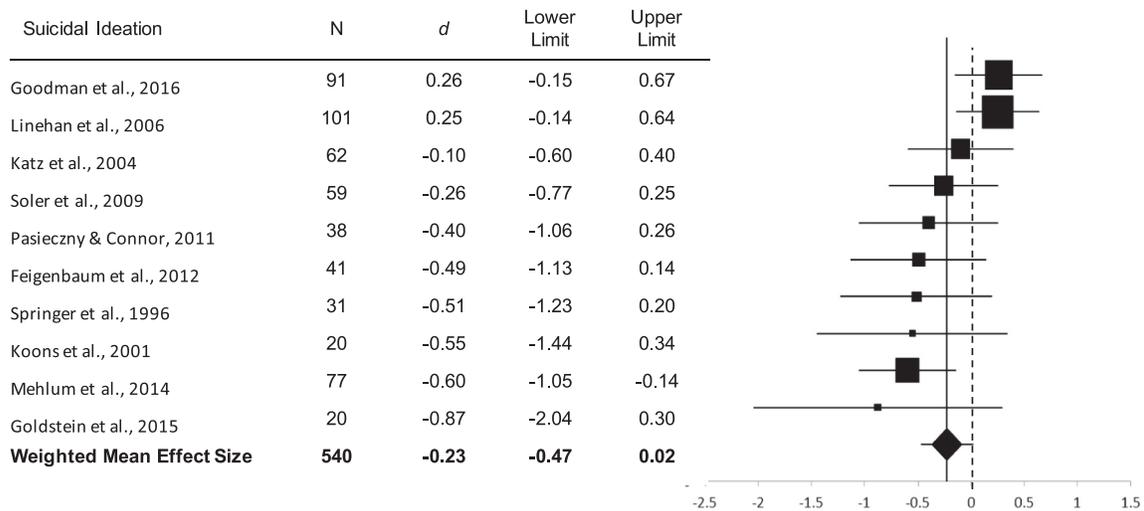**FIGURE 3**   Random effects meta-analysis of DBT for accessing psychiatric crisis intervention services.

Suicidal Ideation	N	d	Lower Limit	Upper Limit
Goodman et al., 2016	91	0.26	-0.15	0.67
Linehan et al., 2006	101	0.25	-0.14	0.64
Katz et al., 2004	62	-0.10	-0.60	0.40
Soler et al., 2009	59	-0.26	-0.77	0.25
Pasieczny & Connor, 2011	38	-0.40	-1.06	0.26
Feigenbaum et al., 2012	41	-0.49	-1.13	0.14
Springer et al., 1996	31	-0.51	-1.23	0.20
Koons et al., 2001	20	-0.55	-1.44	0.34
Mehlum et al., 2014	77	-0.60	-1.05	-0.14
Goldstein et al., 2015	20	-0.87	-2.04	0.30
Weighted Mean Effect Size	**540**	**-0.23**	**-0.47**	**0.02**

FIGURE 4 Random effects meta-analysis of DBT for suicidal ideation outcomes.

is reported in Table 2, none of the "if deleted" calculations for the meta-analyses of self-directed violence or psychiatric crisis services outcomes revealed any marked differences in the direction, magnitude, or statistical significance of the pooled effects observed. In contrast, when either Goodman and colleagues (2016) or Linehan and colleagues (2006) were excluded from the meta-analysis of suicidal ideation outcomes, the pooled effect became slightly increased in magnitude and reached statistical significance (i.e., confidence interval did not include 0.00).

Discussion

Foremost, this meta-analytic review demonstrates the effectiveness of DBT for the treatment of self-directed violence, and in reducing the frequency of accessing psychiatric crisis intervention services. This finding was derived across studies that included adult (e.g., Pasieczny & Connor, 2011) and pediatric populations (e.g., Mehlum et al., 2014), in trials that implemented comprehensive (e.g., Linehan et al., 2006) and modified versions of DBT (e.g., Soler et al., 2009), in both inpatient (e.g., Springer et al., 1996) and outpatient settings (e.g., Feigenbaum et al.,

Table 2
Weighted Mean Effect Sizes for Each Outcome if Each Included Study Were Excluded

Suicidal/NSSI Behavior		Psychiatric Crisis Services		Suicidal Ideation	
All studies included, WME = -.324[*]		All studies included, WME = -.379[*]		All studies included, WME = -.229	
Study	WME if deleted	Study	WME if deleted	Study	WME if deleted
Linehan et al. (1999)	-.364[*]	Feigenbaum et al. (2012)	-.430[*]	Goodman et al. (2016)	-.294[*]
Feigenbaum et al. (2012)	-.363[*]	Carter et al. (2010)	-.443[*]	Linehan et al. (2006)	-.296[*]
Carter et al. (2010)	-.352[*]	Linehan et al. (1991)	-.369[*]	Katz et al. (2004)	-.257
Linehan et al. (2002)	-.330[*]	Soler et al. (2009)	-.364[*]	Soler et al. (2009)	-.235
Goodman et al. (2016)	-.333[*]	Pasieczny and Connor (2011)	-.336[*]	Pasieczny and Connor (2011)	-.218
Mehlum et al. (2014)	-.330[*]	Linehan et al. (2006)	-.331[*]	Springer et al. (1996)	-.207
Soler et al. (2009)	-.324[*]			Koons et al. (2001)	-.212
Clarkin et al. (2007)	-.317[*]			Mehlum et al. (2014)	-.160
Linehan et al. (2006)	-.312[*]			Feigenbaum et al. (2012)	-.205
Koons et al. (2001)	-.316[*]			Goldstein et al. (2015)	-.203
Rathus and Miller (2002)	-.316[*]				
Linehan et al. (1991)	-.311[*]				
Pasieczny and Connor (2011)	-.256[*]				
Bohus et al. (2004)	-.309[*]				
Verheul et al. (2003)	-.308[*]				

Note. WME = weighted mean effect size. [*], statistically significant (i.e., confidence interval does not include 0.00).

2012), and among clients with (e.g., Bohus et al., 2004) and without (e.g., Goldstein et al., 2015) past history of suicidal and/or self-injurious behaviors. The inclusion of suicidal behavior and NSSI within the same outcome in this study reflects the categorization of these potentially life-threatening behaviors within the same primary treatment target within DBT (Linehan, 1993). Given the low base rate of suicidal and crisis intervention behaviors, the present review contributes to the literature by pooling estimates across several studies to better approximate the effectiveness of DBT for preventing suicide-related outcomes in clinical populations. However, it is also important to note that the mean effect of DBT pooled across all studies was modest. As a psychotherapy, DBT represents one element of integrative suicide prevention among clinical populations, and should be considered in concert with parallel efforts to mitigate risk of suicide via means safety (Bernert, Horn, & Roberts, 2014) and systems approaches, such as Zero Suicide (Hogan & Grumet, 2016).

There was no statistically significant pooled effect of DBT with regard to suicidal ideation when all studies were included. Studies trended towards favoring DBT over control conditions, and the absence of a significant effect may have reflected the relatively small number of studies and relatively small sample sizes included in this review. Further, as is demonstrated in Table 2, this finding may reflect the particular influence of two larger studies (Goodman et al., 2016; Linehan et al., 2006), which "if deleted" yielded a significant overall pooled effect. Nonetheless, this sensitivity to the inclusion or exclusion of particular studies suggests that there is not a robust effect of DBT with regard to suicidal ideation across controlled trials. It may be that DBT is not particularly effective for the reduction of suicidal ideation. However, given the explicit prioritization of suicidal behaviors before suicidal thoughts and expectancies in DBT (Linehan, 1993), fewer DBT studies measured suicidal ideation and DBT therapists may not have given suicidal ideation as much attention in the course of treatment. Thus, our findings also suggest the importance of including measures of suicidal ideation in DBT studies as well as the need for additional clinical development of optimal strategies for mitigating durable patterns of suicidal ideation that may not resolve during the course of DBT.

Our findings should be considered in view of several limitations. First, although this review sought to identify all controlled trials of DBT that included specific measures of suicidal thoughts and behavior, it is possible that we failed to identify every study, particularly unpublished works with null findings. Furthermore, given the low base rate of attempted suicide and death by suicide, several

previous studies have not explicitly measured these outcomes, or have not been able to analyze these outcomes due to the limited occurrence of these outcomes during assessment periods. For example, Goldstein and colleagues (2015) observed no occurrence of NSSI in their DBT condition, and only one case in the TAU condition. Similarly, they observed no suicide attempts among TAU participants at follow-up and two attempts among DBT participants, and thus it was not possible to assess the effect of DBT with regard to these behaviors (Goldstein et al., 2015). The low base rate of self-directed violence and related behaviors is a long-standing challenge in the study and prevention of suicide, and underscores the importance of future work that links trials data with administrative records of death and hospitalization over time.

Next, this review only included controlled trials (i.e., randomized and nonrandomized), which may limit the transferability of our findings to applied clinical settings. However, our decision to include only controlled trials lends strength to our conclusions, given the ability to analyze differences in treatment response across DBT and comparison conditions. Nonetheless, future research should consider the effectiveness of DBT for the treatment of suicidality across studies conducted in applied settings that did not include comparisons conditions. As noted above, this study included findings across several distinct settings, populations, and specific DBT modalities. Although the authors assert that this demonstrates, to an extent, the robustness and durability of the findings observed, it should also be noted that the different settings included may also represent particular challenges to recruitment and retention (e.g., inpatient v. outpatient settings) that affected the sample sizes obtained, and which may have influenced the nature of the evidence available for inclusion in this review independent of specific DBT treatment effects.

Finally, our choice to average together multiple effects from the same study may have overestimated the dependence among effects from the same study, and thus underestimated the pooled effect of DBT for the outcomes considered in this review. However, this would not explain the null finding for suicidal ideation, as no study reported more than one outcome in this domain. Taken together, our findings demonstrate that DBT is an effective approach for reducing self-directed violence and accessing psychiatric crisis services. The present review also supports DBT as a first-line treatment for the prevention of suicidal behavior and psychiatric emergency care in diverse clinical populations, including high-risk and acutely suicidal clients, for whom "chronic, aversive emotional dysregulation"

(p.14) and perceptions of life as "intolerable and unsolvable" (p.15) are primary drivers of suicidality (Linehan, 1993).

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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