The Temporal Relationships between Therapist Adherence and Patient Outcomes in Dialectical Behavior Therapy

Melanie S. Harned[1,2], Robert J. Gallop[3], Sara C. Schmidt[1,4], & Kathryn E. Korslund[5]

[1] VA Puget Sound Health Care System, Seattle, WA

[2] Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA,

[3] Department of Mathematics, West Chester University, West Chester, PA

[4] Department of Psychology, University of Washington, Seattle, WA

[5] THIRA Health, Bellevue, WA

In Press, *Journal of Consulting and Clinical Psychology*

Author Note

This work was supported by the National Institute of Mental Health [R56MH117085]. We would like to thank the Principal Investigators (PIs) who allowed data from their clinical trials to be used in these analyses, including Drs. Marsha Linehan, Elizabeth McCauley, Michelle Berk, Joan Asarnow, Stefan Priebe, and Thomas Lynch. The clinical trials from which the data were derived were supported by grants from the National Institute of Mental Health [R01MH034486, PI: Dr. Linehan; R01MH090159, PIs: Drs. Linehan and McCauley; R01MH93898, Drs. Berk and Asarnow; R34MH082143, PI: Dr. Harned; R34MH106598, PI: Dr. Harned], the National Institute on Drug Abuse [R01DA014997, PIs: Drs. Linehan and Lynch], and the National Institute for Health Research [PB-PG-0906-10540, PI: Dr. Priebe]. The data and study materials can be requested by contacting the PIs of the relevant clinical trials. The analysis code used in this study can be accessed by contacting the first author. Drs. Harned, Korslund, and Schmidt are paid to provide training and consultation in DBT.

Correspondence concerning this article should be addressed to Melanie Harned, VA Puget Sound Health Care System, 1660 South Columbian Way, Mailstop S-116-MHC, Seattle, WA 98108; E-mail: melanie.harned@va.gov

Abstract

Objective: Although Dialectical Behavior Therapy (DBT) is a well-established evidence-based psychotherapy, little is known about the role of therapist adherence in promoting positive outcomes. This study evaluated the temporal relationships between therapist adherence to DBT and patient outcomes, as well as potential moderators of these relationships. **Method:** Data were from six clinical trials conducted in research and community settings with a variety of patient populations. In these trials, trained observers rated 83 therapists for adherence during 1,262 DBT individual therapy sessions with 288 patients. Patient outcomes included suicide attempts, non-suicidal self-injury (NSSI), treatment dropout, psychiatric hospitalizations, and global functioning. Longitudinal mixed-effects models evaluated the time-ordered, bidirectional relationships between adherence and outcomes. **Results:** Higher therapist adherence significantly predicted fewer subsequent suicide attempts (p = .002, η = 0.32) and a lower risk of dropout (p = .002, η = 0.33), and the latter relationship was strongest among patients with comorbid opioid dependence. Higher therapist adherence predicted fewer subsequent hospitalizations among community therapists (p = .001, η= 0.35) and patients that were not exclusively suicidal/self-injuring (p < .001, η = 0.41). Conversely, more frequent NSSI (p = .03, η = 0.22) and worse global functioning (p = .01, η = 0.26) predicted higher subsequent therapist adherence, and the latter relationship was moderated by patient population. **Conclusions:** Therapist adherence improves several key patient outcomes and retention, highlighting the importance of delivering DBT with adherence to the manual. Therapists may find it easier to deliver DBT adherently to more severely impaired patients.

Keywords: Dialectical Behavior Therapy, therapist adherence, clinical outcome

Introduction

Dialectical Behavior Therapy (DBT; Linehan, 1993; Linehan, 2015) is a widely used, evidence-based psychotherapy (EBP) for borderline personality disorder (BPD; Storebø et al., 2020) as well as self-injurious behaviors (SIB; DeCou, Comtois, & Landes, 2019). Across scores of randomized controlled trials (RCTs) with adults and adolescents, DBT has been shown to produce change in a variety of clinical and functional outcomes while also reducing the risk of treatment dropout (for a review see Miga et al., 2019). Now that DBT's effectiveness is well-established, researchers have increasingly focused on understanding how and why the treatment works. To date, research has identified several patient characteristics (e.g., use of DBT skills, emotion regulation) and common treatment factors (e.g., therapeutic alliance) that account for improvements in key outcomes in DBT such as suicide attempts, non-suicidal self-injury (NSSI), and treatment dropout (e.g., Asarnow et al., 2021; Barnicot, Gonzalez, McCabe, & Priebe, 2016; Bedics, Atkins, Harned, & Linehan, 2015; Neacsiu, Rizvi, & Linehan, 2010). However, little is known about the role of specific treatment factors such as therapist adherence in promoting positive outcomes in DBT.

Therapist adherence refers to the degree to which therapists utilize prescribed strategies and avoid proscribed strategies of a treatment (Perepletchikova, Treat, & Kazdin, 2007). In DBT, therapist adherence has always been emphasized as an important component of effective treatment delivery. Indeed, DBT includes an entire treatment mode – the therapist consultation team – that functions to "hold the therapist inside the treatment" (Linehan, 1993; p. 101) by enhancing therapists' motivation and ability to deliver DBT adherently. Therapist adherence is also considered critical to conducting high quality DBT research (Miga et al., 2019), is

emphasized in DBT training models (Gaglia, 2019), and is required to become certified as a DBT clinician by the organization established by the treatment developer (https://dbt-lbc.org/).

Despite the emphasis in DBT on providing the treatment with adherence, there is limited research to suggest that doing so impacts patient outcomes. DBT clinical trials that have assessed therapist adherence have typically only reported descriptive data about the degree to which therapists delivered DBT with adherence and have not examined its relationship to outcomes. There are three exceptions that have produced mixed results. First, in an RCT of DBT for women with BPD and drug dependence disorders, Linehan and colleagues (1999) found that adherent therapist/patient dyads had lower rates of urinalysis-assessed drug use than non-adherent dyads. However, Koons and colleagues (2001) found no consistent relationship between adherence and outcomes in an RCT of DBT for women veterans with BPD. Finally, in an RCT of DBT for women with BPD, posttraumatic stress disorder (PTSD), and recent SIB, Harned and colleagues (2014) found that lower therapist adherence was related to patients requesting to be reassigned to a new therapist. Of note, these studies were comprised of relatively small samples (*n's* = 7-26) and only one study (Harned et al., 2014) used the DBT Adherence Coding Scale (DBT ACS; Linehan & Korslund, 2003), the only measure that has been found to be reliable and valid in assessing adherence to DBT (Harned, Korslund, Schmidt, & Gallop, 2021a).

In contrast, there is considerable research on the relationship between therapist adherence and patient outcomes in other treatment modalities, though with similarly mixed results. Across a variety of EBPs, some studies have found that adherence is associated with improved outcomes (e.g., Barber et al., 2006; Dong, Soehner, Belánger, Morin, & Harvey, 2018; Hogue et al 2008), whereas others have found that adherence is negatively associated with outcomes (e.g., DeRubeis & Feeley, 1990; Feeley, DeRubeis, & Gelfand, 1999; Huey, Henggeler, Brondino, &

Pickrel, 2000). In addition, some studies have not found a significant positive or negative relationship between adherence and outcomes (e.g., Liber et al., 2010; Loeb et al., 2005; Southam-Gerow et al., 2021). Accordingly, meta-analyses of adherence-outcome studies have found significant variance across studies and an overall small and non-significant effect among adults (r = .02; Webb, DeRubeis, & Barber, 2010) and a small but significant effect among children and adolescents (r = .10; Collyer, Eisler, & Woolgar, 2020).

There are several potential methodological explanations for the significant heterogeneity in adherence-outcome findings across studies, such as unreliability of adherence measures, lack of power, and the failure to account for the temporal ordering and potential non-linear nature of the data (Collyer et al., 2020; Webb et al., 2010). The variability in findings across studies also suggests the need to examine potential moderators of the adherence-outcome relationship. For example, it may be that adherence is only related to outcomes in certain therapist or patient populations. Among therapists, variability in adherence is significantly smaller among research therapists than community therapists in studies of DBT (Harned et al., 2021a) and other EBPs (e.g., Imel et al., 2011; Imel et al., 2014), which may attenuate adherence-outcome relationships. Furthermore, certain patient populations and outcomes may be more or less responsive to adherent treatment delivery. For example, patient population was a trend-level moderator of adherence-outcome effect sizes, with larger relationships found in studies of patients with major depressive disorder (Webb et al., 2010). In addition, therapist adherence has been found to significantly impact outcomes in studies of children and adolescents (Collyer et al., 2020) but not adults (Webb et al., 2010). This suggests that focusing only on one patient population, outcome, or age group may limit the ability to detect adherence-outcome relationships.

It is also important to consider the potential bidirectional nature of the relationship between adherence and outcomes. Although most studies have focused solely on examining the hypothesis that adherence to EBPs should improve patient outcomes, it is also possible that certain patient characteristics may result in better or worse therapist adherence. This is supported by research indicating that a significant amount of the variance in therapist adherence is accounted for at the patient-level in studies of DBT (Harned et al., 2021a) and other EBPs (e.g., Barber et al., 2006; Boswell et al., 2013; Imel et al., 2011). There may be specific patient characteristics that tend to pull therapists out of adherence. For example, therapists have been found to deliver treatment less adherently to patients with greater interpersonal aggression and Axis II traits in cognitive behavioral therapy (CBT) for panic disorder (Boswell et al., 2013; Zickgraf et al., 2016). In addition, patients who show early improvement may be easier to deliver treatment to in an adherent manner or early improvement may make it harder to remain adherent due to a lack of clear problems to address. Accordingly, research on the impact of early improvement on subsequent therapist adherence has yielded mixed results (e.g., Barber, Crits-Christoph, & Luborsky, 1996; DeRubeis & Feeley, 1990; Loeb et al., 2005).

The present study aimed to evaluate the bidirectional relationships between therapist adherence and patient outcomes in DBT utilizing rigorous methods that addressed the limitations of prior research. To maximize power to detect effects and improve the generalizability of the results, we utilized a large archival dataset that combined data from six clinical trials of DBT. The inclusion of multiple studies also enabled us to examine whether these relationships varied in different therapist and patient populations. To ensure reliability of the findings, only studies that used the psychometrically sound DBT ACS to measure adherence were included. Finally, longitudinal mixed-effects models were implemented that accounted for the temporal ordering of

the variables and potential non-linear relationships between adherence and outcomes. Given that a preponderance of the existing evidence suggests a positive relationship between adherence and outcomes in DBT (Harned et al., 2014; Linehan et al., 1999), we hypothesized that therapist adherence would predict better subsequent patient outcomes (suicide attempts, NSSI, dropout, hospitalizations, and global functioning). Since no prior research has evaluated the impact of patient characteristics on adherence in DBT, we did not have an apriori hypothesis about these potential relationships. We also conducted exploratory analyses to examine the impact of potential moderators on these bidirectional relationships, including therapist type (research vs. community), patient population (recent SIB, opioid dependence (OD), and PTSD), and patient age group (adolescents vs. adults).

Method

Data Sources

Data were derived from six clinical trials of DBT (see Table 1). This archival data analysis project was approved by the VA Puget Sound Institutional Review Board (IRB).

Participants

A total of 315 patients were assigned to receive DBT individual therapy in these clinical trials. Of these, 288 (91.4%) had at least one session coded for adherence and were included in the analyses. The patient inclusion criteria for each study are shown in Table 1. The demographic and clinical characteristics of the intent-to-treat samples in each study are shown in Table 2.

Procedures

Adherence coding. Trained raters (n = 15) used the DBT ACS to code DBT individual therapy sessions according to the adherence sampling schedule determined by each study protocol (see Table 1). Rater training included reading the DBT ACS manual, coding a set of

calibration tapes, and discussing discrepancies. Raters were considered reliable when their computed global scores were within 0.3 points from the gold standard coder for at least 5 sessions. In each study, reliability checks were periodically conducted for each rater to ensure they had not drifted from the gold standard coder and to re-calibrate if needed. Across studies, a total of 1,262 DBT individual therapy sessions were coded that involved 83 therapists and 288 patients. Descriptive data on the number of patients, therapists, and sessions coded in each study is presented in Table 3.

Patient assessments. Patient assessments were conducted by independent evaluators with the exception of Study 5 in which therapists rated patients' global functioning and independent evaluators assessed all other outcomes. Independent evaluators were blinded to treatment condition in all studies except Study 6. Table 1 includes the schedule of patient outcome assessments from pre- to post-treatment for each study.

Measures

DBT adherence. The DBT Adherence Coding Scale (DBT ACS; Linehan & Korslund, 2003) was used to code sessions for adherence to DBT. It is comprised of 66 items that reflect the major therapeutic strategies used in DBT as specified in the treatment manual (Linehan, 1993). Although the DBT ACS is primarily a measure of adherence, it blends this with therapist competence by also considering the degree to which each strategy was done sufficiently (e.g., in terms of frequency, duration, execution). Specifically, each item is rated on a scale where 0 = not used/not necessary, 1 to 3 = below adherence, 4 = minimum threshold for adherence, and 5 = adherent with high sufficiency. All non-zero items are averaged to create a computed global score where 4.0 and higher is considered "adherent." The DBT ACS has been found to have

good internal consistency ($\alpha = 0.81$), excellent inter-rater reliability (ICC = 0.93), and excellent discriminant validity in the studies being used in the present analyses (Harned et al., 2021a).

Suicide attempts and NSSI. The Suicide Attempt Self-Injury Interview (SASII; Linehan, Comtois, Brown, Heard, & Wagner, 2006) is a psychometrically sound interview with excellent inter-rater reliability (ICCs = 0.87-0.98) that was used to assess the frequency of suicide attempts and NSSI in Studies 1-5. In Study 6, the frequency of suicide attempts and NSSI was assessed via an interview on a structured form using definitions consistent with the SASII (i.e., intentional self-harm that caused tissue damage with and without suicidal intent). At baseline, suicide attempts and NSSI were assessed for the previous year (Studies 1, 3, 4, 5, 6) or lifetime (Study 2). Outcome assessments in all studies assessed the frequency of suicide attempts and NSSI since the previous assessment.

Hospitalizations. The number of admissions to inpatient psychiatric units was assessed via the Treatment History Interview (Linehan & Heard, 1987) in Studies 1-5 and a modified version of the Client Service Receipt Inventory (Beecham & Knapp, 2001) in Study 6. All studies assessed psychiatric hospitalizations in the past year at baseline and since the previous assessment at all outcome periods.

Global functioning. Interviewer-rated global functioning was measured via the Global Assessment Scale (GAS; Weissman & Bothwell, 1976 – Studies 1, 2, 3), the Child Global Assessment Scale (CGAS; Schaffer et al., 1983 – Study 4), and the Global Assessment of Functioning scale (GAF; Studies 5 and 6). GAF and GAS use a comparable 0-100 scale to rate the overall severity of illness inclusive of psychiatric symptoms and general functioning where higher scores indicate better functioning. Inter-rater reliability for the GAS has been found to range from 0.61 to 0.91 (Endicott, Spitzer, Fleiss, and Cohen, 1976).

Treatment dropout. Premature dropout from DBT was defined as missing four consecutive weeks of DBT individual or group therapy (Studies 1-4), dropping out of treatment prior to the expected program discharge (Study 5), and missing four consecutive sessions of individual therapy, group therapy, or any combination of the two (Study 6).

Analytic Strategy

All analyses were conducted using SAS (Version 9.4). Primary analyses utilized mixed-effects models, which are designed for longitudinal nested data, account for the time-ordering of variables, and make use of all available data. Preliminary analyses were conducted to evaluate the distribution of the various outcome measures using Hierarchical Linear Models (HLM) for continuous outcomes (global functioning) and Hierarchical Generalized Linear Models (HGLM) for binary (dropout) and count (suicide attempts, NSSI acts, hospitalizations) outcomes (Raudenbush & Bryk, 2002; Raudenbush, Bryk, & Congdon, 2007). For each count outcome, HGLM with negative binomial distributions were found to have the best fit based on Vuong's test (1989). In the reverse outcome-adherence models, separate HLMs evaluated suicide attempts (count), NSSI acts (count), hospitalizations (count), dropout (binary), and global functioning (continuous) as predictors of subsequent adherence (continuous). Given previous findings of non-linear relationships between adherence and outcomes (e.g., Barber et al., 2006), we also examined the linearity of the data in both sets of the HLM/HGLM models by augmenting the models to include quadratic terms for each grand-mean centered predictor and interactions between the quadratic term and the moderators. For all predictor-outcome relationships, a linear distribution provided the best fit to the data ($p > .18$ for all quadratic terms).

The models included three levels: adherence or outcome scores (Level 1) nested within patients (Level 2) nested within therapists (Level 3). Both patients and therapists were treated as

random effects. Given that the data were from multiple studies, all models were adjusted for study by including it as a fixed covariate effect. In the adherence-outcome models, all therapist adherence ratings that occurred between patient assessments were used as individual data points to predict subsequent patient outcomes. In the outcome-adherence models, patient outcomes were used to predict each therapist adherence rating before the next outcome assessment. In both sets of models, several variables were examined as potential moderators, including therapist type (0 = community therapists [Studies 5 and 6], 1 = research therapists [Studies 1-4]), SIB population (0 = recent SIB not required [Studies 2 and 5], 1 = recent SIB required [Studies 1, 3, 4, and 6]), opioid dependence (OD) population (0 = OD not required [Studies 1 and 3-6], 1 = OD required [Study 2]), PTSD population (0 = PTSD not required [Studies 1, 2, 4, and 6], 1 = PTSD required [Studies 3 and 5]), and patient age group (0 = adults [Studies 1-3, 5 (adult patients only), and 6], 1 = adolescents [Studies 4 and 5 (adolescent patients only)]).

For the sake of parsimony, the potential moderators were first examined in separate models to identify significant interaction effects and only those that significantly interacted with the predictor variable were included in the final multivariate model. In addition, we evaluated whether the number of sessions coded for adherence per patient impacted the results by examining it as a covariate in the models. Because the inclusion of this variable did not substantively change the results, it was removed from the final models for parsimony. Model-based effect sizes (eta [η]; Lenhard & Lenhard, 2016) were calculated for each term in the final multivariate models. Recommended guidelines for interpreting the size of η are 0.10 (small), 0.24 (medium), and 0.37 (large) (Richardson, 2011). In addition, for count outcomes a rate ratio was calculated as RR= $e^{\beta \times \delta}$, and deriving $100 \times [e^{\beta \times \delta} - 1]$, where e is the exponential constant, β is the estimated regression coefficient and δ is the estimated standard deviation,

which corresponds to the percent increase/decrease in the expected count outcome per reporting period per standard deviation increase in adherence. The RR focused on the per standard deviation increase in adherence to allow comparability across measures and because a unit increase in the adherence score is a substantial shift. Similarly, for dropout, odds ratios were calculated as OR= $e^{\beta \times \delta}$, and deriving $100 \times [e^{\beta \times \delta} - 1]$, where β is the estimated regression coefficient and δ is the estimated standard deviation, which corresponds to the percent increase/decrease in odds of dropout per standard deviation increase in adherence.

To protect against type I errors due to multiple tests, we limited the description of effects to $p < .05$ and provide effect sizes and confidence intervals for each test. For analyses of the primary adherence-outcome hypotheses, we also implemented the false discovery rate (FDR) approach (Hochberg & Benjamini, 1990) as a sensitivity analysis that adjusts for the number of tests. Because this more conservative approach increases the risk of type II errors, we report both the unadjusted and adjusted (p_{FDR}) values. Given the exploratory nature of the outcome-adherence analyses, we do not adjust for multiple tests in these models (Rothman, 1990).

The data included in the archival dataset and related study materials can be requested by contacting the Principal Investigators of the relevant clinical trials. The analysis code used in this study can be accessed by contacting the first author.

Results

Preliminary Analyses

Descriptive data for therapist adherence and patient outcomes are shown in Tables 3 and 4, respectively. The average therapist adherence scores in the present studies are consistent with the broader DBT clinical trials literature (range = 3.8 – 4.2; Miga et al., 2019). To evaluate whether adherence varied over the course of treatment, we ran mixed-effects models controlling

for study and found no significant effect of time (month in treatment) on adherence as a linear, cubic, or quadratic effect (p's = 0.11 – 0.49). In addition, the within-patient variance in adherence was moderate (ICC = 0.63), indicating that adherence was reasonably consistent across sessions within a patient.

Therapist Adherence as a Predictor of Patient Outcomes

Results of mixed-effects models evaluating therapist adherence as a predictor of each patient outcome are presented in Table 5.

Suicide attempts. Higher therapist adherence significantly predicted fewer subsequent suicide attempts (p = .002) and there were no significant moderators of this relationship. For each standard deviation increase in therapist adherence, there was a 19.6% decrease in subsequent suicide attempts (RR = 0.80, 95% CI = 0.70-0.92).

NSSI. Therapist adherence did not significantly predict subsequent NSSI and there were no significant moderators of this relationship.

Dropout. Higher therapist adherence significantly decreased the risk of treatment dropout (p = .002). For each standard deviation increase in adherence, there was a 23.8% decrease in the odds of dropout (OR = 0.76, 95% CI = 0.64-0.90). This relationship was moderated by OD population (p = .04). Specifically higher therapist adherence predicted a lower risk of dropout among patients with comorbid OD (β = -3.48, SE = 0.98, p = .001, η = 0.36), but not among non-OD patient populations (β = 0.83, SE = 0.58, p = .15, η = 0.15). This moderation effect became non-significant when adjusting for multiple tests (p_{FDR} = .09).

Hospitalizations. The main effect of therapist adherence on subsequent psychiatric hospitalizations was non-significant. However, this relationship was significantly moderated by therapist type (p = .03) and SIB patient population (p = .001). Specifically, higher therapist

adherence significantly predicted fewer subsequent psychiatric hospitalizations among community therapists (β = -2.91, SE = 0.86, p = .001, η = 0.35), but not among research therapists (β = -0.61, SE = 0.56, p = .28, η = 0.11). Among community therapists, for each standard deviation increase in therapist adherence there was a 40.1% decrease in subsequent psychiatric hospitalizations (RR = 0.60, 95% CI = 0.45-0.81). The moderation effect of therapist type was non-significant after adjusting for multiple tests (p_{FDR} = .09). Higher therapist adherence significantly predicted fewer subsequent hospitalizations in studies in which patients were not required to have recent SIB (β = -3.37, SE = 0.80, p < .001, η = 0.41), but not in studies including only patients with recent SIB (β = -0.15, SE = 0.60, p = .79, η = 0.03). In studies that did not require recent SIB, for each standard deviation increase in therapist adherence there was a 44.7% decrease in subsequent psychiatric hospitalizations (RR = 0.55, 95% CI = 0.42-0.73).

Global functioning. Therapist adherence did not significantly predict subsequent global functioning. Although several moderators were significant at the univariate level, these effects were nonsignificant in the final multivariate model.

Patient Outcomes as Predictors of Therapist Adherence

Results of mixed-effects models evaluating each patient outcome as a predictor of subsequent therapist adherence are presented in Table 6. Models could not be run for dropout as therapist adherence could not be assessed after patients were no longer in treatment.

Suicide attempts. The number of suicide attempts did not significantly predict subsequent therapist adherence and there were no significant moderators of this relationship.

NSSI. More frequent NSSI significantly predicted higher subsequent therapist adherence (p = .03) and there were no significant moderators of this relationship. For each standard deviation increase in NSSI, there was a 0.01 point increase in subsequent therapist adherence.

Hospitalizations. The number of psychiatric hospitalizations did not significantly predict subsequent therapist adherence and there were no significant moderators of this relationship.

Global functioning. Worse global functioning significantly predicted higher subsequent therapist adherence (p = .01). For each standard deviation decrease in global functioning, there was a 0.01 point increase in subsequent therapist adherence. This relationship was significantly moderated by SIB population (p = .03). Specifically, worse global functioning predicted higher subsequent therapist adherence in studies restricted to patients with recent SIB (β = -0.02, SE = 0.01, p < .001, η = .35), but not in studies that did not require recent SIB (β = 0.001, SE = 0.01, p = .92, η = .01). In studies of patients with recent SIB, each standard deviation decrease in global functioning was associated with a 0.03 point increase in subsequent therapist adherence.

Discussion

This is the first study to provide a rigorous examination of the temporal relationships between therapist adherence and patient outcomes in DBT. As hypothesized, higher therapist adherence led to medium and significant improvements in multiple patient outcomes, and several moderators of these relationships were identified. Conversely, small to medium effects indicated that greater patient severity on certain outcomes significantly predicted higher subsequent therapist adherence with minimal evidence of moderation.

In DBT, patients typically have multiple severe problems that are addressed according to a hierarchy of treatment targets. The highest-priority target is to reduce the frequency of suicide attempts and NSSI. On average, patients in the present studies had attempted suicide multiple times and engaged in more than 30 NSSI acts prior to starting DBT. The results indicate that higher therapist adherence predicted fewer subsequent suicide attempts during treatment and this effect did not differ across diverse therapist and patient populations. In short, delivering DBT

with adherence appears to be a robust and important factor in reducing the risk of suicide among patients. In contrast, there was no relationship between therapist adherence and subsequent NSSI. It may be that only certain DBT strategies, such as teaching DBT skills, are related to reductions in NSSI rather than global adherence. For example, prior research has found that DBT interventions that include skills training result in greater improvement in NSSI (Linehan et al., 2015) and patients' self-reported use of DBT skills partially mediates reductions in NSSI during treatment (Neacsiu et al., 2010). Alternatively, some research has found that DBT outperforms other treatments in reducing suicide attempts but not NSSI (e.g., Linehan et al., 2006), suggesting that factors specific to DBT such as adherence may be related to decreases in suicide attempts whereas non-specific treatment factors may account for improvements in NSSI.

The second priority in DBT is to decrease behaviors that interfere with therapy, which is most often operationalized in research as premature dropout from treatment. The dropout rate across the studies used in the present analyses was 35.1%. Results indicate that higher therapist adherence to DBT had a medium and significant effect on reducing the likelihood of treatment dropout. Whereas prior meta-analytic research found that dropout rates in DBT were not related to whether therapists were assessed for adherence (Dixon & Linardon, 2020), our findings indicate that it is adherence itself, not simply monitoring it, that improves patient retention. The relationship between adherence and dropout was moderated by patient population, although this result became nonsignificant after adjusting for multiple comparisons. In the unadjusted models, therapist adherence only significantly reduced dropout among BPD patients with comorbid opioid dependence, which is consistent with suggestions that DBT may be particularly effective in improving retention among patients with comorbid BPD and substance use disorders (Bornovalova & Daughters, 2007).

The third tier of targets in DBT includes problems that seriously interfere with patients' quality of life, and common outcomes in this domain include psychiatric hospitalizations and global functioning. On average, patients had been hospitalized slightly less than one time in the year prior to DBT and exhibited serious impairment in functioning. Although the results indicated no overall effect of adherence on hospitalizations, moderator analyses indicated that higher therapist adherence significantly predicted fewer subsequent hospitalizations among community therapists (when not adjusting for multiple comparisons) and in patient samples that were not exclusively suicidal/self-injuring. Prior research has found significant heterogeneity in therapists' assessments of suicide risk and perceptions of the need for hospitalization (e.g., Berman, Stark, Cooperman, Wilhelm, and Cohen, 2015). This heterogeneity may be reduced among DBT research therapists who are typically required to follow structured suicide risk assessment and management protocols (e.g., Linehan, Comtois, & Ward-Ciesielski, 2012), which may attenuate the adherence-hospitalization relationship. Similarly, the impact of therapist factors on decisions to hospitalize may be larger in heterogeneous patient populations than among exclusively high-risk patients. There was no relationship between therapist adherence and changes in patients' global functioning, which is consistent with studies finding that DBT is less likely to have a unique effect on patients' overall symptom severity (e.g., Priebe et al., 2012).

No bidirectional relationships were found between therapist adherence and any outcome. Instead, the only outcomes that were significantly associated with subsequent therapist adherence were the two outcomes on which adherence had no impact. Specifically, more frequent NSSI and worse global functioning predicted higher subsequent therapist adherence. These outcome-adherence effect sizes were small to medium, suggesting that patient characteristics may play a limited role in determining therapist adherence in DBT. This is consistent with findings that

variability in adherence in DBT is attributable more to therapists (33%) than to patients (15%; Harned et al., 2021a). Alternatively, there may be other patient characteristics that have a larger impact on therapist adherence such as challenging interpersonal behaviors (e.g., Boswell et al., 2016). To our knowledge, this is the first study to find a positive relationship between patient severity and subsequent therapist adherence, as studies of other treatments have generally found that more severe patients result in lower therapist adherence (e.g., Barber et al., 1996; Boswell et al., 2013; DeRubeis & Feeley, 1990; Imel et al., 2011; Zickgraf et al., 2016). Given that DBT is primarily designed to facilitate structured targeting of high-risk and severe patient behaviors, therapists may find it easier to implement when these types of clear behavioral targets are present. Furthermore, therapists may deliver DBT with greater adherence to patients who are more seriously impaired or showing little improvement and may relax their delivery of DBT with higher functioning patients who are less at risk of engaging in SIB. This suggests that therapists should be particularly vigilant to potential drift when treating less impaired patients.

Limitations

Limitations of the study include that there were some methodological differences across the clinical trials in the measures used to assess patient outcomes and definitions of dropout. However, all studies assessed the outcomes on comparable scales that could be easily combined. In addition, one clinical trial did not use blinded evaluators (Priebe et al., 2012). Further, the analyses did not control for potential third variables (e.g., therapeutic alliance) that may impact adherence-outcome relationships or consider the effect of adherence on the trajectory of or time to changes in outcomes (e.g., via growth curve modeling or survival analyses) and this would be useful to consider in future research. To address the possibility of type I error in the primary analyses, we adjusted for multiple tests using the false discovery rate method and report both

adjusted and unadjusted *p*-values. Given the exploratory nature of the outcome-adherence models, no adjustment for multiple tests was made and the significance levels of these results should be viewed with some caution. Finally, we limited our analyses to focus on therapist adherence during DBT individual therapy sessions so that we could evaluate adherence-outcome relationships at the level of a specific therapist-patient dyad. Given that DBT is a multi-modal treatment, research is needed to determine whether therapist adherence in the other modes of DBT (e.g., skills groups, phone coaching, consultation team) may also impact patient outcomes.

Conclusions and Future Directions

This study provides support for the long-held stance in DBT that adherence matters; that is, delivering DBT according to the manual is likely to result in better patient outcomes in each domain of DBT's target hierarchy. Although adherence-outcome relationships vary considerably across treatments (Webb et al., 2010; Collyer et al., 2021), in DBT this relationship appears to be reasonably consistent across multiple outcomes. It has been suggested that the small effects in the broader literature may be related to the lack of therapist responsiveness in many protocol-based treatments that require therapists to deliver predetermined levels of particular interventions regardless of patient behaviors and the unfolding context of the session (Webb et al., 2010). In contrast, DBT is a principle-driven treatment that requires therapists to adapt the strategies they use to patient behaviors that occur both in and out of session. Accordingly, the measure that is used to assess adherence in DBT includes many contextual strategies that are coded according to "if/then" rules of when they are needed. For example, if patients and therapists become polarized during a session, then therapists are expected to utilize dialectical strategies to find a synthesis and get unstuck. Or, if a patient attempts suicide between sessions, then therapists must implement the suicidal behaviors protocol. Consequently, adherence may be more predictive of

outcomes in DBT because the principle-driven nature of the treatment enables (indeed requires) therapists to be responsive to patient behaviors.

The present results suggest that when DBT fails to yield positive outcomes, or its effects are smaller than those found in research trials, an important explanation to consider is that the treatment was not delivered with adherence. Therapists who deliver DBT with lower adherence are likely to have patients who show less improvement in suicidal behavior, use more psychiatric crisis services, and drop out of treatment prematurely. Unfortunately, the available evidence suggests that non-adherent delivery of DBT may be relatively common in community practice settings (48% of sessions; Harned et al., 2021a). This suggests the need for training methods that provide increased attention to the strategies that most often fall below adherence as well as pragmatic assessment tools that can be used to identify specific areas for improvement.

To date, little is known about how best to increase therapists' ability to deliver DBT adherently. Two studies have found that relatively brief instructor-led and online trainings resulted in comparable increases in therapists' ability to implement three core strategies of DBT (chain analysis, validation, and skills training) in structured role-plays (Dimeff et al., 2009; Dimeff et al., 2015). However, in both studies, therapists achieved only minimal to moderate proficiency in these DBT strategies. This is consistent with the broader literature on training therapists in EBPs that generally indicates that didactic training must be followed by ongoing support (e.g., consultation with review of recorded therapy sessions) to substantially change therapist behavior (Beidas & Kendall, 2010). Thus, an important area for future research will be to determine optimal training and support methods to increase therapist adherence to DBT in actual clinical practice and, by extension, improve patient outcomes.

References

Asarnow, J. R., Berk, M. S., Bedics, J., Adrian, M., Gallop, R., Cohen, J., ... & McCauley, E. (2021). Dialectical behavior therapy for suicidal self-harming youth: Emotion regulation, mechanisms, and mediators. *Journal of the American Academy of Child & Adolescent Psychiatry, 60,*1105-1115. https://doi.org/10.1016/j.jaac.2021.01.016

Barber, J. P., Crits-Christoph, P., & Luborsky, L. (1996). Effects of therapist adherence and competence on patient outcome in brief dynamic therapy. *Journal of Consulting and Clinical Psychology, 64,* 619–622. https://doi: 10.1037//0022-006x.64.3.619

Barber, J. P., Gallop, R., Crits-Christoph, P., Frank, A., Thase, M. E., Weiss, R. D., and Gibbons, M. B. (2006). The role of therapist adherence, therapist competence, and the alliance in predicting outcome of Individual Drug Counseling: Results from the NIDA Collaborative Cocaine Treatment Study. *Psychotherapy Research, 16,* 229-240. https://doi.org/10.1080/10503300500288951

Barnicot, K., Gonzalez, R., McCabe, R., & Priebe, S. (2016). Skills use and common treatment processes in dialectical behaviour therapy for borderline personality disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, *52*, 147-156. https://doi.org/10.1016/j.jbtep.2016.04.006

Bedics, J. D., Atkins, D. C., Harned, M. S., & Linehan, M. M. (2015). The therapeutic alliance as a predictor of outcome in dialectical behavior therapy versus nonbehavioral psychotherapy by experts for borderline personality disorder. *Psychotherapy*, *52*(1), 67-77. https://doi.org/10.1037/a0038457

Beecham, J. & Knapp, M. (2001). Costing psychiatric interventions. In G. Thornicroft (Ed), *Measuring Mental Health Needs* (2nd ed.) London: Gaskell.

Beidas, R.S. & Kendall, P.C. (2010). Training therapists in evidence-based practice: A critical

review of studies from a systems-contextual perspective. *Clinical Psychology: Science and Practice, 17,* 1-30. https://doi.org/10.1111/j.1468-2850.2009.01187.x

Berman, N. C., Stark, A., Cooperman, A., Wilhelm, S., & Cohen, I. G. (2015). Effect of patient and therapist factors on suicide risk assessment. *Death Studies, 39,* 433-441. https://doi.org/10.1080/07481187.2014.958630

Bornovalova, M. A. & Daughters, S. B. (2007). How does Dialectical Behavior Therapy facilitate treatment retention among individuals with comorbid borderline personality disorder and substance use disorders? *Clinical Psychology Review, 27,* 923-943. https://doi.org/10.1016/j.cpr.2007.01.013

Boswell, J. F., Gallagher, M. W., Sauer-Zavala, S. E., Bullis, J., Gorman, J. M., Shear, M. K., …Barlow, D. H. (2013). Patient characteristics and variability in adherence and competence in cognitive-behavioral therapy for panic disorder. *Journal of Consulting and Clinical Psychology, 81,* 443-454. https://doi.org/10.1037/a0031437

DeCou, C. R., Comtois, K. A., & Landes, S. J. (2019). Dialectical behavior therapy is effective for the treatment of suicidal behavior: A meta-analysis. *Behavior Therapy, 50,* 60-72. https://doi.org/10.1016/j.beth.2018.03.009

DeRubeis, R. J., & Feeley, M. (1990). Determinants of change in cognitive therapy for depression. *Cognitive Therapy and Research, 14,* 469–482.

Dimeff, L. A., Harned, M. S., Woodcock, E. A., Skutch, J. M., Koerner, K., & Linehan, M. M. (2015). Investigating bang for your training buck: A randomized controlled trial comparing three methods of training clinicians in two core strategies of dialectical behavior therapy. *Behavior Therapy, 46,* 283-295. https://doi.org/10.1016/j.beth.2015.01.001

Dimeff, L. A., Koerner, K., Woodcock, E. A., Beadnell, B., Brown, M. Z., Skutch, J. M., Paves, A. P., Bazinet, A., & Harned, M. S. (2009). Which training methods work best? A randomized controlled trial comparing three methods of training clinicians in dialectical behavior therapy skills. *Behaviour Research and Therapy, 47*, 921-930. https://doi.org/10.1016/j.brat.2009.07.011

Dixon, L. J. & Linardon, J. (2020). A systematic review and meta-analysis of dropout rates from dialectical behaviour therapy in randomized controlled trials. *Cognitive Behaviour Therapy, 49*, 181-196. https://doi.org/10.1080/16506073.2019.1620324

Dong, L., Soehner, A. M., Bélanger, L., Morin, C. M., & Harvey, A. G. (2018). Treatment agreement, adherence, and outcome in cognitive behavioral treatments for insomnia. *Journal of Consulting and Clinical Psychology, 86*, 294–299. https://doi.org/10.1037/ccp0000269

Endicott, J., Spitzer, R. L., Fleiss, J. L., & Cohen, J. (1976). The Global Assessment Scale: A procedure for measuring overall severity of psychiatric disturbance. *Archives of General Psychiatry, 33*, 766-771. https://doi.org/10.1001/archpsyc.1976.01770060086012

Feeley, M., DeRubeis, R. J., & Gelfand, L. A. (1999). The temporal relation of adherence and alliance to symptom change in cognitive therapy for depression. *Journal of Consulting and Clinical Psychology, 67*, 578-582. https://doi.org/10.1037//0022-006x.67.4.578

Gaglia, A. (2019). Shaping therapists towards adherence: A how-to guide. In M. A. Swales (Ed.), *The Oxford Handbook of Dialectical Behaviour Therapy* (pp. 981-1004). Oxford, UK: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198758723.013

Harned, M. S., Korslund, K. E., & Linehan, M. M. (2014). A pilot randomized controlled trial of Dialectical Behavior Therapy with and without the Dialectical Behavior Therapy

Prolonged Exposure protocol for suicidal and self-injuring women with borderline personality disorder and PTSD. *Behaviour Research and Therapy, 55,* 7-17. https://doi.org/10.1016/j.brat.2014.01.008

Harned, M. S., Korslund, K. E., Schmidt, S. C., & Gallop, R. J. (2021a). The Dialectical Behavior Therapy Adherence Coding Scale (DBT ACS): Psychometric properties. *Psychological Assessment, 33*(6), 552–561. https://doi.org/10.1037/pas0000999

Harned, M. S., Schmidt, S. C., Korslund, K. E., & Gallop, R. J. (2021b). Does adding the Dialectical Behavior Therapy Prolonged Exposure (DBT PE) protocol for PTSD to DBT improve outcomes in public mental health settings? A pilot nonrandomized effectiveness trial with benchmarking. *Behavior Therapy, 52,* 639-655. https://doi.org/10.1016/j.beth.2020.08.003

Hochberg, Y. & Benjamini, Y. (1990). More powerful procedures for multiple significance testing. *Statistics in Medicine, 9,* 811-818. https://doi.org/10.1002/sim.4780090710

Hogue, A., Henderson, C. E., Dauber, S., Barajas, P. C., Fried, A., & Liddle, H. A. (2008). Treatment adherence, competence, and outcome in individual and family therapy for adolescent behavior problems. *Journal of Consulting and Clinical Psychology, 76,* 544-555. https://doi.org/10.1037/0022-006X.76.4.544

Huey Jr, S. J., Henggeler, S. W., Brondino, M. J., & Pickrel, S. G. (2000). Mechanisms of change in multisystemic therapy: Reducing delinquent behavior through therapist adherence and improved family and peer functioning. *Journal of Consulting and Clinical Psychology, 68,* 451-467. https://doi.org/10.1037/0022-006X.68.3.451

Imel, Z. E., Baer, J. S., Martino, S., Ball, S. A., & Carroll, K. M. (2011). Mutual influence in therapist competence and adherence to motivational enhancement therapy. *Drug and Alcohol Depedence, 115,* 229-236. https://dx.doi.org/10.1016/j.drugalcdep.2010.11.010

Imel, Z. E., Baldwin, S. A., Baer, J., Hartzler, B., Dunn, C., Rosengren, D., & Atkins, D. C. (2014). Evaluating therapist adherence in motivational interviewing by comparing performance with standardized and real patients. *Journal of Consulting and Clinical Psychology, 82,* 472-481. https://dx.doi.org/10.1037/a0036158

Koons, C. R., Robins, C. J., Tweed, J. L., Lynch, T. R., Gonzalez, A. M., Morse, J. Q., ... & Bastian, L. A. (2001). Efficacy of dialectical behavior therapy in women veterans with borderline personality disorder. *Behavior Therapy, 32*(2), 371-390. https://doi.org/10.1016/S0005-7894(01)80009-5

Lenhard, W. & Lenhard, A. (2016). *Calculation of Effect Sizes*. Dettelbach, Germany: Psychometrica. https://doi.org/10.13140/RG.2.1.3478.4245

Liber, J. M., McLeod, B. D., Van Widenfelt, B. M., Goedhart, A. W., van Der Leeden, A. J. M., Utens, E. M. W. J., & Treffers, P. D. A. (2010). Examining the relation between the therapeutic alliance, treatment adherence, and outcome of cognitive behavioral therapy for children with anxiety disorders. *Behavior Therapy, 41,* 172–186. https://doi.org/10.1016/j.beth.2009.02.003

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

Linehan, M. M., (2015). *DBT skills training manual*. (2nd ed.). New York, NY: Guilford Press.

Linehan, M. M., Comtois, K. A., Brown, M. Z., Heard, H. L., & Wagner, A. (2006). Suicide Attempt Self-Injury Interview (SASII): Development, reliability, and validity of a scale

to assess suicide attempts and intentional self-injury. *Psychological Assessment, 18,* 303–312. https://doi.org/10.1037/1040-3590.18.3.303

Linehan, M. M., Comtois, K. A., Murray, A. M., Brown, M. Z., Gallop, R. J., Heard, H. L., Korslund, K. E., Tutek, D. A., Reynolds, S. K., & Lindenboim, N. (2006). Two-year randomized controlled trial and follow-up of Dialectical Behavior Therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Archives of General Psychiatry, 63,* 757-766. https://doi.org/10.1001/archpsyc.63.7.757

Linehan, M. M., Comtois, K. A., & Ward-Ciesielski, E. F. (2012). Assessing and managing risk with suicidal individuals. *Cognitive and Behavioral Practice, 19,* 218-232. https://doi.org/10.1016/j.cbpra.2010.11.008

Linehan, M. M., & Heard, H. L. (1987). Treatment History Interview (THI). Seattle, WA: University of Washington.

Linehan, M. M., & Korslund, K. E. (2003). *Dialectical Behavior Therapy Adherence Coding Scale manual.* University of Washington.

Linehan, M. M., Korslund, K. E., Harned, M. S., Gallop, R. J., Lungu, A., Neacsiu, A. D., McDavid, J., Comtois, K. A., & Murray-Gregory, A. M. (2015). Dialectical Behavior Therapy for high suicide risk in borderline personality disorder: A component analysis. *JAMA Psychiatry, 72,* 475-482. https://doi.org/10.1001/jamapsychiatry.2014.3039

Linehan, M. M., Lynch, T. R., Harned, M. S., Korslund, K. E., & Rosenthal, Z. M. (2009). Preliminary outcomes of a randomized controlled trial of DBT vs. drug counseling for opiate-dependent BPD men and women. In B. Whalley (Chair), Dialectical behavior therapy for substance abuse in individuals with borderline personality disorder: Results from a multicenter randomized controlled trial. Symposium presented at the 43rd Annual Convention of the Association for Behavioral and Cognitive Therapies, New York, NY.

Linehan, M. M., Schmidt, H., Dimeff, L. A., Craft, J. C., Kanter, J., Comtois, K. A. (1999). Dialectical behavior therapy for patients with borderline personality disorder and drug-dependence. *The American Journal on Addictions, 8(4),* 279-292. https://doi.org/10.1080/105504999305686

Loeb, K. L., Wilson, G. T., Labouvie, E., Pratt, E. M., Hayaki, J., Walsh, B. T., & Fairburn, C. G. (2005). Therapeutic alliance and treatment adherence in two interventions for bulimia nervosa: A study of process and outcome. *Journal of Consulting and Clinical Psychology, 73,* 1097–1107. https://doi.org/10.1037/0022-006X.73.6.1097

McCauley, E., Berk, M., Asarnow, J., Adrian, M., Cohen, J., Korslund, K., … Linehan, M. M. (2018). Efficacy of Dialectical Behavior Therapy for adolescents at high risk for suicide: A randomized clinical trial. *JAMA Psychiatry, 75(8),* 777-785. https://doi.org/ 10.1001/jamapsychiatry.2018.1109

Miga, E.M., Neacsiu, A.D., Lungu, A., Heard, H.L., & Dimeff, L.A. (2019). Dialectical Behavior Therapy from 1991-2015: What do we know about clinical efficacy and research quality? In M. A. Swales (Ed.), *The Oxford Handbook of Dialectical Behaviour Therapy* (pp. 415-466), Oxford, UK: Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198758723.013.41

Neacsiu, A. D., Rizvi, S. L., & Linehan, M. M. (2010). Dialectical behavior Therapy skills use as a mediator and outcome of treatment for borderline personality disorder. *Behaviour Research and Therapy*, *48*, 832-839. https://doi.org/10.1016/j.brat.2010.05.017

Perepletchikova, F., Treat, T. A., & Kazdin, A. E. (2007). Treatment integrity in psychotherapy research: Analysis of the studies and examination of the associated factors. *Journal of Consulting and Clinical Psychology*, *75*, 829-841. https://doi.org/10.1037/0022-

006X.75.6.829

Priebe, S., Bhatti, N., Barnicot, K., Bremner, S., Gaglia, A., Katsakou, C., … Zinkler, M. (2012). Effectiveness and cost-effectiveness of Dialectical Behaviour Therapy for self-harming patients with personality disorder: A pragmatic randomised controlled trial. *Psychotherapy and Psychosomatics, 81,* 356-365. https://doi.org/10.1159/000338897

Raudenbush, S.W., & Bryk, A.S. (2002). *Hierarchical linear models* (2nd Ed.). London: Sage.

Raudenbush, S.W., Bryk, A.S., & Congdon, R. (2007). *HLM 6: Hierarchical Linear and Nonlinear Modeling* [Computer software]. Lincolnwood, IL: Scientific Software International.

Richardson J.T.E. (2011). Eta squared and partial eta squared as measures of effect size in educational research. *Educational Research Review, 6,* 135-147. https://doi.org/10.1016/j.edurev.2010.12.001

Rothman, K. J. (1990). No adjustments are needed for multiple comparisons. *Epidemiology, 1,* 43-46.

Schaffer, D., Gould, M. S., Brasic, J., Ambrosini, P., Fisher, P., Bird, H., & Aluwahlia, S. (1983). A Children's Global Assessment Scale (CGAS). *Archives of General Psychiatry, 40,* 1228-1231. https://doi.org/10.1001/archpsyc.1983.01790100074010

Southam-Gerow, M. A., Chapman, J. E., Martinez, R. G., McLeod, B. D., Hogue, A., Weisz, J. R., & Kendall, P. C. (2021). Are therapist adherence and competence related to clinical outcomes in cognitive-behavioral treatment for youth anxiety? *Journal of Consulting and Clinical Psychology, 89,*188-199. https://doi.org/10.1037/ccp0000538

Storebø, O. J., Stoffers-Winterling, J. M., Völlm, B. A., Kongerslev, M. T., Mattivi, J. T., Jørgensen, M. S., … Simonsen, E. (2020). Psychological therapies for people with

borderline personality disorder. *Cochrane Database of Systematic Reviews,* Issue 5. Art. No.: CD012955. https://dx.doi.org/10.1002/14651858.CD012955.pub2

Vuong, Q. H. (1989). Likelihood ratio tests for model selection and non-nested hypotheses. *Econometrica, 57,* 307-333. https://doi.org/10.2307/1912557

Webb C.A., DeRubeis, R.J., Barber, J.P. (2010). Therapist adherence/competence and treatment outcome: A metanalytic review. *Journal of Consulting and Clinical Psychology, 78,* 200–211. https://www.doi.org/10.1037/a0018912

Weissman, M. M., & Bothwell, S. (1976). Assessment of social adjustment by patient self-report. *Archives of General Psychiatry*, *33,* 1111-1115. https://doi.org/10.1001/archpsyc.1976.01770090101010

Zickgraf, H. F., Chambless, D. L., McCarthy, K. S., Gallop, R., Sharpless, B. A., Milrod, B. L., & Barber, J. P. (2016). Interpersonal factors are associated with lower therapist adherence in cognitive–behavioural therapy for panic disorder. *Clinical Psychology & Psychotherapy*, *23,* 272-284. https://doi.org/10.1002/cpp.1955

Data Transparency Statement

The present analyses have not been previously published. However, the archival database from which the present data were derived has been used in a prior publication focused on evaluating the psychometric properties of the DBT Adherence Coding Scale (Harned, Korslund, Schmidt, & Gallop, 2021).

Table 1

Study Characteristics

Study	Source	Study Type (setting)	Patient Population (age group)	Total *n* in DBT	Treatment Length	Outcome Assessments (mos)	Adherence Sampling
1	Linehan et al., 2015	Efficacy (US university clinic)	BPD + recent SIB (adults)	66[b]	1 year	0, 4, 8, 12	1st 2 sessions, 1 randomly selected each month after
2	Linehan et al., 2009	Efficacy (US university clinics[a])	BPD + opioid dependence (adults)	62	1 year	0, 4, 8, 12	1st 2 sessions, 1 randomly selected each month after
3	Harned et al., 2014	Efficacy (US university clinic)	BPD + PTSD + recent SIB (adults)	26	1 year	0, 4, 8, 12	Random selection of 10% of sessions
4	McCauley et al., 2018	Efficacy (US university clinics[a])	BPD traits + recent SIB (adolescents)	86	6 months	0, 3, 6	Random selection of 3 sessions from early, mid, and late treatment
5	Harned et al., 2021b	Effectiveness (US public mental health agencies[a)])	PTSD (adults + adolescents)	35	Variable	0, 4, 8, 12	Random selection of 3 sessions from early, mid, and late treatment (or all available sessions if ≤ 3)
6	Priebe et al, 2012	Effectiveness (UK National Health Service)	PD + recent SIB (adults)	40	1 year	0, 2, 4, 6, 8, 10, 12	Random selection of 10% of available sessions

Note. BPD = borderline personality disorder. SIB = self-injurious behavior. PTSD = posttraumatic stress disorder. PD = personality disorder. US = United States. UK = United Kingdom. [a] Multi-site trial. [b]Includes patients in the two DBT conditions that received DBT individual therapy.

Table 2

Patient Characteristics by Study

	Study 1 (*n* = 66)	**Study 2** (*n* = 62)	**Study 3** (*n* = 26)	**Study 4** (*n* = 86)	**Study 5** (*n* = 35)	**Study 6** (*n* = 40)
Female, %	100.0	48.4	100.0	95.3	80.0	87.5
Age, M ± SD	30.6 ± 8.9	31.3 ± 8.5	32.6 ± 12.0	14.8 ± 1.5	29.9 ± 13.2	33.0 ± 10.7
White race, %	70.3	79.0	80.8	58.1	47.1	65.0
Annual income <$15,000, %	64.6	59.7	66.7	11.9[a]	100.0	–[b]
BPD, %	100.0	100.0	100.0	50.0	54.3	97.5
History of SIB, %	100.0	66.1	100.0	100.0	74.3	100.0

Note. BPD = borderline personality disorder. SIB = self-injurious behavior. [a] Parental income. [b] Income was not in US dollars.

Table 3

Descriptive Data for Therapist Adherence by Study

	Sample Size		# Coded Sessions		DBT ACS Computed Global Score		
Study	Patients *n*	Therapists *n*	Total *n*	# per patient *M (SD)*	*M (SD)*	Range	Non-adherent *n* (%)
1	66	17	439	6.65 (3.11)	4.18 (0.18)	3.63 – 4.69	49 (11.2%)
2	60	15	350	5.83 (3.45)	4.19 (0.14)	3.68 – 4.56	26 (7.4%)
3	25	12	94	3.76 (1.69)	4.12 (0.22)	3.27 – 4.48	18 (19.1%)
4	84	17	286	3.40 (1.72)	4.12 (0.15)	3.30 – 4.44	41 (14.3%)
5	28	13	58	2.07 (0.90)	3.94 (0.18)	3.34 – 4.22	28 (48.3%)
6	25	9	35	1.44 (0.77)	4.12 (0.19)	3.62 – 4.49	9 (25.0%)
Total	**288**	**83**	**1262**	**4.38 (3.01)**	**4.15 (0.18)**	**3.27 – 4.69**	**171 (13.5%)**

Note. Data include all patient-therapist dyads in the intent-to-treat samples that had at least one session coded for adherence.

Table 4

Descriptive Data on Patient Outcomes at Pre- and Post-Treatment

	Pre-Treatment			Post-Treatment		
	n	*M*	*SD*	*n*	*M*	*SD*
Suicide attempts	288	2.52	7.29	231	0.24	1.54
NSSI acts	288	31.46	70.53	231	2.34	8.70
Hospitalizations	288	0.72	1.15	232	0.06	0.28
Global functioning	285	42.36	7.47	193[a]	53.64	11.71
	n	%				
Dropout	101/288	35.1				

Note. Descriptive data are aggregated across studies for patients (*n* = 288) who had at least one session coded for adherence. All *n*'s indicate the number of patients with valid data at each timepoint. NSSI = non-suicidal self-injury. [a] Was not assessed at post-treatment in Study 5.

Table 5

Therapist Adherence as a Predictor of Subsequent Patient Outcomes

	β	SE	*p*	p_{FDR}	η
Suicide attempts					
Adherence	-1.24	0.39	.002	.01	0.32
NSSI acts					
Adherence	0.11	0.34	.75	.75	0.03
Dropout					
Adherence	-1.55	0.49	.002	.01	0.33
Adherence x Therapist type	-3.14	1.80	.08	.15	0.18
Adherence x OD population	-2.35	1.16	.04	.09	0.21
Hospitalizations					
Adherence	0.32	0.26	.23	.28	0.13
Adherence x Therapist type	2.30	1.07	.03	.09	0.22
Adherence x SIB population	-3.22	1.01	.001	.01	0.32
Global functioning					
Adherence	-0.32	0.98	.75	.75	0.04
Adherence x Therapist type	-9.62	5.82	.10	.15	0.17
Adherence x PTSD population	4.72	3.48	.18	.24	0.14
Adherence x Patient age group	-4.03	2.37	.09	.15	0.18

Note. Results of the final multivariate models for each outcome are presented. All models were adjusted for study. p_{FDR} = p-values adjusted using the false discovery rate approach for multiple tests. NSSI = non-suicidal self-injury. OD = opioid dependence. SIB = self-injurious behavior. PTSD = posttraumatic stress disorder.

Table 6

Patient Outcomes as Predictors of Subsequent Therapist Adherence

	β	SE	*p*	η
Suicide attempts	-0.005	0.006	.35	0.10
NSSI	0.011	0.005	.03	0.22
Hospitalizations	0.011	0.006	.08	0.18
Global functioning	-0.014	0.006	.01	0.26
Global functioning x SIB population	0.027	0.013	.03	0.23

Note. Separate models were run for each outcome-adherence combination and any significant moderators are indented under the relevant main effect. All models were adjusted for study. NSSI = non-suicidal self-injury. SIB = self-injurious behavior.