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The effectiveness and safety of dialectical behavior therapy for suicidal ideation and behavior in autistic adults: a pragmatic randomized controlled trial

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Abstract

Backgrounds. Many autistic people in mental health are suicidal. This study evaluated the effectiveness of dialectical behavior therapy (DBT) *v.* treatment as usual (TAU) in reducing suicidal ideation and suicide attempts.

Methods. At six Dutch mental health centers, 123 outpatients (18–65 years) with DSM-5 diagnosed autism spectrum disorder (ASD) and suicidal behavior were randomly assigned to the DBT intervention group ($n = 63$) or TAU control group ($n = 60$). Assessments were conducted at baseline, post-treatment at 6 months and 12-month follow-up. The primary outcomes were severity of suicidal ideation and frequency of suicide attempts. The severity of depression and social anxiety were secondary outcomes.

Results. At end-of-treatment, DBT significantly reduced both suicidal ideation ($z = -2.24$; $p = 0.025$; $b = -4.41$; S.E. = 197.0) and suicide attempts ($z = -3.15$; $p = 0.002$; $IRR = 0.046$; S.E. = 0.045) compared to TAU, but lost statistical significance at the 12-month follow-up. Depression severity significantly decreased with DBT ($z = -1.99$; $p = 0.046$: $b = -2.74$; S.E. = 1.37) remaining so at 12 months ($z = -2.46$; $p = 0.014$; $b = -3.37$; S.E. = 1.37). No effects were observed on social anxiety. Severe adverse events included two suicides in the TAU condition.

Conclusions. DBT is an acceptable, safe, and short-term effective intervention to reduce suicidal ideation and suicide attempts in autistic adults with suicidal behavior.

Introduction

Suicidal ideation (SI) and suicide attempts (SA) are highly prevalent in autistic people (We use identity-first language to describe and discuss autism in this paper, as it is the most preferred language within the autistic community (Bottema-Beutel, Kapp, Lester, Sasson, & Hand, 2021; Kenny et al., 2016)) (Hedley & Uljarević, 2018; Zahid & Upthegrove, 2017). A recent meta-analysis among autistic individuals found lifetime rates of SI and SA at 37.2 and 15.3%, respectively. The corresponding 12-month rates were 25.4% for SI and 14.1% for SA (Huntjens, Landlust, Wissenburg, & van der Gaag, 2024), consistently surpassing general population estimates of 9% for SI and 3% for SA (Castillejos, Huertas, Martín, & Moreno Küstner, 2021), as well as 2.0% for SI and 0.3% for SA over 12 months (Borges et al., 2010). Intrapersonal risk factors that may be associated with autistic suicidality include alexithymia, emotion dysregulation, rumination, low self-esteem, camouflaging efforts (concealing autistic traits or behavior), communicative impairments and cognitive inflexibility (Arwert & Sizoo, 2020; Cassidy, Bradley, Shaw, & Baron-Cohen, 2018; Conner et al., 2020; Costa, Loor, & Steffgen, 2020; Paquette-Smith, Weiss, & Lunsky, 2014; Richards et al., 2019; South et al., 2020). Interpersonal risk factors have likewise been identified, including unmet support needs and loneliness (Cassidy et al., 2018; Hedley, Uljarević, Foley, Richdale, & Trollor, 2018). Additionally, symptoms of autism spectrum disorder (ASD) are heterogeneous and frequently co-occur with psychiatric comorbidities (DeFilippis, 2018; Jadav & Bal, 2022), which also serve as risk factors for suicidality (Kõlves, Fitzgerald, Nordentoft, Wood, & Erlangsen, 2021; Wijnhoven et al., 2019). Among these comorbidities, anxiety and depression are the most common and persistent (Hossain et al., 2020; Lever & Geurts, 2016; Sampson et al., 2020). Research identifies strong associations between the risk of mental health problems, a lack of knowledge and understanding, the absence of or inappropriate support or treatment for such problems, and high rates of suicidal behavior among autistic people (Camm-Crosbie, Bradley, Shaw, Baron-Cohen, & Cassidy, 2019; Cantor, McBain, Kofner,

Stein, & Yu, 2020; Crane, Davidson, Prosser, & Pellicano, 2019; Maddox & Gaus, 2019). Clinicians seem reluctant to treat suicidality in this group, but that lack of treatment may exacerbate the suicide risk (Lipinski, Boegl, Blanke, Suenkel, & Dziobek, 2022).

There is a critical need for effective suicide prevention and treatment in autistic individuals, yet evidence-based approaches are limited. While cognitive-behavioral therapy (CBT) has shown effectiveness in treating comorbidities in autism (Spain, Sin, Chalder, Murphy, & Happe, 2015), it falls short in addressing suicidal behavior linked to severe emotion dysregulation (Hartmann et al., 2019; White et al., 2014). Dialectical behavior therapy (DBT), recognized as the leading transdiagnostic treatment for suicidal behavior and emotion dysregulation, effectively addresses various challenges in social interaction, behavior, and emotional regulation (Chen, Matthews, Allen, Kuo, & Linehan, 2008; Fleming, McMahon, Moran, Peterson, & Dreessen, 2015; Harley, Sprich, Safren, Jacobo, & Fava, 2008; Linehan, 1993; Lynch, Morse, Mendelson, & Robins, 2003; Neacsiu, Eberle, Kramer, Wiesmann, & Linehan, 2014). DBT focuses on enhancing emotion regulation skills and encompasses individual therapy, skills training in a group, a therapist consultation team, and phone consultation if needed (Linehan, 1993). DBT combines acceptance-based strategies (e.g. mindfulness and validation) with change-oriented strategies based on second-generation CBT, e.g., problem-solving, behavior analysis, contingency management, and skills training (Linehan, 1993). The usual treatment period is one year, but some findings suggest that shorter treatment periods also effectively treat suicidal behavior (Delparte et al., 2019; McMain et al., 2018).

This study aimed to assess the effectiveness and safety of DBT compared with treatment as usual (TAU) for reducing suicidal ideation and suicide attempts in autistic patients. Depressive symptom severity and social anxiety were secondary outcomes. We hypothesized that DBT would be superior to TAU in reducing suicidal ideation and suicide attempts during the first six months after baseline and that the effect would persist up to the 12-month follow-up compared to TAU. Furthermore, we hypothesized that DBT would be superior to TAU in reducing depressive symptom severity and symptoms of social anxiety.

Methods

Design and participants

The study is a pragmatic multi-center, single-blind, randomized controlled trial with two parallel arms, DBT and TAU, conducted in outpatient settings across six Dutch mental health care services. It is registered at Current Controlled trials (ISRCTN 96632579) and received approval from the Medical Ethics Committee of the VU University Medical Centre (NL59497.029.17) in March 2018. Details of the study protocol have been published (Huntjens et al., 2020), and see online Supplementary Appendix S1 for following CONSORT guidelines. Participants were recruited from six specialized autism departments within mental health services. All participants had received an ASD diagnosis from experienced clinicians following national guidelines prior to inclusion (Kan, Geurts, & Sizoo, 2013).

Inclusion criteria were (1) age 18 to 65 years; (2) fulfillment of DSM-5 criteria for ASD (American Psychiatric Association, 2013); (3) outpatient status; (4) suicidal ideation (SIDAS score $\geqslant 21$) (van Spijker et al., 2014); and (5) level of suicidal behavior rated as severe on the LPC (score of 2 on each item) (Comtois & Linehan, 1999). Exclusion criteria were (1) IQ < 80 (assessed with WAIS-IV only if baseline testing was difficult due to intellectual deficits) (Wechsler, 2011); (2) addiction to drugs and need for clinical detoxification; (3) insufficient mastery of the Dutch language. Patients were informed about the study by their treating therapist. Written informed consent was obtained from patients who were eligible and willing to participate. All measurements were accessed at baseline, post-treatment at 6 months, and follow-up at 12 months. Participants who dropped out of treatment were asked to complete the post-treatment and follow-up assessment. With $N = 128$ consenting participants (64 in each arm), the study would be well-powered to detect a medium-sized standardized effect of $d = 0.50$ in a test with a power of $(1-b) \geqslant 0.80$ and a $\leqslant 0.05$ (2-tailed). Participants in the TAU condition were offered DBT treatment after 12-month follow-up. All participants received financial compensation of €25 (USD27) for each assessment.

Randomization and masking

After a baseline assessment, block randomization was used to allocate participants to DBT or TAU in a 1:1 ratio. One block of 16 random assignments was generated for each participating mental health service. Each block had eight assignments per condition. If a center had more patients, a second randomized block was allocated. Blocks were made with the scientific randomization program Research Randomizer by the independent randomization bureau of Parnassia Psychiatric Institute (www.randomizer.org), which also allocated patients to groups. Blinded assessors conducted measurements throughout the study. If unblinding occurred, another assessor repeated the assessment. No unblinding occurred.

Intervention

The intervention was based on the four components of comprehensive DBT, combining (a) weekly 45-minute individual cognitive-behavioral psychotherapy sessions with the primary therapist, (b) weekly 2h15 skills training group, (c) if needed, access to telephone coaching with their individual therapist, and (d) weekly 1-hour therapist consultation. Participants randomized to the DBT group received two pretreatment sessions with their assigned primary DBT therapist, preparing them for the demands and expectations of DBT. This process involved familiarizing clients with the therapy's structure, components, and goals. Individual psychotherapy takes place weekly and primarily focuses on motivational issues, including the motivation to stay alive and remain in treatment. The 26-week skill training in this study was adapted from Neacsiu et al. (2014) emotion regulation skill training. The program provided two weekly skill training groups for 26 weeks, totaling 52 sessions with eight participants per group. Given the program's limited duration of 26 weeks (two sets of 13 weeks), the one-week review of mindfulness skills from Neacsiu et al. (2014) was omitted. Mindfulness, emotion regulation, distress tolerance, and interpersonal effectiveness skills were covered in the initial 13 weeks and revisited in the program's second half. These 26-week programs provide increased opportunities for feedback, rehearsal, practice, and enhanced skill learning, tailoring training to the needs of autistic adults (Anderson & Morris, 2006). In collaboration with autistic adults, text modifications were made to the DBT manual before the study began, simplifying explanations of certain DBT skills to make them more concrete and understandable. The mindfulness exercises proposed

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at the beginning of the skills training were also based on precise and unambiguous instructions tailored to the needs of autistic people (Spek, van Ham, & Nyklíček, 2013).

The control group received TAU, involving at least weekly 45-min sessions with a psychotherapist or social worker. Due to the absence of guidelines, TAU encompassed any common form of treatment for suicidal behavior in autism within the Dutch mental health system, ensuring a realistic reflection of current clinical practice in terms of form and intensity (e.g. psycho-education, social skills training, emotion regulation therapy, CBT, trauma therapy, delivered in both group and individual formats, either independently or concurrently).

Outcome measures

The primary outcome measure was the Suicidal Ideation Attributes Scale (SIDAS), which assesses the severity of suicidal ideation (van Spijker et al., 2014). It consists of five items, each targeting an attribute of suicidal thoughts: frequency, controllability, closeness to attempt, level of distress associated with the thoughts, and impact on daily functioning. Scores of $\geqslant 21$ indicate an elevated risk of suicidal ideation, and a higher score indicates more severe suicidal ideation. At the study's outset, the SIDAS lacked validation for autism samples. In 2023, the SIDAS-M was developed and validated for this purpose, incorporating language revisions and visual analog scales (Hedley et al., 2023). However, the SIDAS was conducted as an interview, not a self-report questionnaire, in the current study. The frequency of suicide attempts was assessed for the 6 months preceding the baseline, the experimental period and the follow-up period, using the Lifetime Parasuicide Count (LPC) (Comtois & Linehan, 1999). The LPC questionnaire has not been validated for autism samples. However, in the current study, it served as a frequency questionnaire administered in an interview.

Secondary outcome measures were the Beck Depression Inventory (BDI-II) (Beck, Steer, Ball, & Ranieri, 1996), measuring the severity of depression. BDI-II shows psychometric solid properties (Beck et al., 1996) and has been validated for autism samples (Williams, Everaert, & Gotham, 2021).

The Social Interaction Anxiety Scale (SIAS) (Mattick & Clarke, 1998), assesses the fear and avoidance of social situations. SIAS demonstrates strong psychometric properties and has been validated for autism samples (Boulton & Guastella, 2021).

Supervision and fidelity monitoring

All DBT and TAU therapists had significant experience in treating autistic individuals. Therapists in the DBT group with no prior experience with DBT underwent a 5-day DBT training that included two additional booster sessions led by an accredited and experienced DBT trainer (AH). Furthermore, experts provided four hours per month of group supervision for these therapists (group size 5–7; 48 h by WvdB and 168 h by AH). Additional supervision by phone or e-mail was provided upon request. All DBT treatment sessions were videotaped. Treatment adherence was assessed in a random selection of session recordings (two per therapist) by trained raters. A DBT expert trained psychology master students to practice with the instruments, using session recordings not used in the final adherence assessment. Adherence was assessed with the DBT Adherence Coding Scale (DBT-ACS) (Harned, Korslund, Schmidt, & Gallop, 2021). Treatment adherence greater than or equal to 23 was considered adherent.

Statistical analysis

Analyses were performed with the statistical software Stata (version 17.0) and SPSS (version 27). The analyses were based on the intention-to-treat (ITT) principle, thus including all participants as randomized. ITT analysis was achieved using mixed modeling. The Gaussian-distributed SIDAS, BDI, and SIAS scales were regressed on Condition (0/1), Time (baseline, post-treatment, and follow-up), and Time × Condition interaction with baseline scores on the outcome variables as a covariate for baseline adjustment. This was done in the fixed part of the equation. Participant ID was modeled as a level in the random part of the equation. An unstructured between-group variance and covariance structure was assumed. It was an a priori decision not to include the six treatment sites as an extra level because there were only six sites. Instead, we modeled the nesting of patients within sites by a series of site (0/1) indicators in the fixed part of the equation.

It is worth noting that LPC suicide attempts consisted of a count of those behaviors over the previous six months. The LPC count data were over-dispersed, and they were therefore evaluated using a generalized mixed model of the negative binomial family and the log as the link function. The exponentiated model coefficients can be interpreted as the incidence rate ratio (*IRR*), showing the rate of suicide attempts in the DBT condition over the rate in the TAU condition at post-treatment and follow-up. The fixed and random parts of the negative binomial mixed models for the LPC counts were specified similarly to the (Gaussian) mixed models for the SIDAS, BDI, and SIAS scales.

Sensitivity analyses

It was an a priori decision to assess the robustness of the base case analyses in a sensitivity analysis using last-observation-carried-forward (LOCF) imputation of missing observations caused by study dropout. To that end all mixed models were repeated after LOCF imputation.

A post-hoc sensitivity analysis was conducted to address the impact of disrupted access to healthcare and the shift to telehealth during three COVID-19 lockdowns, given the primary execution of the study during the pandemic. Face-to-face treatment swiftly transitioned to telehealth, primarily utilizing ZOOM, in response to national lockdowns and social distancing regulations (Rijksoverheid, 2021). Proactive measures were taken, including providing smartphones to patients who did not possess any, and facilitating exposure to video features during therapy. Assessments were conducted via video calls during lockdown periods. Three COVID lockdown indicators were created for each participant at each data collection wave (baseline, post-treatment, and follow-up). These indicators were set at 1 if the participant's access to face-to-face care was disrupted by a lockdown at that time and 0 otherwise. The COVID lockdown indicators were included as time-varying confounders in the mixed model equations. The base case analyses were then compared with the lockdown-adjusted analyses.

Results

Sample at baseline

Recruitment was from September 2018 to December 2022, with 167 potential participants assessed for eligibility. Of these, 44

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participants were excluded – 6 for not meeting inclusion criteria due to a low SIDAS score and 38 for various reasons (e.g. 19 found the patient information letter unappealing, 4 due to randomization, 7 unable/unwilling to travel, 5 due to time constraints, 3 due to treatment elsewhere). Subsequently, 123 participants were randomly assigned to either the DBT group ($n = 63$) or the TAU group ($n = 60$) (see Fig. 1). Among these 123 participants, 29 (24%) were recruited remotely due to the COVID-19 lockdowns, 95 (77%) were shifted to remote treatment midway through the trial, and none were treated exclusively via Zoom.

Demographic characteristics, clinical profiles, and medication use at baseline are shown in Table 1.

The two conditions did not differ significantly in demographics, employment, education, diagnoses, medication use, or outcome variable data. No significant differences were observed between patients with medication changes and those without baseline changes throughout the entire study (data not shown).

Study dropout

Dropout from the study was kept to a minimum, with 6 participants (9.5%) in the DBT condition and 5 (8.3%) in TAU having missing values at follow-up on the primary outcome variable (SIDAS). The attrition rates were not statistically different across the conditions ($\chi^2 = 0.05$; $df = 1$; $p = 0.817$). Importantly, none of the variables described in Table 1 was a predictor of missingness due to dropout (not even at a more liberal $p \leqslant 0.10$), suggesting that missingness was not selective for these variables.

Acceptability

Treatment dropout rates did not differ significantly between the two groups ($\chi^2 = 1.44$; $df = 1$; $p = 0.231$): 11 participants in DBT (17.4%) and 6 participants in TAU (10%). In the DBT condition, 6 out of the 11 dropouts left before treatment started as no commitment was obtained. Out of the remaining five dropouts, four participants (6.3%) left DBT due to the treatment format, while one person exited due to COVID-19, indicating DBT was as well-tolerated as TAU.

Adherence and severe adverse events

Two videotapes per therapist were rated for treatment fidelity. Scores ranged from 9 to 26, with an average of 17, meaning low to moderate adherence. We found high interrater agreement (weighted kappa 0.86).

In the TAU condition, two participants died by suicide. Overall, 14 severe adverse events (SAEs) were reported: 9 (15.0%) in TAU, including both suicides and 5 in DBT (7.9%). In DBT, one SAE occurred immediately after randomization and before treatment started. All SAEs were reported to the medical ethics committee. None of the severe adverse events was considered to be caused by participation in the study. These findings may attest to the relative safety of DBT for managing suicidality in ASDs.

Evaluation of primary outcomes

Figure 2 shows how SIDAS suicidal ideation was significantly reduced over time in both conditions at post-treatment ($b = -11.17$, S.E. = 1.41; $z = -7.94$; $p < 0.001$) and follow-up ($b = -14.46$, S.E. = 1.38; $z = -10.51$; $p < 0.001$), but more so in DBT than TAU at post-treatment ($b = -4.42$, S.E. = 1.97; $z = -2.24$; $p = 0.025$), although this between-group difference was no longer statistically significant post-treatment ($b = -3.30$, S.E. = 1.94; $z = -1.70$; $p = 0.089$).

LPC suicide attempts consisted of counts (0, 1, …, K) of these behaviors as they occurred in the 6 months preceding the measurements at baseline, post-treatment, and follow-up. The incidence rate ratio (*IRR*) showed that the decline was much stronger in the DBT condition than in TAU at post-treatment ($IRR = 0.05$; S.E. = 0.05; $z = -3.15$; $p = 0.002$). The ratio was no longer statistically significant at 12-month follow-up ($IRR = 0.25$; S.E. = 0.21; $z = -1.61$; $p = 0.107$). The general picture for both primary outcomes is quite similar: from baseline to post-treatment, a decline in SIDAS suicidal ideation and LPC suicidal behaviors could be observed. This decline was more pronounced in the DBT condition during the experimental time interval. After post-treatment, the reductions in suicidality were sustained up to follow-up in both conditions.

Evaluation of secondary outcomes

BDI depressive symptom severity was significantly more strongly reduced in DBT than in TAU at post-treatment ($b = -2.74$, S.E. = 1.38; $z = -1.99$; $p = 0.046$) as well as at the 12-month follow-up ($b = 3.38$, S.E. = 1.37; $z = -2.46$; $p = 0.014$), see Fig. 2.

SIAS social anxiety declined over time in both conditions, but there was no statistically significant difference between DBT and TAU either at post-treatment ($b = -3.11$, S.E. = 1.90; $z = -1.64$; $p = 0.101$) or at follow-up ($b = -2.78$; S.E. = 1.89; $z = -1.47$; $p = 0.142$), see Fig. 2. For test results of primary and secondary outcomes over time, see Table 2.

Sensitivity analyses

To ascertain the robustness of the main analyses conducted with the mixed models, a pre-planned sensitivity analysis was conducted in which missing observations due to dropout were imputed using the LOCF method. Table 3 compares the regression coefficient, standard error, and p values of time effects (post-treatment and follow-up *v.* baseline) and of condition × time (DBT *v.* TAU at post-treatment and at follow-up) obtained by the base case analyses, the sensitivity analysis after LOCF imputation and the COVID lockdown adjusted analyses for SIDAS suicidal ideation, LPC suicide attempts, BDI depressive symptom severity and SIAS social anxiety.

There were only a few differences between the base case and the LOCF sensitivity analyses. The p value changes for SIDAS and LPC were minute and could not materially alter the conclusions. However, in the LOCF sensitivity analysis of BDI depression, DBT was no longer significantly superior to TAU at post-treatment and follow-up. The BDI analysis contained a relatively high number of dropouts, possibly contributing to the conservative LOCF results. In the base case analysis, the time effect on the SIAS at follow-up was not significant, but it became statistically significant in the LOCF sensitivity analysis.

Table 3 demonstrated that the outcomes of the lockdown-adjusted analyses did not materially affect the original conclusions.

Discussion

Key findings

To our knowledge, this is the first well-powered randomized controlled trial to assess the effectiveness of DBT targeting suicidal

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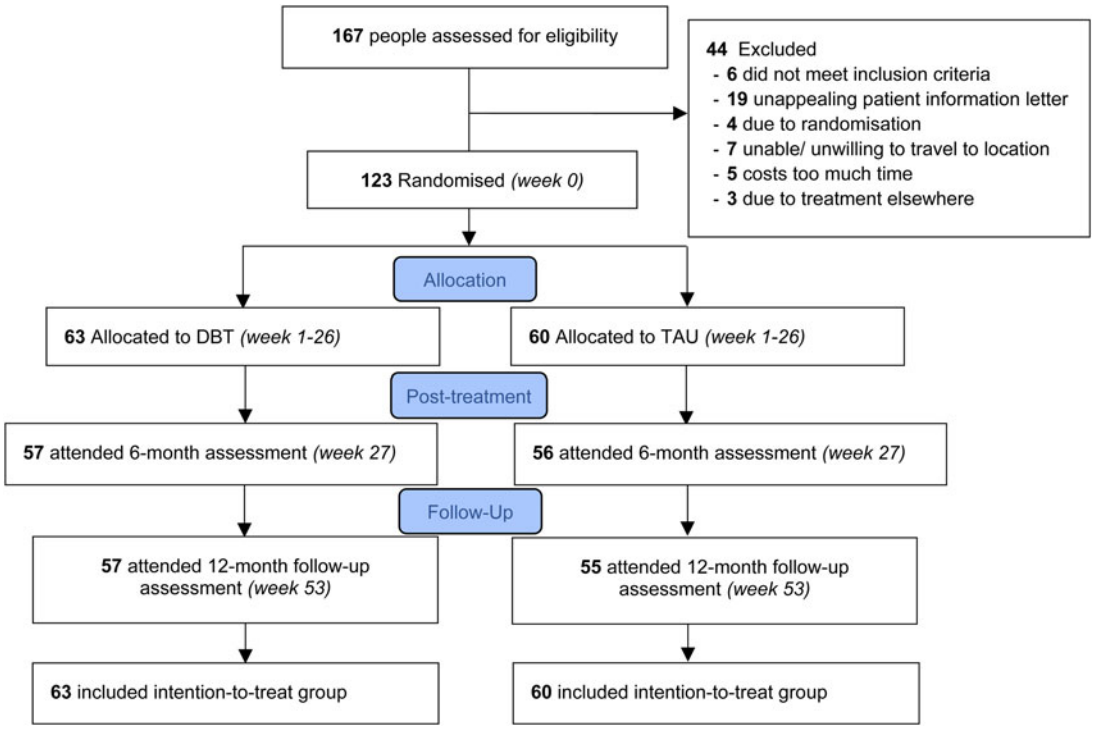

Figure 1. The flow of participants through the trial.

ideation and suicide attempts in autistic adults receiving outpatient care in mental health services. The results support our hypotheses, indicating that DBT led to a more substantial and significant reduction in (1) suicidal ideation, (2) suicide attempts, and (3) depression compared to TAU until six months after baseline. However, the between-group differences lost significance for suicidal ideation and suicide attempts at the 12-month follow-up as the effects of TAU began to approach the effect levels of DBT. Regarding depressive symptom severity, the between-group difference favoring DBT over TAU remained statistically significant at follow-up. Our hypothesis had to be rejected for social anxiety as neither condition showed a statistically significant reduction over time and DBT did not outperform TAU. DBT was conducted with low to moderate fidelity but was well-received by participants, had a low attrition rate, and showed fewer adverse events than TAU. Sensitivity analyses with LOCF and COVID-19 lockdowns attested to the robustness of the key findings.

Findings in context

In general, the significant reductions in suicidal behaviors align with the consistent findings of DBT's effectiveness across various disorders (DeCou, Comtois, & Landes, 2019). Our findings are consistent with other studies that targeted emotion regulation with interventions partially based on DBT in autistic adults. For instance, a study by Bemmouna, Coutelle, Weibel, and Weiner (2022) demonstrated the feasibility and acceptability of an 18-week comprehensive DBT with seven autistic individuals, revealing effects on emotion regulation. Similarly, Ritschel, Guy, and Maddox (2022) conducted a study on a 24-week DBT skill group, indicating effects on emotion regulation. Additionally, Hartmann et al. (2019) assessed the effectiveness of a 12-week CBT and DBT-informed group intervention with seven young individuals, demonstrating effects on emotion regulation.

Follow-up data reported by Linehan et al. (1999) and Linehan et al. (2006) demonstrated a sustained effect in treatment completers at 4 months after the end of treatment, and Linehan et al. (1999) and Linehan et al. (2006) indicated lasting effects on suicide attempts at 12 months post-treatment. These findings provide further support for the data obtained in our current study, indicating the enduring effect of DBT over time.

Regarding the severity of depression, our study demonstrates significant and sustained improvement, which aligns with previous research (Lord et al., 1989; Lynch et al., 2003; Mehlum et al., 2019; Neacsiu et al., 2014). Additionally, concerning the brief treatment duration, our results are consistent with those of a small open study with borderline personality patients, which showed that a brief DBT program significantly reduced suicidal thoughts and had demonstrated effects on self-harming behavior, suicidal ideation, and depression (Stanley et al., 2020).

In this study, the statistically non-significant decline in social anxiety was steeper in DBT, both after treatment and at follow-up. Various factors contribute to the reduction of social anxiety in both groups. Regression to the mean is notable, as participants initially at a high suicide risk likely experienced heightened anxiety at pre-treatment. Plausibly, their anxiety scores decreased during post-assessment and follow-up. Autistic individuals may benefit from a supportive therapeutic relationship, easing social anxiety. Additionally, DBT components like emotion regulation and mindfulness training directly impact social anxiety (Renna et al., 2018).

The intervention is costly, with twice-a-week skill group training plus weekly psychotherapy during a limited period of six months. Of course, reduced suicidality may reduce other

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Table 1. Baseline characteristics of participants by condition

	DBT ($n = 63$)	TAU ($n = 60$)	All ($n = 123$)
Age in years, *M* (s.d.)	36.9 (10.6)	37.9 (12.1)	37.4 (11.3)
Sex, *n* (%)			
Male	33 (52)	31 (52)	64 (52)
Female	30 (48)	28 (47)	58 (47)
Non-binary	0 (0)	1 (2)	1 (1)
Non-Dutch origin, *n* (%)	2 (3)	1 (2)	3 (2)
Living conditions, *n* (%)			
Married or cohabitating	20 (32)	15 (25)	35 (28)
Children	18 (29)	11 (18)	29 (24)
Alone	24 (38)	30 (50)	54 (44)
Sheltered housing	6 (10)	7 (12)	13 (11)
Employed, *n* (%)	20 (32)	23 (38)	43 (35)
Education, *n* (%)			
University	8 (13)	6 (10)	14 (11)
Higher professional	4 (6)	8 (13)	12 (10)
Middle vocational	22 (35)	19 (32)	41 (33)
Lower vocational	2 (3)	0 (0)	2 (2)
Secondary	21 (35)	22 (37)	43 (35)
DSM-5 diagnosis			
ASD, *n* (%)	63 (100)	60 (100)	123 (100)
Age at diagnosis of ASD, *M* (s.d.)	29.2 (12.7)	30.5 (14.3)	29.8 (13.4)
Number of diagnoses, *M* (s.d.)	2.0 (0.7)	1.8 (0.7)	1.9 (0.7)
Prior DSM diagnoses[a] (%)	54 (86)	46 (77)	81 (100)
DSM comorbidity			
Depressive disorder *n* (%)	28 (44)	20 (33)	48 (39)
Personality disorder *n* (%)	8 (10)	4 (7)	12 (10)
Post-traumatic stress disorder	5 (8)	4 (7)	9 (7)
Anxiety disorder *n* (%)	2 (3)	4 (7)	6 (5)
Obsessive compulsive disorder *n* (%)	4 (6)	3 (5)	7 (6)
Attention deficit hyperactivity disorder	14 (22)	15 (25)	29 (24)
Bipolar disorder *n* (%)	1 (2)	–	1 (1)
Eating disorder *n* (%)	4 (6)	4 (7)	8 (7)
Substance-related disorder *n* (%)	7 (11)	4 (7)	11 (9)
Medication use[b], *n* (%)			
Antidepressants	36 (57)	28 (47)	64 (52)
Antipsychotics	23 (37)	21 (35)	44 (36)
ADHD	10 (16)	9 (15)	19 (15)
Outcomes variables, *M* (s.d.)			
Suicidal ideation, (SIDAS)	33.5 (8.9)	32.4 (8.8)	33.0 (8.9)
Self-harm (LPC-SUI)	2.8 (7.6)	3.0 (17.0)	2.9 (13.0)
Depression (BDI-II)	15.9 (8.1)	15.3 (8.1)	15.6 (8.1)
Social anxiety (SIAS)	42.9 (12.3)	42.5 (12.7)	42.7 (12.5)

DBT, dialectical behavior therapy; TAU, treatment as usual; n, number of participants; M, mean; s.d., standard deviation; DSM-5, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; ASD, autism spectrum disorder; ADHD, attention deficit hyperactivity disorder; SIDAS, Suicidal Ideation Attributes Scale; LPC, lifetime parasuicide count of self-harm behavior with suicidal intentions; BDI-II, Beck Depression Inventory-II; SIAS, Social Interaction Anxiety Scale.

[a]*Prior DSM diagnoses* are available on request.

[b]Which and dosage antidepressants, antipsychotics, and ADHD medication are available on request.

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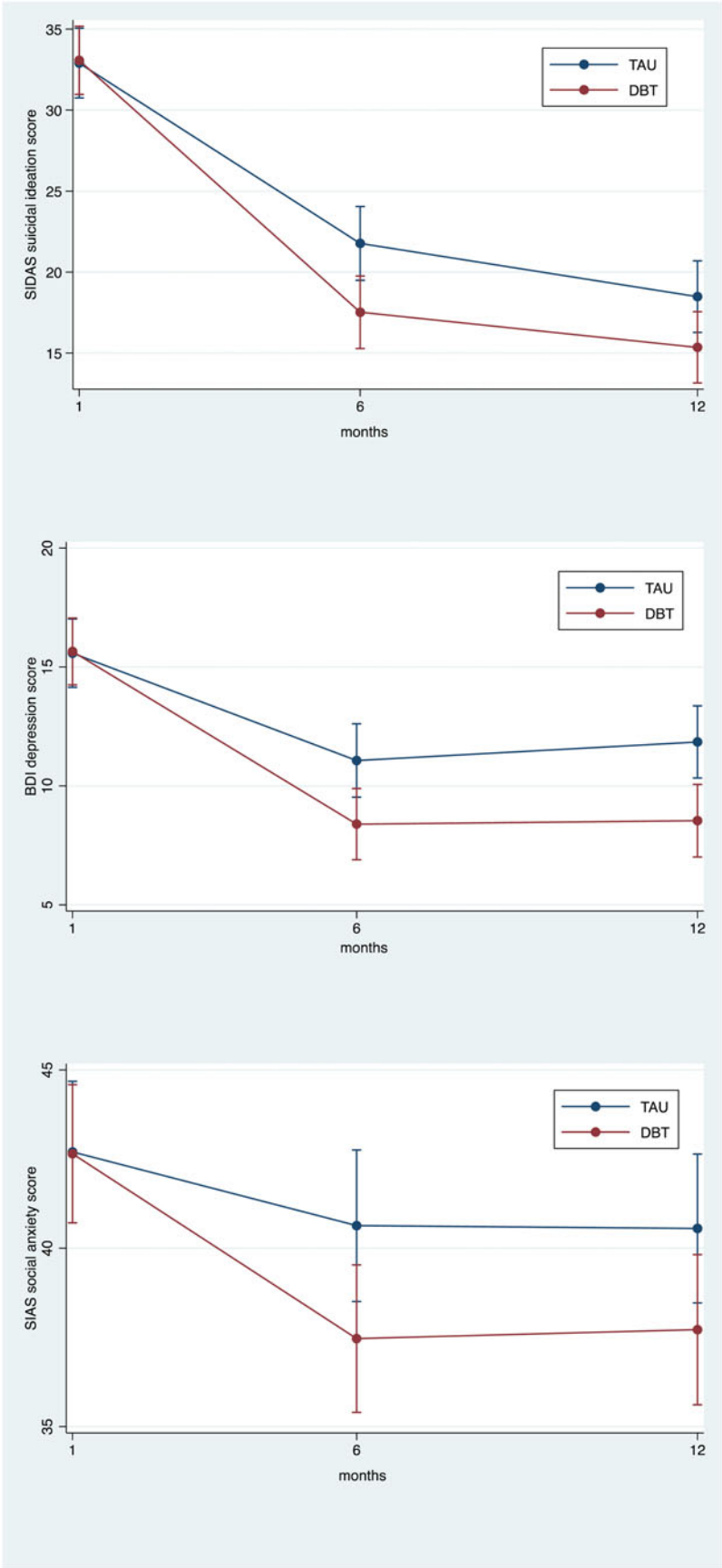

Figure 2. Change in main and secondary outcomes by condition over time.SIDAS, Suicidal Ideation Attributes Scale; BDI, Beck Depression Inventory-II; SIAS, Social Interaction Anxiety Scale; DBT, dialectical behavior therapy; TAU, treatment as usual.

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Table 2. Weighted means, standard deviations, and test results of primary and secondary outcomes over time

	DBT			TAU			Time[a]			Time x treatment[b]				
	t_0	t_6	t_{12}	t_0	t_6	t_{12}								
	$n = 63$	$n = 57$	$n = 57$	$n = 60$	$n = 56$	$n = 55$	$t_0 - t_6$		$t_6 - t_{12}$	$t_0 - t_6$		$t_6 - t_{12}$		
Outcome	*M* (s.d.)	*M* (s.d.)	*M* (s.d.)	*M* (s.d.)	*M* (s.d.)	*M* (s.d.)	*b* (95% CI)	*p*	*b* (95% CI)	*b* (95% CI)	*p*	*b* (95% CI)	*p*	
SIDAS	33.5 (8.9)	20.1 (10.2)	17.5 (12.9)	32.4 (8.8)	23.4 (12.2)	19.7 (12.9)	−1.11 (−13.9 to −8.40)	**0.000**	−1.44 (−17.1 to −11.7)	−4.41 (−8.28 to −0.55)	**0.025**	−3.29 (−7.09 to 0.55)	0.089	
LPC-SUI	2.8 (7.6)	0.6 (3.5)	0.7 (3.7)	3.0 (17.0)	3.4 (22.6)	0.3 (0.9)	0.36^{IRR} (0.12–1.06)	0.065	0.23^{IRR} (0.07–0.78)	0.46^{IRR} (0.00–0.31)	**0.002**	0.24^{IRR} (0.04–1.35)	0.107	
BDI	15.9 (8.1)	9.2 (6.9)	9.4 (8.3)	15.3 (8.1)	11.1 (8.9)	11.3 (8.3)	−4.87 (−6.80 to −2.94)	**0.000**	−3.92 (−5.43 to −201.6)	−2.74 (−543.6 to −0.04)	**0.046**	−3.38 (−6.07 to −0.68)	**0.014**	
SIAS	42.9 (12.3)	38.7 (12.8)	38.6 (12.4)	42.5 (12.7)	40.6 (12.8)	40.0 (12.5)	−1.72 (−4.38 to 0.93)	0.204	−1.68 (−4.31 to 0.94)	−3.11 (−6.83 to 0.60)	0.101	−278 (−6.50 to 0.93)	0.142	

M, mean; s.d., standard deviation; *b*, regression coefficient); *IRR*, incidence rate ratio; CI, confidence interval; *n*, number of participants; SIDAS, Suicidal Ideation Attributes Scale; LPC SUI, lifetime parasuicide count of self-harm behavior with suicidal intentions; BDI, Beck Depression Inventory-II; SIAS, Social Interaction Anxiety Scale; DBT, dialectical behavior therapy; TAU, treatment as usual; t_0, baseline; t_6, posttreatment; t_{12}, 12-month follow-up assessment.
aValues indicate the *p* values of time of the multilevel models. *p* values < 0.05 are presented in bold.
bValues indicate the *p* values of time × treatment of the multilevel models. *p* values < 0.05 are presented in bold.

healthcare and societal costs, and a paper with economic analyses of the results is in preparation to consider the cost-effectiveness of DBT viz-a-viz TAU.

COVID-19

According to a recent review by Scheeren, Crane, Heyworth, and Pellicano (2023), the COVID-19 pandemic significantly affected autistic adults, leading to higher infection and hospitalization rates, heightened the levels of distress and depression and reduced their quality of life (Mutluer, Doenyas, & Aslan Genc, 2020).

However, our clinical observations suggest that many autistic patients responded positively to the general reduction in public social activity and the increase in online appointments brought about by COVID-19 restrictions. They reported benefits from these changes, including relief from external pressures, improved control over sensory stimulation, and a sense of sharing circumstances equally with others. These findings could account for our low dropout rate.

Strengths and limitations

The study has several strengths. One strength is the study's pragmatic trial design which increased the ecological validity of the study because our study was conducted in routine mental healthcare conditions with therapists from the services, allowing our findings to be generalized to routine clinical practice. This approach may facilitate the broader implementation of DBT for suicidality across mental health services for ASD. Another strength is that the existing DBT manual was reworked in cooperation with autistic adults with suicidal behavior, resulting in enhanced accessibility of the manual for autistic people.

The study had several limitations. First, we had an active control group, but it was unstructured. Any treatment and intensity were permitted in the control group during a 12-month treatment duration, whereas DBT treatment ended after 6 months. Second, monitoring of treatment fidelity showed that some DBT sessions deviated from protocol. Adherence to the protocol is essential for the internal validity of the results in our study and how these can be transferred and replicated in other health services. Third, telephone consultation (if needed) was limited to the therapist's availability, so not all patients could access 24-hour consultation. This may have inhibited skills generalization across sessions. Lastly, COVID-19 lockdowns impacted our research, necessitating a temporary but significant shift from in-person to online treatment. However, our sensitivity analysis suggests that these lockdowns did not confound, thus bias, treatment outcomes.

Implications for clinical practice

This study demonstrated that a shortened 26-week DBT treatment was effective in autistic adults with suicidal ideation and suicide attempts. Specifically, participants received DBT well, as evidenced by the low attrition rate, and DBT was shown to be safe in clinical practice, as it did not provoke severe adverse events.

Implications for future research

For future research, we propose several methodological recommendations. These include engaging experienced DBT clinicians, comparing DBT with a well-structured control condition,

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Table 3. Main v. sensitivity using LOCF v. COVID adjusted analyses- comparing *b*, S.E., *p* values

	b				S.E.				*p*			
	Time (month)		*Time × treatment (month)*		*Time (month)*		*Time × treatment (month)*		*Time (month)*		*Time × treatment (month)*	
Outcome *Analysis*	*6*	*12*	*6*	*12*	*6*	*12*	*6*	*12*	*6*	*12*	*6*	*12*
SIDAS												
Main	−1.116	−1.446	−4.419	−3.296	1.407	1.375	197.0	1.937	**0.000**	**0.000**	**0.025**	0.089
Sens	−9.016	−1.271	−4.411	−3.315	1.429	1.429	1.997	1.997	**0.000**	**0.000**	**0.027**	0.097
COVID	−1.052	−9.318	−4.430	−3.291	1.767	1.814	1.908	1.875	**0.000**	**0.000**	**0.020**	0.079
LPC												
Main	0.3675^{IRR}	0.2379^{IRR}	0.0462^{IRR}	0.2445^{IRR}	0.1994	0.1441	0.0451	0.0451	0.065	**0.018**	**0.002**	0.107
Sens	0.3294^{IRR}	0.1181^{IRR}	0.1676^{IRR}	0.8402^{IRR}	0.3294	0.1181	0.1676	0.8402	**0.030**	**0.001**	**0.018**	0.828
COVID	0.4622^{IRR}	0.0798^{IRR}	0.0798^{IRR}	0.2369^{IRR}	0.3534	0.0691	0.0451	0.2017	0.313	**0.004**	**0.002**	0.091
BDI												
Main	−4.873	−3.925	−2.740	−3.379	0.9853	0.9737	1.375	1.374	**0.000**	**0.000**	**0.046**	**0.014**
Sens	−4.183	−3.983	−2.499	−2.445	0.9150	0.9150	1.278	1.278	**0.000**	**0.000**	0.051	0.056
COVID	−4.830	−3.579	−2.741	−3.377	1.268	1.302	137.4	137.3	**0.00**	**0.006**	**0.046**	**0.014**
SIAS												
Main	−1.725	−1.683	−3.115	−2.786	1.359	1.343	1.897	1.896	0.204	0.210	0.101	0.142
Sens	−1.866	−2.483	−2.307	−1.802	1.207	1.207	1.686	1.686	0.122	**0.040**	0.171	0.285
COVID	−1.341	−344.7	−3.088	−2.752	1.695	1.741	1.835	1.834	0.429	**0.048**	0.093	0.134

Boldface = statistically significant at $p < 0.05$; SIDAS, Suicidal Ideation Attributes Scale; LPC SUI, lifetime parasuicide count of self-harm behavior with suicidal intentions; BDI, Beck Depression Inventory-II; SIAS, Social Interaction Anxiety Scale; Base Case, base case analysis; Sens, sensitivity analysis; LOCF, last observation carried forward; COVID, lockdown adjusted analyses; *b*, regression coefficient; S.E., standard error; IRR, incidence rate ratio.

extending follow-up periods, performing mediation and moderator analysis, and conducting an economic evaluation. Implementing these strategies would enhance our comprehension of DBT's effectiveness, sustainability, change mechanisms, cost-effectiveness, and possible variations across subgroups.

Conclusion

This study demonstrates that DBT reduces suicidality more rapidly than TAU and is effective, safe, and acceptable for autistic people and suicidal thoughts and behaviors.

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0033291724000825

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Competing interest. None.

Ethical standards. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

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