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Effects of DBT-based interventions on alexithymia: a systematic review

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ABSTRACT

While dialectical behavior therapy (DBT) appears effective for some psychiatric conditions commonly associated with alexithymia, it is unclear whether DBT improves difficulties experienced by alexithymic individuals. This review investigated the current evidence on the effectiveness of DBT-based interventions in improving alexithymia. A qualitative synthesis of studies that investigated the efficacy of DBT on self-reported alexithymia was performed, identifying eligible studies using EBSCO/Essentials, Google Scholar, PubMed, Web of Science, and PsychINFO databases. Eight studies were identified. Overall, the results were inconclusive due to the heterogeneity of the studies but suggest that DBT-based interventions may be associated with self-reported decreases in alexithymia and increases in the ability to identify emotional states. The literature is limited by significant methodological problems, such as the low number of controlled trials, small samples, and high variability between DBT programs, which increases the risk of bias across study outcomes. More research is needed to reach conclusions regarding the effectiveness of DBT in improving alexithymia. Future studies should conduct randomized controlled trial designs (primarily with active treatment control conditions), greater standardization of DBT-based interventions, and a more in-depth examination of the level of participant involvement in long-term DBT-based interventions may help to understand whether DBT improves alexithymia difficulties.

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Dialectical behavior therapy; DBT; alexithymia; systematic review; psychotherapy

Introduction

Alexithymia [from the Greek a (not) – lexis (words) – thymos (emotion); “no words for emotions”] is a term developed by Sifneos (1973) to describe patients who have psychosomatic disorders with marked restriction in the experience of emotions, difficulties in identifying and distinguishing their feelings from physical sensations and a particular struggle to find appropriate words to verbalize what they feel. These patients also have reduced imaginative abilities, presenting a paucity of dreams and fantasy life, as well as an external-oriented thinking style with marked avoidance of inner experiences (Nemiah &

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Sifneos, 1970; Sifneos, 1973). Alexithymia has prevalence rates ranging from 7% to 13% in community samples, although it is estimated to be several times higher in clinical samples (McGillivray et al., 2017).

Although originally described in patients with psychosomatic disorders, research has shown that alexithymia is found in a variety of physical and mental health problems, thus constituting a transdiagnostic risk factor for several psychiatric conditions, such as depression (Hemming et al., 2019), eating disorders (ED) (Berkovskaya et al., 2020), panic disorder (Šago et al., 2020), abuse of alcohol (Linn et al., 2021), dependence on other substances (Honkalampi et al., 2022). It is estimated that at least 50% of individuals with autism are alexithymic (Berthoz & Hill, 2005; Hill et al., 2004; Lombardo et al., 2007). Additionally, the lack of emotional awareness associated with alexithymia has been shown to affect quality of life and prevent connecting with others and forming close and meaningful relationships (Kennedy & Franklin, 2002).

There is evidence that alexithymia is linked to psychopathological symptoms because alexithymia impairs people's ability to regulate their emotions (Preece et al., 2022). Indeed, research has consistently shown that highly alexithymic individuals tend to use more avoidant and maladaptive emotion regulation strategies, such as high suppression and low cognitive reappraisal (Chen et al., 2011; Laloyaux et al., 2015; Samson et al., 2012, 2015; Swart et al., 2009; Wagner & Lee, 2008) – (dys)regulation profiles also commonly found in psychopathologies (e.g. depression and anxiety; Sheppes et al., 2015). At least partially, alexithymia has been also characterized as a general failure of interoception (Brewer et al., 2016; Murphy et al., 2018). Impaired interoception is argued to represent a central impairment in all psychiatric disorders (Brewer et al., 2016; Murphy et al., 2018). Therefore, evidence suggests that alexithymia is prevalent in several disorders also because of its link with atypical interoception (Brewer et al., 2016; Herbert et al., 2011; Longarzo et al., 2015; Shah et al., 2016).

There has been debate as to whether alexithymia is an enduring personality trait or a circumstantial phenomenon, with absolute or relative stability (Cameron et al., 2014). Although alexithymia appears to be a relatively stable feature, evidence has suggested that it can be modified with psychological intervention (Cameron et al., 2014). Psychotherapy is expected to help patients with alexithymia develop some ability to recognize their feelings and communicate them to others, and to use emotional information to guide adaptive behavior (Ogrodniczuk et al., 2011). Nevertheless, patients with high alexithymic traits can be particularly challenging to psychotherapeutic treatment, as their inability to communicate emotions can induce negative reactions in therapists (Ogrodniczuk et al., 2011). A recent systematic review found that high alexithymia predicts less favorable outcomes in the treatment of mental disorders (Pinna et al., 2020). For example, a study showed that difficulty identifying emotions in alexithymic patients with ED was a significant predictor of poor outcome in a range of therapeutic interventions (Speranza et al., 2011), whereas another found that lower levels of alexithymia at baseline were predictive of a higher probability of patients achieving recovery from ED after psychoeducational outpatient group treatment (Balestrieri et al., 2013). Similar unfavorable outcomes have been found in alexithymics with other pathologies, such as mood disorders (Ogrodniczuk et al., 2004), post-traumatic stress disorder (Löf et al., 2018), and somatoform disorders (Bach & Bach, 1995). A number of studies have shown that alexithymia, not autism spectrum disorder (ASD), predicts several socio-

emotional impairments in individuals with autism, such as social isolation, atypical eye contact, impaired interoception, and abnormal emotional processing (Bird & Cook, 2013; Cook et al., 2013; Cuve et al., 2021; Gerber et al., 2019; Shah et al., 2016; Trevisan et al., 2016). In addition, alexithymia seems to be related to greater severity of anxiety disorders (Berardis et al., 2008), and to contribute to the emergence of somatic symptoms in depression, particularly following childhood trauma (Güleç et al., 2013).

A systematic review found greater reductions in alexithymia in psychological interventions that directly targeted alexithymia symptoms, such as poor fantasy and attention to internal experiences, difficulty identifying and differentiating feelings and bodily sensations, inability to express emotions, reduced emotion regulation, and interpersonal problems (Cameron et al., 2014). For example, Levant et al. (2009) found a significant reduction in alexithymia after participants joined a psychoeducational group including interventions on dysfunctional emotion beliefs, developing a vocabulary of emotions, learning to read others' emotions, identifying feelings or bodily sensations, and practical emotional experiencing exercises. In addition, Melin et al. (2010) observed that participants significantly reduced alexithymia, mainly in terms of difficulties in identifying feelings and describing feelings, after undergoing a psychological intervention of 8 weekly training sessions designed to identify, differentiate, and verbally express emotions and associated bodily sensations. Although to date there is no gold standard intervention to treat alexithymia, evidence has suggested that therapeutic approaches aimed at emotional aspects, such as third-wave cognitive-behavioral therapies (CBT) (Kahl et al., 2012) that include mindfulness and emotional psychoeducation interventions (e.g. Dialectical Behavior Therapy—DBT; Linehan, 2014), hold promise for ameliorating deficits presented in alexithymic patients (Cameron et al., 2014; Norman et al., 2019).

DBT is a third-wave CBT intervention with the potential to improve emotional processing skills in alexithymia—mainly through mindfulness and emotion regulation modules, which encourage patients to get in touch with their feelings in order to identify, describe, and regulate them (Linehan, 2014). DBT is expected helps individuals learn to understand their emotions by exploring links between triggering events, thoughts, physical sensations, action tendencies and expressive behaviors. Thus, individuals may develop alternative ways of processing their emotions rather than engaging in dysregulated behaviors (Linehan, 2014). DBT has been shown to be effective in treating clinical populations who experience reduced emotion awareness and emotional dysregulation, such as borderline personality disorder (Kliem et al., 2010), bulimia nervosa (Safer et al., 2001), binge-eating disorder (Telch et al., 2001), problem gambling (Christensen et al., 2013), and substance use disorders (Dimeff & Linehan, 2008) – psychiatric conditions commonly associated with alexithymia (Luminet et al., 2018; Pinna et al., 2020).

Researchers have suggested that DBT-based interventions could also help individuals with high levels of alexithymia (Fink et al., 2010; Greene et al., 2020; Swannell et al., 2012), particularly in improving emotion identification and awareness (Brown et al., 2018). For example, one case study found improvements in alexithymia levels after a patient underwent 10 sessions of DBT-based intervention with mindfulness and emotion regulation skills training (Frye & Spates, 2012). DBT is especially listed for alexithymia because it helps patients learn to identify and describe their emotions (Brown et al., 2018; Greene et al., 2020) – a difficulty particularly found in alexithymic individuals (Bagby et al., 1994). In addition, people with high levels of alexithymia may benefit from learning and training

emotion regulation strategies provided by DBT-based interventions (Fink et al., 2010; Swannell et al., 2012). However, highly alexithymic individuals may avoid DBT group training because of their concerns about social interactions (Panayiotou et al., 2020), which can substantially compromise their adherence to DBT treatment.

Although DBT is promisingly helpful for difficulties experienced by alexithymic individuals, empirical evidence on its effectiveness for alexithymia is still diffuse in the literature. In fact, to our knowledge, there is no systematic review assessing the effects of DBT-based interventions on alexithymia. Bringing together the findings on the issue is critical to clarifying whether DBT-based interventions may be indicated to treat alexithymia. Due to this gap in the literature, the present study aimed to carry out a systematic review of DBT-based interventions in alexithymia, regardless of sample characteristics (e.g. presence or absence of clinical diagnosis, gender, age, or any other demographic aspect).

Method

Search strategy

The systematic review was conducted according to the PRISMA statement (Moher et al., 2011). PUBMED, Google Scholar, EBSCO (Essentials), Web of Science, and PsychINFO were searched from inception until April 2022 with the following terms: “alexithymia” AND (“DBT” OR “Dialectical Behavior Therapy” OR “Dialectical Behavioral Therapy” OR “Dialectical Behaviour Therapy”). Advanced search was used in EBSCO (Essentials) to filter results with the term “alexithymia” in the abstract.

Eligibility

This review included studies of DBT-based interventions with psychiatric or non-clinical samples. Inclusion criteria were 1) full text available in English, 2) published in a peer-reviewed journal, 3) reporting a comparison of mean total alexithymia scores, 4) explicitly describing the intervention as based on DBT. No exclusion criteria were set regarding age, diagnosis, or other participant demographics.

Selection

The selection process is summarized in Figure 1. After excluding duplicates and non-articles (e.g. book chapters, dissertations, theses, etc.), the remaining studies had their abstracts screened. Abstracts that reported non-empirical studies (e.g. theoretical research, reviews, etc.), non-intervention studies (e.g. correlational research), or not available in English were excluded. Full texts were evaluated, excluding those that did not meet the inclusion criteria described.

Data extraction

The following data were extracted from the 8 articles that met the inclusion criteria: (a) authors, (b) year of publication, (c) study location, (d) study design, (e) sample

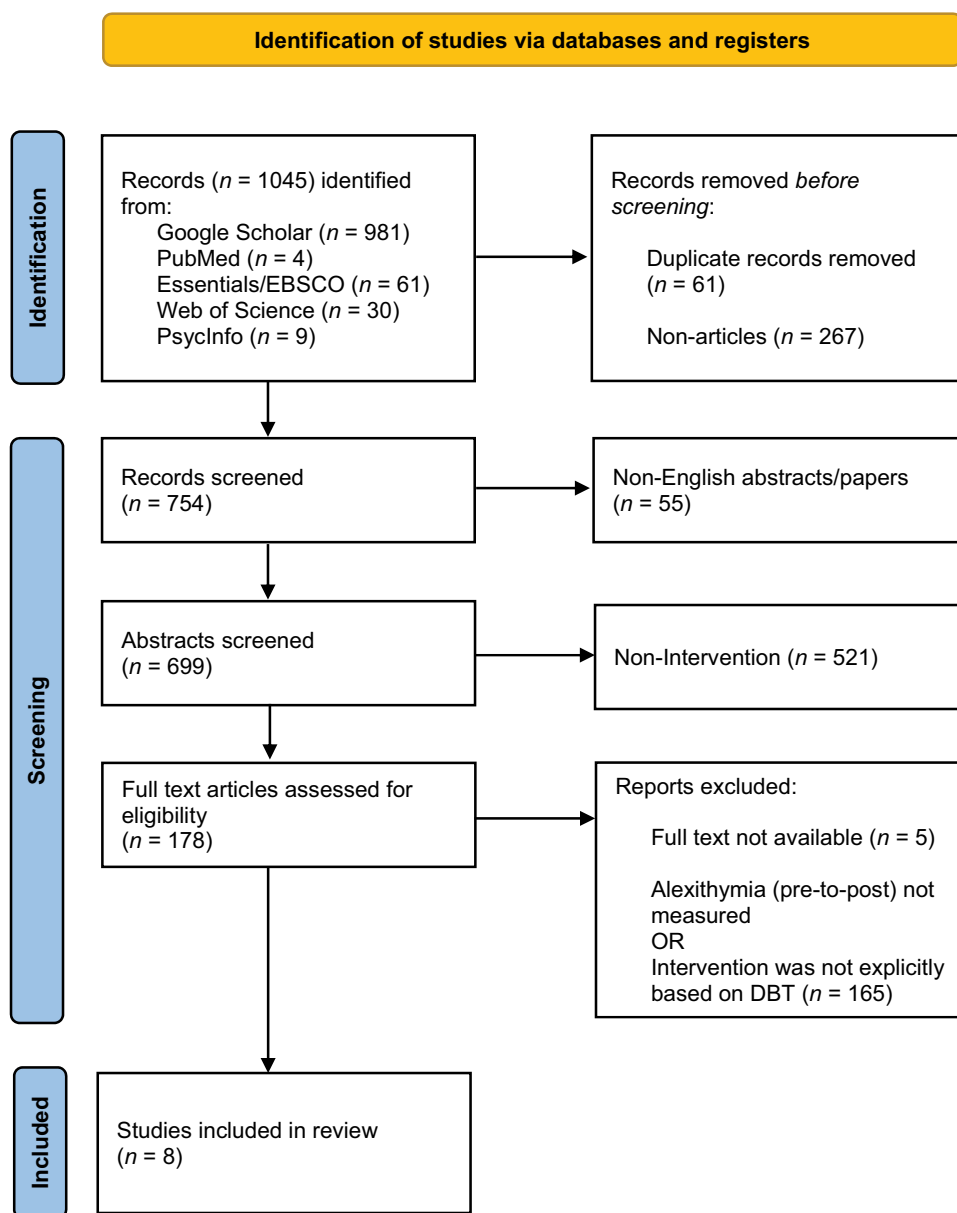


Figure 1. Flow diagram of study selection process.

characteristics (sample size, gender, age, and recruitment), (f) participant inclusion/exclusion criteria, (g) assessment tool of alexithymia, (h) delivery and format of DBT intervention, (i) intervention provided to the comparison group (j) diagnostic assessment tools, (k) diagnosis, (l) findings. Effect sizes (Cohen's d) were calculated by dividing the difference between the group means by the combined standard deviation where this information was available.

Quality assessment

Assessment of methodological quality and risk of bias was performed on the included studies based on the “Checklist for Assessing the Quality of Quantitative Studies” (Kmet et al., 2004). Items were scored depending on the degree to which specific criteria were met (“yes” = 2, “partial” = 1, “no” = 0). For criteria in which some study scored, studies that did not include that feature were penalized with a score of zero. Items not applicable in any of the reviewed studies were marked as “n/a” and were excluded from the total quality score calculation. A summary score was calculated for each article by adding the total score obtained on the relevant items and dividing by the total possible score [i.e.: $28 - (\text{number of “n/a”} \times 2)$]. The total scores of the articles were then converted into a percentage of meeting the criteria for all evaluated items. Higher percentages represent a stronger methodological quality. Good quality was defined as percentages greater than or equal to 75%; fair quality was defined as percentages of at least 55%; poor quality was defined as those with scores below 55%. A second rater (WM) independently assessed the eight studies using quality criteria to verify agreement. The checklist and ranking procedure were discussed before rankings were made to ensure consistency in the interpretation of checklist items. Inter-rater reliability for the quality scores of these eight articles was calculated and resulted in an almost perfect agreement (Kappa = 0.96). Remaining disagreements were resolved through discussion to determine a final rating.

Results

Rating of study quality

Overall, the methodological quality of the studies included in the review ranged from fair to good, with scores ranging from 63% to 83% ($m = 73.5\%$, $SD = 0.08$) on the “Checklist for assessing the quality of quantitative studies” (Kmet et al., 2004, see Appendix A). Three studies were rated fair and five good quality. Higher quality studies involved randomized controlled trials, with detailed samples and adequate measurement. Common limitations among studies that impacted their quality rating included: absence of a control condition, insufficient sample size, and inappropriate statistical analysis methods.

Summary of included studies

A summary of the eight included studies is provided in Table 1. Studies were conducted between 2002 and 2022. Five studies were conducted in Europe (62.5%): France ($k = 1$), Sweden ($k = 2$), and Italy ($k = 2$); and three studies were performed in North America (37.5%): United States ($k = 2$) and Canada ($k = 1$).

Assessment of alexithymia

The majority of studies employed the Toronto Alexithymia Scale 20 items (TAS-20; Bagby et al., 1994). It includes 20 items assessing three dimensions of alexithymia: difficulty identifying feelings (e.g. “When I am upset. I don’t know if I am sad, frightened, or angry”), difficulty describing feelings (e.g. “It is difficult for me to find the right words for my feelings”), and externally-oriented thinking (e.g. “I prefer talking to people about

Table 1. Study characteristics sample.

Study	Sample	Inclusion or Exclusion Criteria	DBT Intervention	Control Condition	Alexithymia Assessment	Results
Reilly et al. (2022) USA	N = 894(91% female) Adult: (n = 512) Adolescent: (n = 382) M age = 21.76 years Outpatients with mixed diagnoses of EDs.	(I) Participants enrolled in a PHP of EDs. (E) None listed.	Delivery: 10 h of treatment per day, for 6 days a week (m = 83.27 days). Format: Individual therapy, phone coaching, consultation meetings, and DBT skills groups (all 4 modules).	None	TAS-20 Baseline, 1-month post-treatment, 6-12-24-month follow-up	Even after controlling for relevant covariates, there were significant decreases in alexithymia from intake to discharge and discharge to follow-up.
Bemmouna et al. (2021) France	N = 7(43% female) Adult sample M age = 27.71 years Outpatients with ASD.	(I) Previous diagnoses of ASD. (E) Absence of ID.	Delivery: 2h15 weekly skills training group session; weekly 1-h individual therapy session; and weekly 2 h therapist consultation. Format: Individual therapy, phone coaching, consultation meetings, and DBT skills groups (all 4 modules).	None	Adapted TAS: GAFS-8 items Baseline, post-treatment, 4-month follow-up	Alexithymia is the only dimension that did not show statistically significant improvement following DBT neither post-treatment nor at follow-up.
Holmqvist Larsson et al. (2020) Sweden	N = 29(100% female) Adult sample M age = 21.41 years Outpatients with mixed diagnoses of EDs.	(I) Meet DSM-V criteria for ED with difficulties with emotion regulation. (E) Psychosis or mania, drug or alcohol abuse, or severe suicidality.	Delivery: Five 2 h weekly sessions in a group setting. Format: Group intervention, based on treatment principles from DBT and ERGT, UP, and ACT.	None	TAS-20 Baseline, post-treatment	Alexithymia showed significant improvement after treatment.

(Continued)

Table 1. (Continued).

Study	Sample	Inclusion or Exclusion Criteria	DBT Intervention	Control Condition	Alexithymia Assessment	Results
Holmqvist Larsson et al. (2020)	Adolescent: ($n = 20$) 100% female M age = 15.95 years	(I) Ongoing treatment for at least one psychiatric diagnosis and had moderate to severe functional impairment. (E) Psychosis or mania, drug or alcohol abuse, severe anorexia, ID or ASD.	Delivery: Five 2 h weekly sessions of emotion regulation skills training in groups. Format: Group intervention, based on treatment principles from DBT and ERGT, UP, and ACT.	None	TAS-20 Baseline, post-treatment	For adolescents, measures of alexithymia were significantly reduced.
Sweden	Outpatient with mixed diagnoses.					
Lagrotteria et al. (2019)	$N = 30$ (Age and gender not informed) DBT: ($n = 15$) Control: ($n = 15$) Forensic psychiatric inpatients.	(I) IQ > 70; past history of impulsive and aggressive behaviors; significant score at TAS-20; personal initiative to the DBT group. (E) None listed.	Delivery: 1 h group sessions for 12 months. Format: Skills training only in group format (unspecified modules).	TAU: Supportive psychotherapy and nonspecific skills group.	TAS-20 Baseline, post-treatment	Interaction effect between TAS-20 and the DBT experimental group. This treatment was more effective in improving alexithymia in the experimental group than in the control group.
Italy						
Bianchini et al. (2019)	$N = 21$ (100% male) DBT: ($n = 10$) Control: ($n = 11$) Adult sample M age = 41.79 years	(I) Meet criteria for BPD; History of violence to others. (E) Cognitive deficit (QI < 70); comorbid neurological diseases.	Delivery: 12 months of weekly 1 h sessions of individual therapy and 2 h weekly group sessions. Format: Individual therapy, coaching meetings, and group skills training (all 4 modules).	TAU: Usual REMS treatments alone.	TAS-20 Baseline, post-treatment	There were no significant differences between groups in alexithymia scores.
Italy	Forensic psychiatric inpatients with BPD.					

(Continued)

Table 1. (Continued).

Study	Sample	Inclusion or Exclusion Criteria	DBT Intervention	Control Condition	Alexithymia Assessment	Results
McMain et al. (2013) Canada	N = 80 (84% female) Adult sample M age = 32.60 years Outpatients with BPD.	(I) Meet criteria for BPD; history of at least 2 suicidal behaviors or non-suicidal self-injurious behavior. (E) Substance dependence, PD, BD, delirium, dementia, or mental retardation.	Delivery: 12 months of individual therapy (1 h/week), group skills training (2 h/week), telephone coaching (24/7), and consultation meetings (2 h/week). Format: Individual therapy, phone coaching, DBT therapist consultation, and group skills training (all 4 modules).	None	TAS-20 Baseline, post- treatment	Significant increased ability to identify feelings (TAS-DIF). Non-significant changes in TAS-DDF, and TAS-EOT.
Cloitre et al. (2002) USA	N = 58 (100% female) DBT: (n = 31) Control: (n = 27) Adult sample M age = 34 years Outpatients with PTSD.	(I) Meet criteria for PTSD and trauma history. (E) Substance-dependence disorder; BPD diagnosis; recent hospitalization; thought disorder.	Delivery: 16 sessions delivered over a 12-week period with 1 h or 1.5 h sessions. Format: Intervention group sessions based on DBT and CBT strategies.	WLC: 12 weeks and monitored weekly by 15- minute phone sessions.	TAS-20 Baseline, mid- treatment, post-treatment	Non-significant pre-to-mid treatment improvements in the TAS-20 and significant mid-to-post treatment improvements in the TAS-20 after intervention.

EDs = eating disorders; DBT = dialectical behavior therapy; TAS-20 = Toronto Alexithymia Scale; ASD = autism spectrum disorder; IQ = intelligence quotient; ID = intellectual disability; GAFS-8 = Eight-item General Alexithymia Factor Score; ERGT = emotion regulation group therapy; UP = unified protocol; ACT = acceptance and commitment therapy; BPD = borderline personality disorder; TAU = treatment as usual; REMS = *Residenze per la Esecuzione della Misura di Sicurezza*; DIF = difficulties identifying feelings; DDF = difficulties describing feelings; EOT = externally oriented thinking; PTSD = post-traumatic stress disorder; CBT = cognitive behavioral therapy; WLC = waitlist control.

their daily activities rather than their feelings”). One study applied the Eight-item General Alexithymia Factor Score (GAFS-8; Bemmouna et al., 2021), a non-validated adapted version of the TAS-20 with only 8 items.

Sample characteristics

A total of 1148 participants were included, aged between 11 and 64 years. The mean age of the 8 samples was 27.89 years. The sample size was between 7 and 894 (median = 29.5 participants). Two studies (Holmqvist Larsson et al., 2020; Reilly et al., 2022) examined alexithymia outcomes in adolescents and adults. However, the sample of parents in the study conducted by Holmqvist Larsson et al. (2020) did not undergo the DBT-based intervention, so this adult sample was not considered in the present review. Six studies examined alexithymia only in adults. Three samples included only female participants, while two samples included exclusively male participants. Although the criteria of the current review do not exclude articles with non-clinical samples, all studies included had samples with some diagnosis.

Clinical diagnosis

Two studies included a mixed-diagnosis group of patients with EDs (Holmqvist Larsson et al., 2020; Reilly et al., 2022). One study recruited adults with autism spectrum disorders (ASD) (Bemmouna et al., 2021), and another included patients with borderline personality disorder (BPD) (McMain et al., 2013). One treatment included only women with post-traumatic stress disorder (PTSD) (Cloitre et al., 2002). Two studies investigated mentally ill inmate offenders (Bianchini et al., 2019; Lagrotteria et al., 2019). A further study recruited a sample of adolescents with multiple diagnoses (Holmqvist Larsson et al., 2020).

Study designs

Three of the studies reviewed were controlled trials. Two studies (66.7%) used a treatment as usual (TAU) control design, while one study (33.3%) used a waiting list (WLC) design. Five included studies had single-group designs (i.e. without a control condition). McMain et al. (2013) reported only the results of the entire sample (without differentiating those who were treated with DBT and GPM), which made it impossible to compare treatments on the outcome of alexithymia. Four studies (50.0%) were described as pilot or feasibility studies.

Treatment conditions

Among the DBT interventions, four of the included studies (Bemmouna et al., 2021; Bianchini et al., 2019; McMain et al., 2013; Reilly et al., 2022) implemented a standard DBT treatment protocol (including ongoing individual psychotherapy, phone coaching, and DBT therapist consultation, in addition to the group skills-training component) as part of their treatment program. Half of the studies ($k = 4$) delivered all four DBT modules (i.e. mindfulness, emotion regulation, distress tolerance and interpersonal effectiveness) as part of treatment. One study was unclear which DBT modules were used (Lagrotteria et al., 2019). In Reilly et al. (2022), adolescent participants received a blend of DBT and family-based treatment. Bemmouna et al. (2021) made slight adaptations to better accommodate autistic patients (e.g. maintain visual, auditory, and temperature stable environment; reductions in text and more illustrations; and brief

activity on social anxiety in the first session). In Bianchini et al. (2019), participants in the DBT intervention group also received treatment as usual, which could include antipsychotic medications. Participants in the study conducted by McMain et al. (2013) were treated with DBT or GPM (an outpatient treatment with individual psychodynamic therapy, case management, and symptom-targeted medication management), however, participants from both treatments were later regrouped into a single sample, making it impossible to compare effectiveness between groups.

Three studies used interventions merely based on the principles of DBT together with other treatments. For example, the intervention used by Holmqvist Larsson et al. (2020) and Holmqvist Larsson et al. (2020) was based on DBT and Emotion Regulation Group Therapy (ERGT), Unified Protocol (UP), and Acceptance and Commitment Therapy (ACT). Furthermore, Cloitre et al. (2002) used an intervention based on generic DBT and cognitive behavioral therapy (CBT) strategies. There was high variability in the duration of DBT-based interventions provided, ranging from interventions with sessions over 5 weeks to sessions delivered over 12 months. The number of sessions delivered in the 8 studies ranged from 5 to over 100 (counting individual and group therapy sessions), with session duration ranging from 1 h to 2 h¹⁵. Three studies (37.5%) included a follow-up period to evaluate the results. The duration of this follow-up varied across studies from 1-month post-intervention to 24 months post-intervention.

Synthesis of findings on alexithymia (see Table 2)

Pre- to post-treatment effects

Among the eight studies included, six of them (75.0%) reported reductions in alexithymia measures after DBT intervention. Overall, within-group TAS-20 total score effect sizes when examining the effectiveness of DBT intervention ranged from $d = 0.09$ to 1.07 (trivial to large), indicating high variability in alexithymia outcomes. Included studies with control condition showed mixed results in alexithymia outcomes. One study with women diagnosed with PTSD found no pre-to-mid-treatment changes in TAS-20 total score between WLC and DBT-based intervention, but showed mid-to-post-treatment reductions in alexithymia after DBT-based intervention (Cloitre et al., 2002). A study with inpatient forensic patients found no pre-to-post-treatment changes in alexithymia after DBT treatment compared to TAU (Bianchini et al., 2019). Another study of inmates with mental illness found a pre-to-post-treatment changes in alexithymia with DBT intervention in comparison with TAU (Lagrotteria et al., 2019). The between-group effect sizes of the TAS-20 total score in the 3 studies with a comparison group ranged from $d = 0.07$ to 0.91 , indicating null to large effects. Among the included studies with single-group designs ($k = 4$), three reported significant improvements in alexithymia immediately after DBT intervention. It is noteworthy that among these studies, the only one that found no changes in alexithymia after DBT treatment had a very small sample ($n = 7$) and used a non-validated adapted version of the TAS-20 with only 8 items (Bemmouna et al., 2021).

DBT standard vs. DBT-based interventions

Among the included studies, five implemented a purely DBT treatment, with four following standardized DBT protocols. The within-group effect sizes of the TAS-20

Table 2. Study outcomes at post-treatment and follow-up on alexithymia as a function of DBT treatment.

Study	Pre-post DBT treatment: Within-group effect sizes (Cohen's <i>d</i>)	F/U DBT treatment: Within-group effect sizes (Cohen's <i>d</i>)	Between-treatment group comparisons
Reilly et al. (2022)	Means and standard deviations not provided.	Means and standard deviations not provided.	N/A
Bemmouna et al. (2021)	<i>ns</i> (<i>d</i> = 0.30)	<i>ns</i> (<i>d</i> = 0.66)	N/A
Holmqvist Larsson et al. (2020).	TAS-20 (Total): <i>d</i> = 0.75	N/A	N/A
Holmqvist Larsson et al. (2020)	Adolescent sample TAS-20 (Total): <i>d</i> = 0.57 TAS-20 (DDF): <i>d</i> = 0.54 TAS-20 (DIF): <i>d</i> = 0.48 TAS-20 (EOT): <i>d</i> = 0.52	N/A	N/A
Lagrotteria et al. (2019)	TAS-20 (Total): <i>d</i> = 0.63	N/A	Significant group differences found at post-treatment. Participants in the DBT intervention reported a significantly reduced total TAS-20 score compared to the control TAU condition (<i>d</i> = 0.91)
Bianchini et al. (2019)	TAS-20 (Total): <i>ns</i> (<i>d</i> = 0.09) TAS-20 (DIF): <i>ns</i> (<i>d</i> = 0.17) TAS-20 (DDF): <i>ns</i> (<i>d</i> = 0.00) TAS-20 (EOT): <i>ns</i> (<i>d</i> = 0.25)	N/A	TAS-20 (Total): <i>ns</i> (<i>d</i> = 0.07) TAS-20 (DIF): <i>ns</i> (<i>d</i> = 0.18) TAS-20 (DDF): <i>ns</i> (<i>d</i> = 0.03) TAS-20 (EOT): <i>ns</i> (<i>d</i> = 0.18)
McMain et al. (2013)	TAS-20 (DIF): <i>d</i> = 0.51 TAS-20 (DDF): <i>ns</i> (<i>d</i> = 0.25) TAS-20 (EOT): <i>ns</i> (<i>d</i> = 0.19)	N/A	N/A
Cloitre et al. (2002)	TAS-20 (Total): <i>d</i> = 1.07	N/A	Significant group differences found at post-treatment. Participants in the DBT intervention reported a significantly reduced total TAS-20 score compared to the control waitlist condition (<i>d</i> = 0.73)

total score in those studies where this information was available to be calculated ranged from *d* = 0.09 to 0.63 (trivial to medium), indicating high variability in the results. Among these studies in which the intervention was purely DBT, only two were controlled trials. They presented between-group effect sizes on the TAS-20 total score ranging from *d* = 0.07 to 0.91 (trivial to large). Regarding the three studies with interventions purely based on DBT principles (along with other treatments), the within-group effect sizes ranged from *d* = 0.57 to 1.07 (medium to large). Among them, only one compared the intervention with a control condition (WLC), demonstrating an effect size of TAS-20 total score of *d* = 0.73, indicating a large effect size.

Pretreatment to follow-up effects

Of the three studies that included follow-up outcomes, two study studies reported alexithymia outcome. One study (Bemmouna et al., 2021) found no significant difference in alexithymia at post-treatment or after follow-up (4 months). Another study (Reilly et al., 2022) found improvements in alexithymia at post-treatment and at follow-up (24 months), however, means and standard deviations were not provided to calculate the effect size.

Treatment effects for specific samples

The two studies that investigated the efficacy of DBT in samples with EDs demonstrated significant improvement in alexithymia after treatment (Holmqvist Larsson, Lowén et al., 2020; Reilly et al., 2022), with a within-group effect size of $d = 0.75$ for EDs samples—means and standard deviations were not provided by Reilly et al. (2022) to calculate effect sizes. One study with a very small sample of individuals with autism found no change in alexithymia after DBT treatment (Bemmouna et al., 2021). Another study (McMain et al., 2013) with a BPD sample did not report TAS-20 total score, but found significant improvements in the ability to identify feelings (TAS-DIF; $d = 0.51$) comparing before and after DBT treatment, although not in other aspects of alexithymia, such as the ability to describe feelings (TAS-DDF) and externally oriented thinking (TAS-EOT). Two studies investigated the effectiveness of DBT in inmates with mental illness. One of them examined male inmates with BPD and showed no significant difference in alexithymia (Bianchini et al., 2019). Another (Lagrotteria et al., 2019) had a sample of inmates with mixed diagnoses (e.g. BPD, antisocial personality disorder, schizophrenia, bipolar disorder, etc.) and found improvements in alexithymia after treatment with DBT compared with TAU ($d = 0.91$). A study of women with PTSD (Cloitre et al., 2002) found statistically significant reductions in TAS-20 total score after DBT-based intervention compared with WLC ($d = 0.73$). Finally, a study of adolescents with mixed diagnoses (Holmqvist Larsson et al., 2020) found significantly reduced alexithymia measures after DBT-based intervention, with a within-group effect size of $d = 0.57$.

Sample size comparison

Two of the included studies had very small samples ($n \leq 10$) in DBT treatment conditions, with both showing no statistically significant change in alexithymia. Among those with larger samples ($n \geq 15$) that underwent DBT treatment, all studies ($k = 6$) found significant improvements in alexithymia, with effect sizes within-group of TAS-20 total score ranging from $d = 0.57$ to 1.07 (medium to large), and effect sizes between-group ranging from $d = 0.73$ to 0.91, indicating a large effect size of DBT treatment compared to control conditions among larger samples.

Discussion

Since its inception, DBT has been investigated to treat a variety of psychiatric conditions (e.g. BPD, suicidal behavior, EDs, and substance abuse disorders), generally showing promising results (see Bedics, 2020). Although these disorders are commonly associated with alexithymia (Pinna et al., 2020), to date no study has reviewed the effectiveness of DBT-based interventions to ameliorate alexithymia deficits. The current review systematically reviewed the current literature to address this empirical gap. The review identified 8 studies that provided inconclusive evidence on the effectiveness of DBT in the treatment of alexithymia, relative to treatment as usual or waitlist control designs.

Several methodological limitations that hamper the reliability of studies and their results in the literature that examines this research question could be observed. The major shortcomings found in the present review were the low number of controlled trials ($k = 3$), very small samples in some studies, few studies with follow-up measures ($k = 2$),

and the high variability in the nature of DBT interventions delivered, which limits the replicability of the studies.

Interpretation of outcomes

The large variability in treatment effects of DBT in reducing alexithymia is indicative of the high variability in study design and methodologies examined in this review. These investigated the effectiveness of treatment in clinical or forensic inpatient settings with adults and adolescents ranging in diagnoses such as depression, anxiety disorders, schizophrenia, antisocial personality disorder, ASD, BPD, PTSD, etc. The DBT interventions appeared to be relatively efficient in treating alexithymia for most diagnoses, except for samples with ASD and BPD. However, the low efficacy of DBT treatment in these samples can be explained by the small number of participants. For example, a study with an ASD sample (Bianchini et al., 2019) had only 10 subjects participating in DBT treatment, which may explain the lack of statistically significant changes in alexithymia in this group. Indeed, samples with smaller sample sizes found no difference in alexithymia, while studies with more robust samples showed large within-group effect sizes in improving alexithymia among those who underwent DBT treatment. Future research should incorporate larger samples to arrive at statistically significant results to reach any conclusion as to the effectiveness of DBT in alexithymia. None of the reviewed studies consisted of non-clinical samples, since all participants were diagnosed with some pathology. Therefore, it is unclear whether DBT principles can be used to improve alexithymia in non-clinical samples, an issue that may be resolved by further investigations.

Furthermore, it is difficult to draw any firm conclusions about the effectiveness of DBT in improving alexithymia as there was high variability in the interventions delivered. Five studies in this review delivered purely DBT interventions, with within-group effect sizes ranging from trivial to medium. The between-group effect sizes of these studies ranged from trivial to large, indicating highly variable results when purely DBT treatment is compared with control conditions. The three studies with interventions merely based on DBT principles had within-group effect sizes ranging from medium to large, with the only one of these studies having a control condition presenting a large effect size. These results may suggest that interventions merely based on DBT, which also implement principles of other treatments (such as ACT, CBT, and ERGT), are more effective in treating alexithymia than those purely DBT. However, the high variability of effect sizes and samples (in terms of age and diagnosis) makes it difficult to establish a firm judgment about which type of intervention is most promising for alexithymia. Understanding the critical components of DBT skills training (e.g. conducting studies with replicable interventions) is critical to developing a consensus in the literature on the ideal and critical principles of DBT to achieve significant improvement in alexithymia. It is possible that the mindfulness and emotion regulation components of DBT could be useful for alexithymics to get in touch with their emotions and associated physical sensations, as well as identify, describe, and regulate their feelings. DBT also includes an interpersonal effectiveness module, which may help highly alexithymic individuals overcome some of their difficulties in dealing with other people. However, the usual discomfort of alexithymics with social interactions may decrease their adherence to training groups

(Panayiotou et al., 2020), thus limiting the success of group-based DBT interventions. Exploring which aspects of alexithymia are linked to negative treatment outcomes, including worse prognosis and low treatment adherence, may be important in tailoring interventions to specific patient groups. In addition, future research should focus on investigating which components of DBT are especially effective in improving alexithymia difficulties (as well as related constructs, such as interoception and emotion regulation), and which aspects of the intervention may challenge the permanence of alexithymic patients in treatment (e.g. group meetings).

In the current systematic review, most studies had a single-group design, which may overinflate the relative effectiveness of the DBT intervention. In addition, among studies with comparison groups, the control condition was often not described in detail. For example, one study (Lagrotteria et al., 2019) used supportive psychotherapy and non-specific skills grouping, making it unclear whether these procedures are covered by DBT modules or not. Therefore, evidence for between-group effects of the DBT for alexithymia should be viewed with caution as it is based on a limited number of studies. Future research aimed at improving alexithymia should conduct randomized controlled trials comparing the effectiveness of DBT interventions compared to other more detailed standardized treatments. From the studies reviewed, it is uncertain how much participants were engaged in the intervention, to understand a possible moderating effect in improving difficulties related to alexithymia. The effectiveness of DBT may be underestimated in the current review simply because alexithymic individuals did not commit to participating in sessions or practicing skills outside the session. Additionally, more research is needed with longer follow-up of results, as only two of the studies in the current review reported follow-up outcomes. Given the complex and relatively stable nature of alexithymia, more research is needed to understand how improvement in alexithymia-related difficulties develops over time after DBT treatment.

Limitations

A meta-analysis was not considered appropriate for this review due to the limited number of studies (mainly randomized controlled trials) and observed heterogeneity in the DBT interventions delivered. To increase the quality of the studies included in the review, the current systematic review is limited to articles published in the literature in peer-reviewed journals, thus excluding dissertations, theses, and book chapters. Therefore, there may have been more studies eligible for inclusion that were not considered.

The current review was limited to self-report measures. With the exception of one, all other studies reviewed used TAS-20 to assess alexithymia. The TAS-20 is the most widely used measure of alexithymia, although this tool has some noteworthy limitations. One of these limitations is an inherent bias for any self-report measure of alexithymia. Highly alexithymic people may not be able to assess their own deficits reliably or accurately on a self-report scale (Taylor & Bagby, 2013). To address this potential shortcoming, some authors suggest the application of clinician-rated instruments such as the Toronto Structured Interview for Alexithymia (Bagby et al., 2006). However, these instruments have their own limitations, such as costly conduction in large samples, training of interviewers, high dependence on the quality of the interviewer-patient interaction, etc. (Cameron et al., 2014).

The TAS-20 has also been criticized for exclusively measuring cognitive factors, thus underestimating emotional aspects of alexithymia (Vorst & Bermond, 2001). The BVAQ-40 is an alternative instrument to the TAS-20, typically used by researchers interested in assessing both cognitive and affective components of alexithymia (Goerlich & Aleman, 2018). However, the very claim of an affective component of alexithymia is still a matter of debate among scholars on the subject (Bagby et al., 2007; Goerlich, 2018; Preece et al., 2017). In addition, the validity of the alexithymia construct can be better clarified. Is alexithymia basically the result of a general failure of interoception? What exactly is the link between alexithymia and emotion regulation in affective disorders? Some efforts have been made to understand the relationship and differences between alexithymia and related concepts (Brewer et al., 2016; Murphy et al., 2018; Preece et al., 2022). Future work may explore whether potential reductions in alexithymia after treatments are accompanied by improvements in other overlapping constructs.

Finally, the specificity of the TAS-20 has been challenged by psychiatric comorbidities (e.g. depression) that can interfere with outcomes, as negative affects linked to a critical appraisal of one's own abilities, which can lead to high self-reported alexithymia (de Groot et al., 1995; Subic-Wrana et al., 2005). Using negative affects as covariates in research may allow for a better understanding of changes in alexithymia over the course of treatments. However, only two studies in the current review analyzed covariates that could be confounding due to their links with alexithymia (McMain et al., 2013; Reilly et al., 2022). Future studies may perform analyzes controlling for relevant covariates (e.g. symptoms of depression and anxiety) to rule out the hypothesis that improvements in alexithymia were not solely due to a decrease in overall negative affect.

Conclusion

The current systematic review evaluated the empirical literature on the effectiveness of DBT interventions in reducing alexithymia. Although our results indicate that DBT-based interventions do improve alexithymia, the literature is currently inconclusive as to the effectiveness of DBT for alexithymia relative to other existing psychological treatments. While there is some promise, to draw conclusions about the effects of DBT interventions on alexithymia, future studies should: (a) target larger samples to achieve potentially statistically significant results; (b) investigate improvements in alexithymia in non-clinical samples; (c) explore which DBT components are most effective in alleviating alexithymia difficulties, and which are detrimental to treatment adherence in alexithymic individuals; (d) understand which alexithymia traits may interfere with the success of DBT and treatments in general; (e) identify whether reductions in alexithymia after interventions are accompanied by improvements in other overlapping constructs; (f) conduct randomized controlled trials to compare the effectiveness for alexithymia of DBT interventions compared to other standardized treatments; (g) perform follow-up explorations to understand how improvements in alexithymia develop over time after DBT treatment; and (h) perform analyzes to control for confounding covariates of alexithymia (e.g. negative affects).

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References

- Bach, M., & Bach, D. (1995). Predictive value of alexithymia: A prospective study in somatizing patients. *Psychotherapy and Psychosomatics*, 64(1), 43–48. <https://doi.org/10.1159/000288989>
- Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia scale—i. item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, 38(1), 23–32. [https://doi.org/10.1016/0022-3999\(94\)90005-1](https://doi.org/10.1016/0022-3999(94)90005-1)
- Bagby, R. M., Taylor, G. J., Parker, J. D. A., & Dickens, S. E. (2006). The development of the Toronto Structured Interview for Alexithymia: Item selection, factor structure, reliability and concurrent validity. *Psychotherapy and Psychosomatics*, 75(1), 25–39. <https://doi.org/10.1159/000089224>
- Bagby, R. M., Taylor, G. J., Quilty, L. C., & Parker, J. D. A. (2007). Reexamining the factor structure of the 20-item Toronto Alexithymia scale: Commentary on Gignac, Palmer, and Stough. *Journal of Personality Assessment*, 89(3), 258–264. <https://doi.org/10.1080/00223890701629771>
- Balestrieri, M., Isola, M., Baiano, M., & Ciano, R. (2013). Psychoeducation in binge eating disorder and EDNOS: A pilot study on the efficacy of a 10-week and a 1-year continuation treatment. *Eating and Weight Disorders*, 18(1), 45–51. <https://doi.org/10.1007/s40519-013-0014-2>
- Bedics, J. (2020). *The handbook of dialectical behavior therapy: Theory, research, and evaluation*. Academic Press.
- Bemmouna, D., Coutelle, R., Weibel, S., & Weiner, L. (2021). Feasibility, acceptability and preliminary efficacy of dialectical behavior therapy for autistic adults without intellectual disability: A mixed methods study. *Journal of Autism and Developmental Disorders*, 1–18. <https://doi.org/10.1007/s10803-021-05317-w>
- Berardis, D., Campanella, D., Nicola, S., Gianna, S., Alessandro, C., Chiara, C., Valchera, A., Marilde, C., Salerno, R., & Ferro, F. (2008). The impact of alexithymia on anxiety disorders: A review of the literature. *Current Psychiatry Reviews*, 4(2), 80–86. <https://doi.org/10.2174/157340008784529287>
- Berkovskaya, M. A., Tarasenko, A. A., Fadeev, V. V., & Gurova, O. Y. (2020). Alexithymia and its relation with eating disorders and obesity. *Problemy Endokrinologii*, 66(2), 42–48. <https://doi.org/10.14341/PROBL12416>
- Berthoz, S., & Hill, E. L. (2005). The validity of using self-reports to assess emotion regulation abilities in adults with autism spectrum disorder. *European Psychiatry*, 20(3), 291–298. <https://doi.org/10.1016/J.EURPSY.2004.06.013>
- Bianchini, V., Cofini, V., Curto, M., Lagrotteria, B., Manzi, A., Navari, S., Ortenzi, R., Paoletti, G., Pompili, E., Pompili, P. M., Silvestrini, C., & Nicolò, G. (2019). Dialectical behaviour therapy

- (DBT) for forensic psychiatric patients: An Italian pilot study. *Criminal Behaviour and Mental Health*, 29(2), 122–130. <https://doi.org/10.1002/cbm.2102>
- Bird, G., & Cook, R. (2013). Mixed emotions: The contribution of alexithymia to the emotional symptoms of autism. *Translational Psychiatry*, 3(7), e285. <https://doi.org/10.1038/tp.2013.61>
- Brewer, R., Cook, R., & Bird, G. (2016). Alexithymia: A general deficit of interoception. *Royal Society Open Science*, 3(10). <https://doi.org/10.1098/rsos.150664>
- Brown, T. A., Avery, J. C., Jones, M. D., Anderson, L. K., Wierenga, C. E., & Kaye, W. H. (2018). The impact of alexithymia on emotion dysregulation in anorexia nervosa and bulimia nervosa over time. *European Eating Disorders Review*, 26(2), 150–155. <https://doi.org/10.1002/erv.2574>
- Cameron, K., Ogrodniczuk, J., & Hadjipavlou, G. (2014). Changes in alexithymia following psychological intervention: A review. *Harvard Review of Psychiatry*, 22(3), 162–178. <https://doi.org/10.1097/HRP.0000000000000036>
- Chen, J., Xu, T., Jing, J., & Chan, R. C. K. (2011). Alexithymia and emotional regulation: A cluster analytical approach. *BMC Psychiatry*, 11(1), 1–6. <https://doi.org/10.1186/1471-244X-11-33/TABLES/2>
- Christensen, D. R., Dowling, N. A., Jackson, A. C., Brown, M., Russo, J., Francis, K. L., & Umemoto, A. (2013). A proof of concept for using brief dialectical behavior therapy as a treatment for problem gambling. *Behaviour Change*, 30(2), 117–137. <https://doi.org/10.1017/BEC.2013.10>
- Cloitre, M., Koenen, K. C., Cohen, L. R., & Han, H. (2002). Skills training in affective and interpersonal regulation followed by exposure: A phase-based treatment for PTSD related to childhood abuse. *Journal of Consulting and Clinical Psychology*, 70(5), 1067. <https://doi.org/10.1037/0022-006X.70.5.1067>
- Cook, R., Brewer, R., Shah, P., & Bird, G. (2013). Alexithymia, not autism, predicts poor recognition of emotional facial expressions. *Psychological Science*, 24(5), 723–732. <https://doi.org/10.1177/0956797612463582>
- Cuve, H. C., Castiello, S., Shiferaw, B., Ichijo, E., Catmur, C., & Bird, G. (2021). Alexithymia explains atypical spatiotemporal dynamics of eye gaze in autism. *Cognition*, 212(April). <https://doi.org/10.1016/j.cognition.2021.104710>
- de Groot, J. M., Rodin, G., & Olmsted, M. P. (1995). Alexithymia, depression, and treatment outcome in bulimia nervosa. *Comprehensive Psychiatry*, 36(1), 53–60. [https://doi.org/10.1016/0010-440X\(95\)90099-H](https://doi.org/10.1016/0010-440X(95)90099-H)
- Dimeff, L. A., & Linehan, M. M. (2008). Dialectical behavior therapy for substance abusers. *Addiction Science & Clinical Practice*, 4(2), 39. <https://doi.org/10.1151/ASCP084239>
- Fink, E. L., Anestis, M. D., Selby, E. A., & Joiner, T. E. (2010). Negative urgency fully mediates the relationship between alexithymia and dysregulated behaviours. *Personality and Mental Health*, 4(4), 284–293. <https://doi.org/10.1002/pmh.138>
- Frye, L. A., & Spates, C. R. (2012). Prolonged exposure, mindfulness, and emotion regulation for the treatment of PTSD. *Clinical Case Studies*, 11(3), 184–200. <https://doi.org/10.1177/1534650112446850>
- Gerber, A. H., Girard, J. M., Scott, S. B., & Lerner, M. D. (2019). Alexithymia – not autism – is associated with frequency of social interactions in adults. *Behaviour Research and Therapy*, 123 (January), 103477. <https://doi.org/10.1016/j.brat.2019.103477>
- Goerlich, K. S. (2018). The multifaceted nature of alexithymia - A neuroscientific perspective. *Frontiers in Psychology*, 9(AUG), 1614. <https://doi.org/10.3389/FPSYG.2018.01614/BIBTEX>
- Goerlich, K. S., & Aleman, A. (2018). Neuroimaging studies of alexithymia. In *Alexithymia*. Cambridge University Press. <https://doi.org/10.1017/9781108241595.015>
- Greene, D., Boyes, M., & Hasking, P. (2020). The associations between alexithymia and both non-suicidal self-injury and risky drinking: A systematic review and meta-analysis. *Journal of Affective Disorders*, 260, 140–166. <https://doi.org/10.1016/j.jad.2019.08.088>

- Güleç, M. Y., Altıntaş, M., Inanç, L., Bezgin, Ç. H., Koca, E. K., & Güleç, H. (2013). Effects of childhood trauma on somatization in major depressive disorder: The role of alexithymia. *Journal of Affective Disorders*, 146(1), 137–141. <https://doi.org/10.1016/j.jad.2012.06.033>
- Hemming, L., Haddock, G., Shaw, J., & Pratt, D. (2019). Alexithymia and its associations with depression, suicidality, and aggression: An overview of the literature. *Frontiers in Psychiatry*, 10 (APR), 203. <https://doi.org/10.3389/FPSYT.2019.00203/BIBTEX>
- Herbert, B. M., Herbert, C., & Pollatos, O. (2011). On the relationship between interoceptive awareness and alexithymia: Is interoceptive awareness related to emotional awareness? *Journal of Personality*, 79(5), 1149–1175. <https://doi.org/10.1111/J.1467-6494.2011.00717.X>
- Hill, E., Berthoz, S., & Frith, U. (2004). Brief report: Cognitive processing of own emotions in individuals with autistic spectrum disorder and in their relatives. *Journal of Autism and Developmental Disorders*, 34(2), 229–235. <https://doi.org/10.1023/B:JADD.0000022613.41399.14>
- Holmqvist Larsson, K., Andersson, G., Stern, H., & Zetterqvist, M. (2020). Emotion regulation group skills training for adolescents and parents: A pilot study of an add-on treatment in a clinical setting. *Clinical Child Psychology and Psychiatry*, 25(1), 141–155. <https://doi.org/10.1177/1359104519869782>
- Holmqvist Larsson, K., Lowén, A., Hellerstedt, L., Bergcrona, L., Salerud, M., & Zetterqvist, M. (2020). Emotion regulation group skills training: A pilot study of an add-on treatment for eating disorders in a clinical setting. *Journal of Eating Disorders*, 8(1), 141–155. <https://doi.org/10.1186/s40337-020-00289-1>
- Honkalampi, K., Jokela, M., Lehto, S. M., Kivim, M., Aki, E., & Virtanen, M. (2022). Association between alexithymia and substance use: A systematic review and meta-analysis. *Scandinavian Journal of Psychology*. <https://doi.org/10.1111/SJOP.12821>
- Kahl, K. G., Winter, L., & Schweiger, U. (2012). The third wave of cognitive behavioural therapies: What is new and what is effective? *Current Opinion in Psychiatry*, 25(6), 522–528. <https://doi.org/10.1097/YCO.0b013e328358e531>
- Kennedy, M., & Franklin, J. (2002). Skills-based treatment for alexithymia: An exploratory case series. *Behaviour Change*, 19(3), 158–171. <https://doi.org/10.1375/BECH.19.3.158>
- Kliem, S., Kröger, C., & Kosfelder, J. (2010). Dialectical behavior therapy for borderline personality disorder: A meta-analysis using mixed-effects modeling. *Journal of Consulting and Clinical Psychology*, 78(6), 936–951. <https://doi.org/10.1037/A0021015>
- Kmet, L. M., Lee, R. C., & Cook, L. S. (2004). *Standard quality assessment criteria for evaluating primary research papers from a variety of fields*. HTA Initiative.
- Lagrotteria, B., Nicolò, G. A., Paoletti, G., Bianchini, V., Bilotta, E., Fedele, C., Silveri, L., Foroni, B., & Marconi, M. (2019). Impulsivity and violent behavior: The employment of dialectical behavior therapy in a forensic setting. *Rassegna Italiana Di Criminologia*, 77–84.
- Laloyaux, J., Fantini, C., Lemaire, M., Luminet, O., & Larøi, F. (2015). Evidence of contrasting patterns for suppression and reappraisal emotion regulation strategies in alexithymia. *The Journal of Nervous and Mental Disease*, 203(9), 709–717. <https://doi.org/10.1097/NMD.0000000000000353>
- Levant, R. F., Hall, R. J., Williams, C. M., & Hasan, N. T. (2009). Gender differences in alexithymia. *Psychology of Men & Masculinity*, 10(3), 190–203. <https://doi.org/10.1037/a0015652>
- Linehan, M. M. (2014). *DBT skills training manual*. Guilford Publications.
- Linn, B. K., Zhao, J., Bradizza, C. M., Lucke, J. F., Rusczyk, M. U., & Stasiewicz, P. R. (2021). Alexithymia disrupts emotion regulation processes and is associated with greater negative affect and alcohol problems. *Journal of Clinical Psychology*, 77(12), 2915–2928. <https://doi.org/10.1002/JCLP.23279>
- Löf, J., Clinton, D., Kaldö, V., & Rydén, G. (2018). Symptom, alexithymia and self-image outcomes of mentalisation-based treatment for borderline personality disorder: A naturalistic study. *BMC Psychiatry*, 18(1), 1–9. <https://doi.org/10.1186/s12888-018-1699-6>
- Lombardo, M. V., Barnes, J. L., Wheelwright, S. J., & Baron-Cohen, S. (2007). Self-referential cognition and empathy in autism. *PLoS one*, 2(9), e883. <https://doi.org/10.1371/JOURNAL.PONE.0000883>

- Longarzo, M., D'Olimpio, F., Chiavazzo, A., Santangelo, G., Trojano, L., & Grossi, D. (2015). The relationships between interoception and alexithymic trait. The self-awareness questionnaire in healthy subjects. *Frontiers in Psychology*, 6, 1149. <https://doi.org/10.3389/FPSYG.2015.01149/BIBTEX>
- Luminet, O., Bagby, R. M., & Taylor, G. J. (2018). *Alexithymia: Advances in research, theory, and clinical practice*. Cambridge University Press. <https://play.google.com/books?id=AvxsDwAAQBAJ>
- McGillivray, L., Becerra, R., & Harms, C. (2017). Prevalence and demographic correlates of alexithymia: A comparison between Australian psychiatric and community samples. *Journal of Clinical Psychology*, 73(1), 76–87. <https://doi.org/10.1002/JCLP.22314>
- McMain, S., Links, P. S., Guimond, T., Wnuk, S., Eynan, R., Bergmans, Y., & Warwar, S. (2013). An exploratory study of the relationship between changes in emotion and cognitive processes and treatment outcome in borderline personality disorder. *Psychotherapy Research*, 23(6), 658–673. <https://doi.org/10.1080/10503307.2013.838653>
- Melin, E. O., Thulesius, H. O., & Persson, B. A. (2010). Affect school for chronic benign pain patients showed improved alexithymia assessments with TAS-20. *BioPsychosocial Medicine*, 4(1), 1–10. <https://doi.org/10.1186/1751-0759-4-5/TABLES/5>
- Moher, D., Altman, D. G., Liberati, A., & Tetzlaff, J. (2011). PRISMA statement. *Epidemiology*, 22(1), 128. <https://doi.org/10.1097/EDE.0b013e3181fe7825>
- Murphy, J., Brewer, R., Hobson, H., Catmur, C., & Bird, G. (2018). Is alexithymia characterised by impaired interoception? Further evidence, the importance of control variables, and the problems with the Heartbeat Counting Task. *Biological Psychology*, 136, 189–197. <https://doi.org/10.1016/J.BIOPSYCHO.2018.05.010>
- Nemiah, J. C., & Sifneos, P. E. (1970). Psychosomatic illness: A problem in communication. *Psychotherapy and Psychosomatics*, 18(1–6), 154–160. <https://doi.org/10.1159/000286074>
- Norman, H., Marzano, L., Coulson, M., & Oskis, A. (2019). Effects of mindfulness-based interventions on alexithymia: A systematic review. *Evidence-Based Mental Health*, 22(1), 36–53. <https://doi.org/10.1136/ebmental-2018-300029>
- Ogrodniczuk, J. S., Piper, W. E., & Joyce, A. S. (2004). Residual symptoms in depressed patients who successfully respond to short-term psychotherapy. *Journal of Affective Disorders*, 82(3), 469–473. <https://doi.org/10.1016/j.jad.2004.03.007>
- Ogrodniczuk, J. S., Piper, W. E., & Joyce, A. S. (2011). Effect of alexithymia on the process and outcome of psychotherapy: A programmatic review. *Psychiatry Research*, 190(1), 43–48. <https://doi.org/10.1016/J.PSYCHRES.2010.04.026>
- Panayiotou, G., Leonidou, C., Constantinou, E., & Michaelides, M. P. (2020). Self-awareness in alexithymia and associations with social anxiety. *Current Psychology*, 39(5), 1600–1609. <https://doi.org/10.1007/s12144-018-9855-1>
- Pinna, F., Manchia, M., Paribello, P., & Carpiniello, B. (2020). The impact of alexithymia on treatment response in psychiatric disorders: A systematic review. *Frontiers in Psychiatry*, 11, 311. <https://doi.org/10.3389/fpsy.2020.00311>
- Preece, D., Becerra, R., Allan, A., Robinson, K., & Dandy, J. (2017). Establishing the theoretical components of alexithymia via factor analysis: Introduction and validation of the attention-appraisal model of alexithymia. *Personality and Individual Differences*, 119, 341–352. <https://doi.org/10.1016/J.PAID.2017.08.003>
- Preece, D. A., Mehta, A., Becerra, R., Chen, W., Allan, A., Robinson, K., Boyes, M., Hasking, P., & Gross, J. J. (2022). Why is alexithymia a risk factor for affective disorder symptoms? The role of emotion regulation. *Journal of Affective Disorders*, 296(January 2021), 337–341. <https://doi.org/10.1016/j.jad.2021.09.085>
- Reilly, E. E., Brown, T. A., Arunagiri, V., Kaye, W. H., & Wierenga, C. E. (2022). Exploring changes in alexithymia throughout intensive dialectical behavior therapy for eating disorders. *European Eating Disorders Review*, 30(3), 193–205. <https://doi.org/10.1002/erv.2887>
- Safer, D. L., Telch, C. F., & Agras, W. S. (2001). Dialectical behavior therapy for bulimia nervosa. *The American Journal of Psychiatry*, 158(4), 632–634. <https://doi.org/10.1176/APPI.AJP.158.4.632/ASSET/IMAGES/LARGE/J118T1.JPEG>

- Šago, D., Babić, G., Bajić, Ž., & Filipčić, I. (2020). Panic disorder as unthinkable emotions: Alexithymia in panic disorder, a croatian cross-sectional study. *Frontiers in Psychiatry*, 11, 466. <https://doi.org/10.3389/FPSYT.2020.00466/BIBTEX>
- Samson, A. C., Hardan, A. Y., Podell, R. W., Phillips, J. M., & Gross, J. J. (2015). Emotion regulation in children and adolescents with autism spectrum disorder. *Autism Research*, 8(1), 9–18. <https://doi.org/10.1002/AUR.1387>
- Samson, A. C., Huber, O., & Gross, J. J. (2012). Emotion regulation in Asperger's syndrome and high-functioning autism. *Emotion*, 12(4), 659–665. <https://doi.org/10.1037/A0027975>
- Shah, P., Hall, R., Catmur, C., & Bird, G. (2016). Alexithymia, not autism, is associated with impaired interoception. *Cortex*, 81, 215–220. <https://doi.org/10.1016/J.CORTEX.2016.03.021>
- Sheppes, G., Suri, G., & Gross, J. J. (2015). Emotion regulation and psychopathology. *Annual Review of Clinical Psychology*, 11(December 2014), 379–405. <https://doi.org/10.1146/annurev-clinpsy-032814-112739>
- Sifneos, P. E. (1973). The prevalence of 'alexithymic' characteristics in psychosomatic patients. *Psychotherapy and Psychosomatics*, 22(2–6), 255–262. <https://doi.org/10.1159/000286529>
- Speranza, M., Loas, G., Guilbaud, O., & Corcos, M. (2011). Are treatment options related to alexithymia in eating disorders? Results from a three-year naturalistic longitudinal study. *Biomedicine and Pharmacotherapy*, 65(8), 585–589. <https://doi.org/10.1016/j.biopha.2010.01.009>
- Subic-Wrana, C., Bruder, S., Thomas, W., Lane, R. D., & Köhle, K. (2005). Emotional awareness deficits in inpatients of a psychosomatic ward: A comparison of two different measures of alexithymia. *Psychosomatic Medicine*, 67(3), 483–489. <https://doi.org/10.1097/01.PSY.0000160461.19239.13>
- Swannell, S., Martin, G., Page, A., Hasking, P., Hazell, P., Taylor, A., & Protani, M. (2012). Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame. *Child Abuse & Neglect*, 36(7–8), 572–584. <https://doi.org/10.1016/j.chiabu.2012.05.005>
- Swart, M., Kortekaas, R., & Aleman, A. (2009). Dealing with feelings: characterization of trait alexithymia on emotion regulation strategies and cognitive-emotional processing. *PLOS ONE*, 4(6), e5751. <https://doi.org/10.1371/JOURNAL.PONE.0005751>
- Taylor, G. J., & Bagby, R. M. (2013). Psychoanalysis and empirical research: the example of alexithymia. *Journal of the American Psychoanalytic Association*, 61(1), 99–133. <https://doi.org/10.1177/0003065112474066>
- Telch, C. F., Agras, W. S., & Linehan, M. M. (2001). Dialectical behavior therapy for binge eating disorder. *Journal of Consulting and Clinical Psychology*, 69(6), 1061–1065. <https://doi.org/10.1037/0022-006X.69.6.1061>
- Trevisan, D. A., Bowering, M., & Birmingham, E. (2016). Alexithymia, but not autism spectrum disorder, may be related to the production of emotional facial expressions. *Molecular Autism*, 7(1), 46. <https://doi.org/10.1186/s13229-016-0108-6>
- Vorst, H. C. M., & Bermond, B. (2001). Validity and reliability of the Bermond–vorst alexithymia questionnaire. *Personality and Individual Differences*, 30(3), 413–434. [https://doi.org/10.1016/S0191-8869\(00\)00033-7](https://doi.org/10.1016/S0191-8869(00)00033-7)
- Wagner, H., & Lee, V. (2008). Alexithymia and individual differences in emotional expression. *Journal of Research in Personality*, 42(1), 83–95. <https://doi.org/10.1016/J.JRP.2007.04.001>

Appendix A

Table A1. Quality ratings outcome.

Study	Items of the "Checklist for assessing the quality of quantitative studies" (Kmet et al., 2004)														Hit %
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Total
Reilly et al. (2022)	2	1	2	2	0	n/a	n/a	2	2	2	2	2	1	2	20/24
Bemmouna et al. (2021)	2	1	2	2	0	n/a	n/a	0	0	2	2	0	2	2	15/24
Holmqvist Larsson, Lowén et al. (2020)	2	1	2	2	0	n/a	n/a	2	1	2	2	0	2	2	18/24
Holmqvist Larsson et al. (2020)	2	1	2	2	0	n/a	n/a	2	1	2	2	0	2	2	18/24
Lagrotteria et al. (2019)	2	2	2	0	0	n/a	n/a	2	1	1	2	0	2	1	15/24
Bianchini et al. (2019)	2	2	2	1	1	n/a	n/a	2	1	0	2	0	1	2	16/24
McMain et al. (2013)	2	1	2	2	0	n/a	n/a	2	2	2	2	2	1	2	20/24
Cloitre et al. (2002)	1	2	2	2	1	n/a	n/a	2	1	2	2	0	2	2	19/24

Good quality was defined as percentages $\geq 75\%$; fair quality was defined as percentages of at least 55%; poor quality was defined as those with scores below 55%. Q1: Question or objective sufficiently described?; Q2: Design evident and appropriate to answer study question?; Q3: Method of subject selection (and comparison group selection, if applicable) or source of information/input variables (e.g. for decision analysis) is described and appropriate; Q4: Subject (and comparison group, if applicable) characteristics or input variables/information (e.g. for decision analyses) sufficiently described?; Q5: If random allocation to treatment group was possible, is it described?; Q6: If interventional and blinding of investigators to intervention was possible, is it reported?; Q7: If interventional and blinding of subjects to intervention was possible, is it reported?; Q8: Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?; Q9: Sample size appropriate?; Q10: Analysis described and appropriate?; Q11: Some estimate of variance (e.g. confidence intervals, standard errors) is reported for the main results/outcomes (i.e. those directly addressing the study question/objective upon which the conclusions are based)?; Q12: Controlled for confounding?; Q13: Results reported in sufficient detail?; Q14: Do the results support the conclusions?.