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REVIEW ARTICLE

A systematic review of interventions aimed at improving emotional regulation in children, adolescents, and adults

Deborah Lancastle [a], Nyle H. Davies [a,*], Shelley Gait [a], Andrea Gray [b], Bev John [a], Alexis Jones [a], Taf Kunorubwe [a], Josh Molina [a], Gareth Roderique-Davies [a], Philip Tyson [a]

[a] *Faculty of Life Science and Education, University of South Wales, Treforest Campus, Pontypridd CF37 1DL, Wales, United Kingdom*
[b] *Mental Health Development Lead for Wales, Improvement Cymru, Quality, Safety and Improvement, NHS Wales Executive, Number 2 Capital Quarter, Tyndall Street, Cardiff CF10 4BZ, Wales, United Kingdom*

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Emotion regulation;
Systematic Review;
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Abstract
There are a wide range of interventions designed to target emotional regulation, but there has yet to be a holistic examination of their comparable effectiveness. The aim of this review was to map the landscape of interventions targeting emotional regulation difficulties and identify their effectiveness and the methodologies employed. Controlled studies examining the impact of interventions targeting emotion regulation in children and adults were included in the review. This review demonstrated that there was considerable heterogeneity in the conceptualisation of emotional regulation, the characteristics and mental health problems of the participants, the measures used, and the duration of follow-up assessment (where one was reported). In addition, the emotional regulation interventions used in the studies were adapted in many cases. Together, this heterogeneity makes it difficult to draw firm conclusions about the specific circumstances where emotional regulation interventions will be more effective than alternatives and precluded a meta-analysis of the included papers. Clinicians and researchers should examine the relevant literature closely when selecting interventions and measures for research

* Corresponding author.
E-mail addresses: deborah.lancastle@southwales.ac.uk (D. Lancastle), nyle.davies@southwales.ac.uk (N.H. Davies), Andrea.Gray@wales.nhs.uk (A. Gray), bev.john@southwales.ac.uk (B. John), alexis.jones@southwales.ac.uk (A. Jones), info@mindfulnessinreading.co.uk (T. Kunorubwe), josh.molina@southwales.ac.uk (J. Molina), gareth.rdavies@southwales.ac.uk (G. Roderique-Davies), philip.tyson@southwales.ac.uk (P. Tyson).

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and practice to ensure that these are appropriate for the aims and intended outcomes of their work.

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Introduction

Emotional dysregulation involves difficulties in the following: ''a) awareness and understanding of emotions; (b) acceptance of emotions; (c) the ability to engage in goal-directed behavior, and refrain from impulsive behavior, when experiencing negative emotions; and (d) access to emotion regulation strategies perceived as effective" (Gratz & Roemer, 2004, p.43). Such difficulties are associated with and underpin numerous mental health difficulties. Persistent problems with regulating emotions are, therefore, a transdiagnostic problem and are likely to be frequently presented to practitioners by adults and by children and young people (CYP) seeking help from mental health services. Moreover, emotional dysregulation is likely to impact an individual's ability to engage with psychosocial interventions that aim to improve their well-being (Berking et al., 2008, 2013; Van Rheenen & Rossell, 2014). Beyond the therapeutic context, emotional dysregulation impacts on social, interpersonal, and occupational functioning, especially where emotional difficulties affect interactions with others (e.g., Shuman, 2013). Moreover, emotional dysregulation has been shown to a be transdiagnostic construct which is present in clinical disorders such as bipolar disorder and is significantly correlated with its symptomology (Oliva et al., 2023). Despite the obvious impact of emotional dysregulation on well-being, however, there are no authoritative guidelines about which interventions should be made available to those with emotional regulation difficulties based on the evidence for their effectiveness.

The provision of psychological interventions in Wales is guided by Matrics Cymru and Matrics Plant, national standards for service delivery and are supported by Evidence tables which were first published in 2017. The aim of the Evidence tables is to provide evidence-based guidelines about the effectiveness of psychological interventions for a range of mental and physical health problems. However, there was no clear evidence base to add to these evidence tables about the 'which, why, how much, when and for whom' of emotional regulation interventions. Such information would have a key role in assisting clinicians in selecting and providing the most appropriate evidence-based care for people

seeking help for problems linked to emotional dysregulation. There is therefore a clear need to supplement current best practice guidelines, with evidence relating to these interventions. As such the aims of this review were threefold (1) To map the landscape of interventions targeting emotional regulation difficulties and discuss their various features and approaches, (2) to identify effective interventions to address emotional dysregulation and the most beneficial approaches across age categories (children, adolescents, and adults), and (3) to synthesise the collected information to formulate a clear set of recommendations regarding best practice for addressing emotional regulation difficulties.

Methods

The systematic review protocol was developed by the study team and registered with the National Institute for Health Research database ''Prospero". 2023 CRD42023393847, registered in January 2023. This review adhered to the Prisma guidelines (Page et al., 2020) for the reporting of systematic reviews.

Eligibility criteria

Due to the limited nature of the literature surrounding emotional regulation interventions, no limitation was enforced regarding study design, other than that the design must include some level of randomised control. Additionally, studies had to meet the following criteria to be eligible for inclusion: The study must include baseline measures and some follow-up measures to track the impact of the intervention/therapy/training. Papers must be available in English so that every research team member can review each included paper. Papers must have undergone peer review. Studies must have used a valid and reliable measure to track the outcomes relating to emotion regulation. The study must provide a clear and complete overview of the intervention/therapy/training and its components and identify its theoretical underpinnings. The intervention/therapy/training must be delivered by a trained professional. The sample must contain adults, adolescents, or children with emotional regulation difficulties. Observational measures were considered in the form of clinician ratings or other such metrics if the assessment method was clearly outlined in full and deemed valid.

Information sources and search strategy

The following databases were used to collect relevant papers: MEDLINE, CINAHL Plus, Embase, ProQuest Psychology Database, PsycArticles and PsycINFO. The databases were searched using predefined terms for emotional regulation treatments and interventions. Terms for Intervention types (such as but not limited to Dialectic behavioural therapy (DBT), cognitive behavioural therapy (CBT), and emotional coaching) and delivery methods (for example, intervention, treatment, and skills training) were combined with the term emotional regulation, using the Boolean operator ''AND". In addition, due to the ubiquity of some search terms (emotional regulation, intervention, skills training), an additional parameter was placed on the searches, that being that the search only returns papers that include the search terms in either its title or abstract. The searches were completed on 10/01/23.

Selection

Retrieved papers were uploaded to the screening program Rayyan which allowed multiple reviews to screen the suitability of each record independently. There were eight reviewers (DL, PT, ND, AJ, BJ, SG, JM GR-D) and each record was screened by two reviewers independently. An inclusion checklist was developed to standardise the screening process and guide the reviewers in assessing the records. In instances of disagreement, the principal reviewers discussed the record until agreement was achieved. If agreement could not be reached, the research team met and discussed the paper's suitability. This involved examining the papers in line with the review inclusion checklist. The team would systematically discuss each criterion and the degree to which the contested paper did or did not meet them. This was done until there was a consensus regarding the status of the contested paper.

Data collection & data items

An extraction form, which was a modified version of the Cochrane tool (Li et al., 2023) guided data extraction. The tool was piloted to allow for refinement and modification before beginning data extraction. The form collected information across the following domains: (1) general information (e.g., author, study type, participants and follow up procedure. (2) Aims and methodology (e.g. intervention, recruitment and group allocation, inclusion/exclusion criteria and statistical methods), (3) Outcome measures (e.g. validity and reliability, rational for selection and intervals of measurement) and (4) results and findings. Each record was extracted by one reviewer and second-reviewed by another to ensure accuracy. Disagreements were resolved as outlined above for the title and abstract screening.

Quality assessment

The NIH quality assessment tool for controlled studies (NIH 2021) was used to examine the risk of bias and the quality of the records. These tools are a widely used and flexible method of assessing quality across various studies. The tool rates a range of domains, including randomisation and blinding, participant characteristics, and exclusion, drop-out and treatment adherence, outcome measures, prespecified outcomes, Intention-to-treat, and treatment consultation. We also examined papers for reporting of factors relating to ethnicity, and whether patients were consulted about their views of the intervention they had received. Each record was independently screened by one reviewer then another reviewer second reviewed the ratings to ensure accuracy, with disagreements being resolved the same way as previously described.

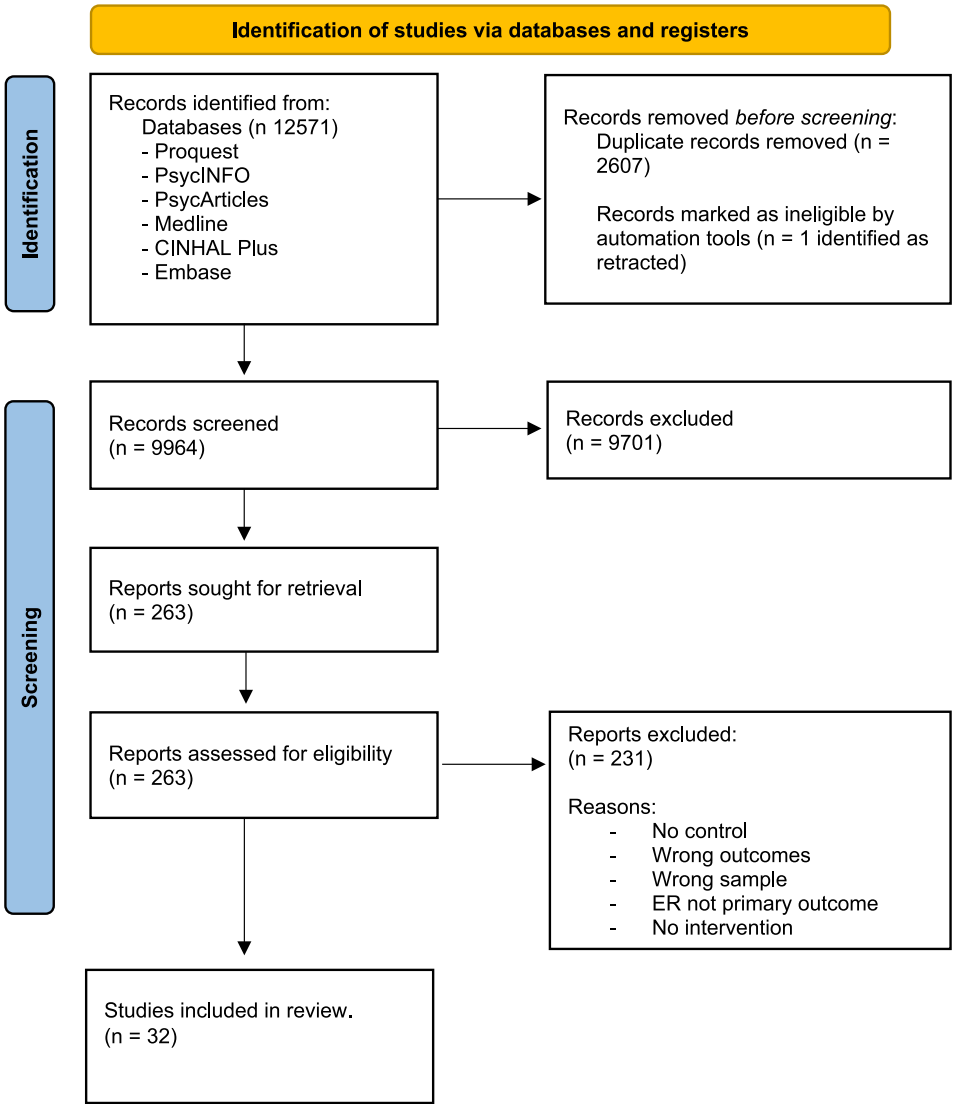

Fig. 1 PRISMA flow diagram.

Results

Methodologies

This review included 32 papers (see Fig. 1) focused on approaches to addressing aspects of emotional regulation difficulties, using controlled trial methodologies. A range of designs were used, including randomised control trials (n = 22), pilot randomised control trials (n = 5), Cluster randomised control trials (n = 2), and non-randomised control trials (n = 2). One study used an RCT approach, but the follow-ups were not controlled (see Table 1 for details of included studies).

Participants

The included studies involved 3,942 participants (see Table 1). Twenty-five studies used adult samples with a total sample size of 3,126, and seven involved children or young people (846 participants in total). One study included children and their parents (N = 98). The total sample included 69.2% female participants (N = 2731). The majority of the studies originated from the USA (N = 14), followed by Canada (N = 5), Germany (N = 3), Iran (N = 2), the Republic of Ireland (N = 3), Sweden (2) and one for each of the following countries, Mexico, Taiwan and Norway.

The mental health and behavioural conditions represented in the included studies are disparate (see Table 1). Eight studies with adult participants involved participants diagnosed with borderline personality disorder (N = 453), and three included participants with post-traumatic stress disorder (PTSD) (N = 188). Eleven studies included a sample with anxiety or depression (N = 1340), and the participants in four studies had more than one mental health problem (N = 679). Two studies drew on participants with eating disorders (n = 99), and another two used participants with foetal alcohol syndrome (30). Additionally, two studies identified their sample as either being autistic or having behavioural issues. Several issues were represented by a single study only, and this included those with medically unexplained symptoms (n = 255), suicide risk (n = 93) and perpetrators of partner violence (n = 101).

Table 1 Study characteristics.

Author and date	Aims	Design	Population	Intervention	Comparator/control	Follow-up	Research setting	Outcomes	Findings
Afshari et al., 2020 (Iran)*	To examine the effects of DBT skills-based psychoeducation on executive functions, emotion regulation, and mindfulness in borderline personality disorder (BPD)	Randomised controlled trial	60 adults with BPD Treatment: mean age = 36, SD=6/53% female Control: mean age = 37, SD=6/ 60% female	Dialectic behavioural therapy (DBT)	Waitlist control	3-month	Hospital (In-patient)	Young Mania Rating Scale (YMRS). Beck Depression Inventory (BDI-II). Five Facet Mindfulness Questionnaire (FFMQ). Tower of London Task (TOL). Wisconsin Card Sorting Task (WCST). Difficulties in Emotion Regulation Scale (DERS).	DBT group post- treatment showed lower mania, depression, and emotion dysregulation. Additionally, the DBT group showed higher scores in mindfulness, problem solving and cognitive flexibility.
Agako et al., 2021 (USA)	To examine the level of emotion dysregulation, in women with perinatal anxiety and to establish (1) if baseline emotional dysregulation moderated treatment outcomes, (2) if CBT is effective in reducing emotion dysregulation in women with perinatal anxiety, (3) whether changes in emotion dysregulation during CBT are reliable and clinically meaningful.	Randomised controlled trial	120 pregnant and post-partum women with anxiety disorder.	Cognitive behavioural therapy (CBT)1	–	3-month	Health care clinic	Difficulties in Emotion Regulation Scale (DERS). The Emotion Regulation Questionnaire (ERQ).	Baseline rates of emotional dysregulation (ED) did not moderate treatment outcomes. CBT was shown to have a significant impact on some ED subscales. Those with high baseline ED remained high post-treatment.
Berking et al., 2008 (Germany)	To examine which emotion regulation skills are associated with good mental health, associated with treatment outcomes and whether CBT-based treatments are improved by incorporating a non-disorder specific intervention that specifically targets emotion regulation skills.	Controlled trial	289 inpatients with a variety of mental health disorders. 246 non-clinical controls	Only the clinical sample received an intervention: Cognitive behaviour therapy Treatment As Usual (CBT-TAU)1 CBT-TAU+Integrative Training of Emotional Competencies (ITEC)	CBT – TAU	–	Hospital (In-patient)	Emotion regulations skills questionnaire (ERSQ).	Only the clinical sample were included in this analysis: There was a significant effect of time on emotional regulation groups, with both the CBT-TAU and CBT-ITEC groups improving in emotional regulation over time. A significant interaction indicated that improvements in emotional regulation were greater for the CBT-ITEC group than the CBT-TAU group. Acceptance, tolerance and active modification of negative emotions were identified as important to treatment outcomes.
Berking et al., 2013 (Germany)	To test whether integrating systematic emotion regulation training (ERT) enhances the efficacy of routine inpatient cognitive behavioural therapy (CBT) for MDD.	Randomised controlled trial	432 inpatients meeting the criteria for major depressive disorder.	Cognitive behaviour therapy enriched with intense emotion regulation skills training (CBT-RRT)1 Routine cognitive behaviour therapy (CBT)1	CBT – TAU	–	Hospital (In-patient)	Emotion Regulation Skills Questionnaire (ERSQ). Beck Depression inventory (BDI). HEALTH-49 (wellbeing sub-scale). Positive and negative affect scales (PANAS).	The CBT-ERT group showed significantly greater reduction in depression rates. Additionally, the CBT-ERT group showed improvements in emotion regulation skills.
Brennan et al., 2020 (Canada)	To examine the use of Yoga in eating disorder treatment and its impact on self-compassion, self-criticism and emotion regulation.	Randomised controlled trial	53 women with symptoms of bulimia nervosa and binge eating disorder.	8-week yoga program 9	Waitlist control	1-month	Community	Difficulties in emotion regulation scale (DERS). Eating disorder diagnostic scale (EDDS). Eating disorder examination questionnaire (EDE-Q). The forms of self-criticizing/ attacking and self-reassuring scale (FSCRS). Self-compassion scale –short form (SCS-SF). Toronto mindfulness scale (TMS). Attitudes toward seeking professional psychological help– short form (ATSPPH-SF).	The study found tentative evidence to highlight the possible benefits of yoga with participants showing an improvement in binge eating frequency, emotional regulation and self-criticism.

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Table 1 (*continued*)

Author and date	Aims	Design	Population	Intervention	Comparator/control	Follow-up	Research setting	Outcomes	Findings
Cloitre et al., 2002 (USA)	To examine the effects of a treatment developed to specifically address the three core problems of the child abuse population: PTSD symptoms, emotion regulation problems, and interpersonal difficulties.	Randomised controlled trial	58 women with post-traumatic stress disorder (PTSD)	Skills training in affect and interpersonal regulation (STAIR) + prolonged exposure.	Minimal attention waitlist control	9-month	–	General Expectancy for Negative Mood Regulation Scale (NMR). State–Trait Anger Expression Inventory. The Toronto Alexithymia Scale (TAS–20). Dissociation Scale (DISS). Beck depression inventory (BDI).	Participants in the treatment group showed significant improvements in interpersonal skills, regulation problems and PTSD symptoms.
Cloitre et al., 2010 (USA)	To evaluate the benefits and risks of a treatment combining an initial preparatory phase of skills training in affect and interpersonal regulation (STAIR) followed by exposure by comparing it against two control conditions: Supportive Counselling followed by Exposure (Support/ Exposure) and skills training followed by Supportive Counselling (STAIR/ Support).	Randomised controlled trial	104 women with post-traumatic stress disorder (PTSD) related to childhood abuse.	Skills training in affect and interpersonal regulation (STAIR) + exposure therapy.3 Supportive counselling + exposure (support/exposure) Skills training followed by supportive counselling (STAIR/ Support)	Supportive counselling followed by exposure & Skills training followed by supportive counselling	6-month	–	Structured Clinical Interview for DSM–IV Axis I Disorders (SCID-I). Structured Clinical Interview for DSM–III–R Personality Disorders (SCID–II). The Clinician-Administered PTSD Scale. The General Expectancy for Negative Mood Regulation Scale (NMR). Beck depression inventory (BDI). The State-Trait Anxiety Inventory-S. The State-Trait Anger Expression Inventory. Interpersonal Support Evaluation List.	The STAIR/exposure group was the most likely to achieve sustained and full PTSD remission.
Dixon-Gordon et al., 2015 (USA)	To examine the effects of dialectical behaviour therapy (DBT) emotion regulation (ER) skills training for borderline personality disorder (BPD)	Pilot randomised controlled trial	19 women (mean age = 34.4, SD=11.8) with borderline personality disorder (BPD)	Dialectic behaviour therapy + emotion regulation skills training (DBT-ER)2 Dialectic behaviour therapy + interpersonal skills training (DBT-IE)	Interpersonal and psych-education	7-week	–	Difficulties in Emotion Regulation Scale (DERS). Computerized Mirror Tracing persistence task (MTPT-C). The social problem-solving inventory-revised (SPSI-R). Distress tolerance scale (DTS). Five facet mindfulness questionnaire (FFMQ). Borderline personality symptoms (PAI-BOR). Beck depression inventory (BDI). State-trait anger expression inventory-2 (STAXI-2). Deliberate self-harm inventory (DSHI).	DBT-ER was associated with the greatest improvements in emotion regulation, social problem solving and depression.
Enrique et al., 2021 (Ireland)	To establish whether emotion regulation skills and positive beliefs about rumination were affected by iCBT and if these constructs mediated changes in depression and anxiety	Randomised controlled trial	358 adults with depression and anxiety	Internet-delivered cognitive behavioural therapy (iCBT)	Waitlist control	–	Online intervention	Positive Beliefs About Rumination Scale-Adapted Version (PBRS-A). Emotion Regulation Questionnaire (ERQ).	The treatment condition showed reduction of depression, anxiety, and improvement across a range of emotional regulation skills.
Feurer et al., 2021 (USA)	To examine the effectiveness of CBT or SSRI at improving emotion regulation in a transdiagnostic sample.	Randomised controlled trial	91 adults with anxiety, depression and/or posttraumatic stress disorder	Cognitive behavioural therapy (CBT)	Selective serotonin reuptake inhibitors (SSRIs)	–	–	The Hamilton Anxiety Rating Scale (HAMA). Hamilton Depression Rating Scale (HADA). The Emotion Regulation Questionnaire (ERQ). Penn State Worry Questionnaire (PSWQ). Ruminative Response Scale (RRS).	Both treatments improved symptoms, emotion regulation strategies and reduced rates of repetitive negative thinking (RNT). However, those who received CBT showed the greatest rates of improvement overall.
Gibson et al., 2014 (Ireland)	To examine whether the addition of DBT-informed skills training to TAU was associated with any improved outcomes for individuals presenting with Deliberate Self Harm (DSH), as compared to TAU only.	Non-randomised clinical trial	82 adults presenting with BPD or DSH (LTD+TAU: Mean age = 38, SD=10.2/78.6% female TAU: Mean age = 31.5, SD=11.2/ 57.1% female)	Living through distress programme (LTD), a DBT-informed skills training.2	TAU	3-month	Hospital (In-patient)	The Difficulties in Emotion Regulation Scale (DERS). The Cognitive Emotion Regulation Questionnaire, Short Form (CERQ short). The 'Deliberate Self-Harm Inventory' (DSI).	LTD was associated with a greater reduction in DSH and improvements in emotion regulation.

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Table 1 (*continued*)

Author and date	Aims	Design	Population	Intervention	Comparator/control	Follow-up	Research setting	Outcomes	Findings
González-Robles et al., 2020 (Ireland)	To test the effectiveness of a transdiagnostic internet-delivered protocol for emotional regulation compared to treatment as usual in specialised mental health care.	Randomised controlled trial	214 Adults attending specialised mental health care services seeking psychological and psychiatric treatment.	Emotion Regulation, an internet delivered intervention, based on the unified protocol for the transdiagnostic treatment for emotional disorders (UP)	TAU	3-month	Hospital (In-patient)	Beck depression inventory (BDI). Beck anxiety inventory (BAI). Behavioural inhibition scale (BIS). Quality of life EuroQoL-5D-3L (EQ-5D-3L). Penn State Worry Questionnaire (PSWQ). Panic Disorder Severity Scale, Self-Reported. Social interaction anxiety scale. Obsessive compulsive inventory-revised.	The Emotion Regulation group showed greater improvement in rates of depression, anxiety and health-related quality of life which were maintained at follow up.
Gratz et al., 2014 (USA)	To examine the efficacy of adjunct Emotion Regulation Group Therapy (ERGT) in a randomized controlled trial and the durability of treatment gains over a 9-month uncontrolled follow-up period.	Randomised controlled trial (with uncontrolled follow-up)	61 female outpatients with borderline personality disorder (BPD)	Adjunct emotion regulation group therapy (ERGT)	Waitlist control	9-month	Out-patient	The Self-Harm Inventory (SHI). The Difficulties in Emotion Regulation Scale (DERS). The Acceptance and Action Questionnaire (AAQ). Interview version of the Deliberate Self-Harm Inventory (DSHI).	ERGT had a significant effect on deliberate self-harm, self-destructive behaviours, emotion dysregulation, BPD symptoms, depression, stress symptoms and quality of life.
Houck, Barker, et al., 2016; Houck, Hadley, et al., 2016 (USA)	To examine the immediate impact of the ER intervention relative to an active comparison intervention, Health Promotion (HP), on reducing early adolescents' engagement in sexual intercourse.	Clustered randomised controlled trial	420 adolescents with emotional and behavioural issues. (Mean age = 12.9, SD=.55/53% male)	Emotion regulation intervention (ER) Health Promotion intervention (HP)	–	–	Public school	Emotion Regulation Behaviors Scale (ERBS). Self-Efficacy Questionnaire for Children- Emotional Self-Efficacy subscale (SEQC-ESE). Emotion Regulation Checklist (ERC)	Those who received ER were less likely to be sexually active and engage in other risky behaviours such as fighting. Additionally, those in the ER group showed greater use of emotion regulation strategies.
Jain et al., 2020 (USA)	To assess the efficacy of a five-session STAIR intervention among veterans in primary care.	Randomised controlled trial	26 veterans with post-traumatic stress disorder. (Mean age = 55.2, SD=14.2/84.6% male)	Skills training in affective and interpersonal regulation (STAIR)3	TAU	3-month	Veteran affairs medical center	Difficulties in Emotion Regulation Scale (DERS). PTSD checklist (PCL-5). Beck depression inventory-II (BDI-II). The getting along with people, life activates, and participation in society subscales from the WHO Disability Assessment Schedule (WHODAS-2).	The STAIR group showed significant improvement on all measures, PTSD symptomology, and social functioning.
Kleinstäuber et al., 2019 (Germany)	To improve the efficacy of CBT for patients with multiple medically unexplained symptoms by complementing it with emotion regulation training.	Randomised controlled trial	254 patients with medically unexplained symptoms (MUS) (Mean age = 43.3, SD=12.9/64% female)	Cognitive behavioural therapy Cognitive behavioural therapy complimented with emotion regulation training (ENCERT)	CBT-SOMA	6-month	Mental health outpatient clinics	The somatisation severity index of the screening of somatoform disorders-7 T (SOMS-7 T). Emotion Regulation Skills Questionnaire (ERSQ). EuroQoL-5D (EQ-5D). Short health anxiety inventory (mSHAI). Pain coping questionnaire (mPCQ). Global severity index (GSI). Symptom checklist-90-revised (SCL-90-R).	CBT and ENCERT both had a positive effect on a range of MUS related factors. The added emotion regulation training did not lead to significantly improved outcomes for those with MUS
Lindqvist et al., 2020 (Sweden)	To examine whether affect-focused internet-based psychodynamic therapy (IPDT) with therapist support is more effective than an internet-based supportive control condition on reducing depression in adolescents.	Randomised controlled trial	76 adolescents fulfilling the criteria for major depression.	Affect-focused internet-based psychodynamic therapy (IPDT)	Supportive control	6-month	Online intervention	Difficulties in Emotion Regulation Scale (DERS). Columbia-suicide severity rating scale (C-SSRS). QIDS-A17-SR. Generalized anxiety disorder 7-item (GAD-7). Montgomery Asberg depression rating scale-self report (MADRS-S). Self-compassion scale short form.	IPDT significantly reduced depression, anxiety and significantly increased both emotion regulation and self-compassion.

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Table 1 (*continued*)

Author and date	Aims	Design	Population	Intervention	Comparator/control	Follow-up	Research setting	Outcomes	Findings
Mahmoodi et al., 2021 (Iran)	To establish whether CBT-P or UP would be most effective for depression and anxiety disorders and dysfunctional perfectionism.	Randomised controlled trial	75 adults with a range of depressive, anxiety disorders as well as elevated perfectionism.	Cognitive behavioural therapy for perfectionism (CBT-P)1 The ununified protocol for the transdiagnostic treatment for emotional disorders (UP)	Waitlist control	3-month	Counselling & Psychotherapy centres	Emotion regulation questionnaire (ERQ). Depression anxiety stress scale-21 (DASS-21). Beck depression inventory-II (BDI-II). Beck anxiety inventory (BAI). Penn state worry questionnaire (PSWQ). Social phobia inventory (SPIN). Anxiety sensitivity index (ASI). Frost's multidimensional perfectionism scale (FMPS). The WHOQOL-BREF.	The CBT-P group showed significantly greater pre-post reductions in perfectionism, however, the UP group showed significantly greater pre-post improvements in emotional regulation.
McMain et al., 2017 (Canada)	To evaluate the clinical effectiveness of brief dialectical behaviour therapy (DBT) skills training as an adjunct intervention for high suicide risk in patients with BPD	Randomised Controlled trial	84 suicidal patients with borderline personality disorder. (Mean age = 29.6, SD=8.6/78.6% female)	Brief dialectic behaviour therapy skills training.	Waitlist control	3-month	In-patient	The clinician-administered Lifetime Suicide Attempt Self-Injury Interview (LSASI). Deliberate Self-Harm Inventory (DSHI). The Difficulties in Emotion Regulation Scale (DERS). The Treatment History Interview-2 (THI-2). The Borderline Symptom List- 23 (BSL-23). The State-Trait Anger Expression Inventory (STAXI).	DBT receiving participants showed greater reductions in suicidal and non-suicidal self-injury compared to waitlist controls. Additionally, the DBT group showed greater improvement in anger, distress tolerance and emotion regulation.
Neacsiu et al., 2014 (USA)	To assess Dialectical behaviour therapy skills training (DBT-ST) as a stand-alone, transdiagnostic treatment for emotion dysregulation and DBT skills use as a mediator of outcome.	Pilot randomised controlled trial	44 anxious and/or depressed non-BPD adults with high emotion dysregulation. (DBT-ST: Mean age = 32.2, SD=10.5/68.2% female ASG: Mean age = 38.8, SD=13.5/63.6% female)	Dialectic behaviour therapy skills training (DBT-ST)	Activities-based support group (ASG)	2-month	–	Difficulties in Emotion Regulation Scale (DERS). DBT ways of coping checklist (DBT-WCCL). Patient health questionnaire-9 (PHQ-9).	DBT-ST group showed significant improvement in emotion dysregulation.
Petersson et al., 2022 (Sweden)	Evaluation of the Affect School as supplementary treatment of Swedish women with eating disorders: a randomized clinical trial	Randomised controlled trial	46 adults with a range of eating disorders.	Affect school, a manualised group intervention aimed at addressing emotional awareness and the ability to perceive and express emotions.4	TAU	12-month	Out-patient clinic	Eating Disorder Examination Questionnaire (EDE-Q) Difficulties in emotion regulation (DERS-36) Toronto Alexithymia Scale- 20	Affect school shown to improve emotional awareness and emotion regulation as well decrease certain eating disorder symptoms.
Petrenko et al., 2017 (USA)	To pilot a multicomponent intervention designed to prevent secondary conditions in children with FASD and improve family adaptation.	Pilot randomised controlled trial	30 children with foetal alcohol spectrum disorder (FASD) or prenatal alcohol exposure (PAE).	Families on Track integrated prevention intervention.4 Neuropsychological assessment and personalised community referral.	Active control	–	Community	Emotion regulation checklist (ERC). Berkley puppet interview (BPI). Eyberg child behaviour inventory. Impaired rating scale (IRS). Perceived social support scale (PSSS). Parenting sense of competence (PSOC). Family needs met. Knowledge and advocacy scale (K & A). Parenting practice interview (PPI)	The results showed a significant group by time interaction on the Emotional Regulation subscale of the ERC, with the group receiving the Families on Track programme showing an improvement in emotional regulation from baseline to follow up, and the control group showing a decrement. There were no significant effects of group or time on the Emotional Regulation subscale.
Petrenko et al., 2019 (USA)	To examine the sustainability of the effects of the families on track intervention 6 months post intervention	Pilot randomised controlled trial	30 children with foetal alcohol spectrum disorder (FASD) or prenatal alcohol exposure (PAE).	Families on Track integrated prevention intervention.	Neuropsychological assessment and personalised community referral.	6-month	Community	Emotion regulation checklist (ERC). Berkley puppet interview (BPI). Eyberg child behaviour inventory. Impaired rating scale (IRS). Perceived social support scale (PSSS). Parenting sense of competence (PSOC). Family needs met. Knowledge and advocacy scale (K & A). Parenting practice interview (PPI)	Continued gains in parent efficacy and knowledge relating to FAE. The intervention groups reported their needs being met more than those in the comparison group. Both control and intervention groups showed similar reduction in disruptive behaviour. Increases in child self-esteem and emotion regulation seen at post intervention were not sustained at follow up.

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Table 1 (*continued*)

Author and date	Aims	Design	Population	Intervention	Comparator/control	Follow-up	Research setting	Outcomes	Findings
Reyes-Ortega et al., 2020 (Mexico)	To test the clinical efficacy of a brief combined ACT+DBT+FAP therapy by comparing it with brief versions of ACT or DBT	Controlled study using sequential allocation	65 adults attending a borderline personality disorder clinic.	Combined ACT+DBT+Functional analytical psychotherapy (FAP)	Acceptance and commitment therapy (ACT) Dialectic behavioural therapy (DBT)	–	Hospital (out-patient)	Difficulties in Emotion Regulation Scale (DERS). Structured clinical interview for DSM-IV (SCID-II). The borderline evaluation of severity over time (BEST). The acceptance and action questionnaire-II (AAQ-II). The adult attachment questionnaire. The experience of self-scale. Five-facet mindfulness questionnaire (FFMQ).	The study found significant improvements in emotional dysregulation from baseline to follow up, in all three groups. There were no significant main effects of intervention group on emotional dysregulation scores, and no significant group by time interaction.
Schanche et al., 2020 (Norway)	To explore the effects of Mindfulness—Based Cognitive Therapy (MBCT) on risk and protective factors for depressive relapse within the domains of cognition, emotion and self-relatedness	Randomised waiting-list controlled trial	68 adults with recurrent depression.	Mindfulness-based cognitive therapy (MBCT)	Waitlist control	–	University	Rumination-reflection questionnaire (RRQ-rum). State-trait anxiety inventory (STAI). Self-compassion scale (SCS). Five facet mindfulness questionnaire (FFMQP). Beck depression inventory II (BDI-II). The Beck anxiety inventory (BAI). Difficulties in emotion regulation scale (DERS).	Participants who underwent MBCTshowed significant improvement is measures relating to protective factors for recurrent depression. These included rumination, emotion regulation, emotion reactivity, self-compassion, mindfulness and depression.
Suveg et al., 2018 (USA)	To examine the effectiveness of emotion focused cognitive behavioural therapy in improving broad emotion-regulation difficulties in children with a primary anxiety disorder.	Randomised controlled trial	92 children aged between 7 and 12 with anxiety disorder.	Emotion focused cognitive behavioural therapy (ECBT)	Cognitive behavioural therapy (CBT)	–	University	Emotion regulation checklist (ERC). Children's emotion management scales (CEMS). Anxiety disorders interview schedule (ADIS-IV-C/P). Clinical global impression (CG-I, CG-S).	Both modalities showed similar levels of success in improving emotion regulation.
Lin et al., 2019 (Taiwan)	The effectiveness of dialectical behaviour therapy skills training group vs. cognitive therapy group on reducing depression and suicide attempts for borderline personality disorder in Taiwan	Randomised controlled trial	82 depressed college students diagnosed with borderline personality disorder (BPD).	Dialectic behaviour therapy skills training group (DBTSTG) Cognitive therapy group (CTG)	Cognitive therapy	8-month	University Counselling centres	Emotion regulation scale (ERS)	Both modalities led to a reduction in suicide attempts and depression after 6 months. CTG improved cognitive errors and DBTSTG increased acceptance and decreased suppression.
Tobon et al., 2020 (Canada)	To investigate whether motivational enhancement therapy (MET) improved the treatment effects of a 12-week psychological intervention, Dialectical Behaviour Therapy Skills Training (DBT-ST), for adults presenting in the early stages of mental health difficulties.	Pilot randomised controlled trial	75 emerging adults with early-stage mental health problems.	Dialectic behaviour therapy + Motivational enhancement therapy (MET)	Dialectic behaviour Therapy skills training (DBT-ST)	3-month	Youth & student wellness centre	The Difficulties in Emotion Regulation Scale (DERS).	Both treatment approaches resulted in a significant improvement in emotional dysregulation, psychological distress, depression, and anxiety.
Vohra et al., 2019 (Canada)	To compare the efficacy of Mindfulness Based Stress Reduction plus usual care versus usual care alone for reducing mental health symptoms in youths.	Cluster randomised controlled trial	85 adolescents who were residents of a voluntary treatment program for individuals requiring a high level of intensive mental health treatment.	Mindfulness-based stress reduction (MBSR)	TAU	–	Residential treatment centre	Behavior Assessment System for Children, Second Edition (BASC-2). Perceived Stress Scale (PSS). Child Acceptance and Mindfulness Measure (CAMM). Emotional Regulation Questionnaire (ERQ).	The MBSR group showed significant improvement in teacher ratings of the internalizing problems and the adaptive skills subscale. Additionally, MBSR group members had a short time to discharge.
Ward-Ciesielski et al., 2017 (USA)	To test the effectiveness of a DBT brief suicide intervention (DBT-BSI) as a suicide prevention intervention.	Randomised controlled trial	93 suicidal individuals currently not engaged in treatment. (Mean age = 40.2, SD=15.2/59% male)	Single session dialectic behaviour therapy skill-based intervention4	Relaxation training	12-week	University out-patient clinic	The difficulties in emotion regulation scale (DERS).	Both treatments showed a meaningful reduction in suicidal ideation, depression, and anxiety. However, there was no significant difference in measures of emotional dysregulation.

(*continued on next page*)

Table 1 *(continued)*

Author and date	Aims	Design	Population	Intervention	Comparator/control	Follow-up	Research setting	Outcomes	Findings
Weiss et al., 2018 (Canada)	To establish whether CBT improved emotion regulation in children with autism spectrum disorder (ASD) using transdiagnostic CBT.	Randomised waitlist-controlled trial	68 children (mean age = 9.7, SD=1.2/88% male) with autism and their parents (Mean age = 43.9, SD=4.1/83% female).	Cognitive behavioural therapy (CBT)1	Waitlist control	10-week	University	Children's Emotion Management Scales (anger, sadness, worry). Dylan is Being Teased and James and the maths test (open-ended tasks). Emotion Regulation Checklist (ERC).	CBT led to significant improvement in emotion regulation and aspects of psychopathology relating to internalising and externalising symptoms.
Zarling et al., 2015 (USA)	To test the efficacy of a group-based Acceptance and Commitment Therapy (ACT) intervention for partner aggression, compared with a support and discussion control group, in a clinical sample of adults.	Randomised controlled trial	101 adults who had reported engaging in at least 2 acts of partner aggression.	Acceptance and commitment therapy (ACT) 7	Support and discussion control	6-month	–	Difficulties in Emotion Regulation Scale (DERS). Acceptance and Action Questionnaire–II (AAQ–II). Conflict Tactics Scales–2–Physical Assault Scale (CTS-2). Multidimensional Measure of Emotional Abuse (MMEA). M.I.N.I. International Neuropsychiatric Interview.	The ACT group showed significant reductions psychological and physical aggression which was mediated by experiential avoidance and emotion dysregulation.

Note: Not reported = –.

[*] This record was retracted after the completion of this review and has been included here for completeness.

Intervention approaches

A range of interventions were employed across the 29 included studies (see Table 1). The most widely used were Cognitive Behavioural Therapy (CBT, *n* = 9), Dialectic Behaviour Therapy (DBT, *n* = 8) and Skills Training in Affect and Interpersonal Regulation (STAIR, *n* = 4). These interventions tended to be used in studies with patients who had anxiety and/or depression, BPD, or PTSD, respectively. Other interventions included skills training not related to STAIR (*n* = 4), Mindfulness (*n* = 2), the Unified Protocol for the transdiagnostic treatment of emotional disorders (UP, *n* = 2), counselling (*n* = 4) and motivational components (*n* = 1). Some studies employed more than one intervention and/or intervention component in the intervention or control arms. For example, adding exposure therapy or supportive counselling to the STAIR intervention, combining Acceptance and Commitment Therapy with DBT + Functional analytical psychotherapy (FAP), adding emotion regulation training (ENCERT) to CBT, or adding interpersonal skills training to DBT. Twenty of the studies included a follow-up assessment. Of these, nine had a three month follow up, five had a six month follow up, and two had a nine month follow up, with the remaining follow ups being conducted at one month (*n* = 1), two months (*n* = 1), seven weeks (*n* = 1), ten weeks (*n* = 1), or twelve weeks (*n* = 1).

Outcome measures

The measures used to assess emotional regulation differed across the included studies (see Table 1). Nearly half of the studies involving adult participants used the Difficulties in Emotion regulation scale (DERS, *n* = 13) or a shortened version of the DERS (*n* = 1). Other studies used The Emotion Regulation Questionnaire (ERQ, *n* = 5), the Emotion Regulation Skills Questionnaire (ERSQ, *n* = 3), or the Generalized Expectancies for Negative Mood Regulation (NMR) Scale (NMR, *n* = 2). One study evaluating a transdiagnostic emotion regulation intervention (González-Robles et al., 2020) did not include an emotion regulation measure, but assessed depression, anxiety, behavioural inhibition/activation, and quality of life. We retained the study in the review because we anticipate that clinicians will be interested in the outcomes of this study. Measures used to assess emotion regulation interventions for children and young people (CYP) used the Emotion Regulation Checklist (ERC; *n* = 4), or the Children's Worry Management Scale (CWMS; *n* = 1). Two studies with children also included a measure developed for the study (Houck, Barker, et al., 2016; Houck, Hadley, et al., 2016) or multiple measures of emotion regulation (Weiss et al., 2018).

Studies included a range of outcomes pertinent to the population receiving the emotional regulation intervention. Most studies used multiple measures of outcomes indicative of or arising from emotional regulation difficulties in addition to one or more measures of emotional (dys)regulation. These measures included the Beck Depression inventory/-II (BDI; *N* = 7), the Beck Anxiety Inventory (BAI; *N* = 3), The State-Trait Anger Expression inventory/-2(STAXI/-2) (*N* = 4), and the State-Trait Anxiety Inventory/-2 (STAI/-2) (*N* = 2). However, outside of these tools, there was little overlap between

Table 2 Quality assessment of individual studies.

Papers	Randomised	Adequate randomisation	Allocation concealment	Blinding	Baseline similarity	Dropout (20%)	Differential dropout	Adherence	Avoid other intervention	Outcome measures	Power	Prespecified outcomes	Intention-to-treat	Ethnicity	Participant consulted	Overall quality
Petersson et al., 2022	✓	✓	✗	?	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	Good
Agako et al., 2021	✓	✓	?	?	✓	✓	✓	✓	?	✓	✗	✓	✗	✓	✗	Good
Mahmoodi et al., 2021	✓	✓	✗	✓	✓	✓	✓	?	✓	✓	✗	✗	✗	✗	✗	Fair
Enrique et al., 2021	✓	✓	?	?	✓	✓	✓	?	✓	✓	✗	✓	✗	✗	✗	Fair
Feurer et al., 2021	✓	✓	✗	?	✓	?	?	?	✓	✓	✗	✗	?	✓	✗	Fair
Afshari et al., 2020	✗	✗	✗	✗	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✗	Fair
Schanche et al. 2020	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	Good
Lindqvist et al., 2020	✓	✓	✗	✗	✓	✓	✓	✓	✗	✓	✓	✗	✓	✗	✗	Good
Jain et al., 2020	✓	✓	✗	?	✓	✓	✓	?	✗	✓	?	✓	✗	✓	✗	Good
González-Robles et al., 2020	✓	✓	✗	✓	✓	✗	✗	✓	?	✗	✓	✓	✓	✗	✓	Good
Tobon et al., 2020	✓	✓	✗	?	✓	✗	✗	?	✓	✓	✗	✗	✓	✗	✗	Poor
Brennan et al., 2020	✓	?	✗	?	✗	✗	✓	✓	?	✓	?	✓	✗	✗	✗	Poor
Reyes-Ortega et al., 2020	✗	✗	✗	✓	✓	?	?	✓	?	✓	✗	✓	?	✓	✗	Poor
Lin et al., 2019	✗	✗	✗	?	✓	✓	✓	?	✓	✓	✗	✗	✓	✗	✗	Good
Vohra et al. 2019	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	Good
Kleinstäuber et al., 2019	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	Good
Petrenko et al., 2019	✓	?	?	?	✓	✓	✓	✗	✗	✓	✗	✓	✗	✓	✗	Poor
Suveg et al., 2018	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	Good

(continued on next page)

Table 2 (*continued*)

Papers	Randomised	Adequate randomisation	Allocation concealment	Blinding	Baseline similarity	Dropout (20%)	Differential dropout	Adherence	Avoid other intervention	Outcome measures	Power	Prespecified outcomes	Intention-to-treat	Ethnicity	Participant consulted	Overall quality
Weiss et al., 2018	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	Good
Petrenko et al., 2017	✓	?	?	?	✓	✓	✓	✗	✗	✓	✗	✓	✗	✓	✗	Poor
Ward-Ciesielski et al., 2017	✓	✓	✓	✗	✗	✗	✓	?	✓	✓	✓	✗	✓	✓	✗	Good
McMain et al., 2017	✓	✓	✗	✗	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✗	Fair
Houck, Barker, et al., 2016; Houck, Hadley, et al., 2016	✓	✓	✗	?	✓	✗	✗	✓	✗	✓	✗	✓	✗	✓	✗	Fair
Dixon-Gordon et al., 2015	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✓	✓	✗	✗	Fair
Zarling et al., 2015	✓	?	✓	?	✓	✓	✓	✓	✗	✓	✗	✓	✓	✗	✗	Fair
Gratz et al., 2014	✓	?	?	✗	✓	✗	?	✓	✗	✓	✗	✓	✓	✗	✗	Fair
Neacsiu et al., 2014	✓	✓	✗	?	✓	✗	✗	✓	✗	✓	✓	✓	✓	✗	✓	Good
Gibson et al., 2014	✗	✗	✗	✗	✓	✗	✗	✓	✓	✓	✗	✓	✓	✗	✗	Poor
Berking et al 2013	✓	✗	✗	?	✓	✓	✓	✓	✓	✓	?	✓	?	✗	✗	Fair
Cloitre et al., 2010	✓	✓	✓	✓	✓	✗	✗	✓	✗	?	?	✓	✓	✓	✗	Good
Berking et al., 2008	✗	✗	✗	✓	✓	?	?	✓	?	✓	✗	✓	?	✓	✗	Poor
Cloitre et al., 2002	✓	✓	✓	✓	✓	✗	✗	✓	?	?	?	✓	✓	✓	✗	Good

the measures employed across the studies because outcome measures were tailored to the specific context. For example, Frost's multidimensional perfectionism scale (FMPS) was used in a study where the participants had dysfunctional perfectionism, the Deliberate Self-Harm Inventory (DSHI) in a study of patients at high risk of suicide, and the Eyberg child behaviour inventory in a study of children with children with foetal alcohol spectrum disorder (FASD).

Control conditions

These were similarly heterogeneous in nature. Seven studies utilised waitlist control groups, and four involved Treatment as Usual (TAU) control groups (see Table 1). The nature of other control groups varied. Some studies intended to establish differences between interventions expected to target ER, so their control arms included interventions such as CBT (with or without additional elements such as perfectionism, transdiagnostic therapy), or DBT (with or without additional aspects such as interpersonal effectiveness, skills training, counselling), or ACT. Two studies had medication as a control arm, and one had Health Promotion as a control arm. Control interventions such as supportive counselling, health promotion, relaxation, and prolonged exposure may be less likely to enhance emotional regulation than others such as CBT or DBT interventions. For example, four studies that reported a significant effect of time but no significant group by time interaction involved intervention and control groups that could both be expected to benefit emotional regulation (e.g., DBT-Emotional Regulation [DBT-ER] versus DBT-Interpersonal psychoeducation [DBT-IE] or Motivational enhancement treatment + DBT versus DBT skills training).

Effectiveness of the interventions

Improvements in outcomes favoured the target intervention in most studies (n = 24, 82.76%), with one study reporting a trend of that nature and four studies demonstrating no significant interactions (see Table 1). In those four studies, both/all groups improved significantly over time, but there were no significant differences between groups. Improvements were not seen on every subscale of measures with multiple subscales, in every study. This suggests that some interventions have differential effects on specific aspects of emotional regulation. A multitude of benefits of interventions for emotional regulation were observed, including greater use of emotional regulation strategies and skills, but also improvements in suicidal injury, distress tolerance, behaviour, anxiety, PTSD symptoms, compassion, rumination and reactivity, quality of life, and internalising and externalising issues.

Individual risk of bias

Of the 32 studies included 15 (46.8%) were rated as being of Good quality overall by the reviewers, 9 (28.1%) were rated as Fair, and 8 (%) were rated as Poor quality studies (see Table 2). The overall evaluations of quality were based on the reviewers' opinions of the rigour of the studies, along such dimensions as group assignment (e.g., randomisation, blinding), participant flow through the study (e.g., baseline similarity, attrition), intervention fidelity (e.g., adherence, presence of other interventions), and analytic strategies (e.g., power, intention to treat analyses). We also evaluated whether participants had been consulted about their views of the intervention, and how ethnicity was reported in the study. Overall ratings of Good, Fair, or Poor were made on consideration of the overall balance of strengths and weaknesses in each study, and an independent reviewer verified the first reviewer's ratings for individual dimensions and the overall study quality.

Most studies (n = 27, 84.3%) used randomised controlled trial methodologies, and 20 (62.5%) reported satisfactory methods of allocating participants to condition (e.g., randomisation sequences). Few studies reported concealing allocation to condition (n = 5, 15.6%), or blinding (n = 10, 31.2%) of participants or researchers to the intervention received by participants. The studies in this review focus on intervention delivery in clinics and different groups of participants received an emotional regulation intervention, a control intervention, or no intervention. Therefore, it is unsurprising that the proportion of studies reporting such procedures is low because the practitioner would know which intervention they were delivering. The vast majority of studies reported equivalence between groups at baseline (n = 30, 93.7%), that adherence to the interventions was satisfactory (n = 22, 68.7%) and most studies involved participants who were not receiving another intervention that could have confounded the outcomes of the target intervention(s). The quality of studies in terms of participant drop out was less consistent, with 16 (50%) reporting attrition of greater than 20%, although fewer reported differential drop-out between study arms (n = 12, 37.5%), suggesting that in most studies it is unlikely that aspects of a particular intervention or control provision led to systematic attrition. All but one study administered an emotional regulation measure to assess the effects of their intervention(s) on participants' emotional regulation, and around half of studies had or reported whether their study had the appropriate number of participants to detect significant effects on emotional regulation arising from their intervention without making a Type 1 error. Over half of studies reported Intention to Treat (ITT) analyses which retained all participants in the study, regardless of attrition (N = 18, 56.6%). Few studies (n = 4, 12.5%) consulted participants about their views of the intervention they received. The ethnic background of participants was reported adequately in 12 (37.5%) of studies. Numerous studies grouped those of different ethnic backgrounds into an 'other' category, thereby losing a full description of all who participated, and ethnic factors were only included in analyses in one study (Dixon-Gordon et al., 2015).

Discussion

Emotional regulation: Issues with measurement and applicability

The aim of this review was to examine emotional regulation interventions, how effective they were, and the quality of the methodologies used to evaluate their effectiveness. The review indicated that emotional regulation interven-

tions were effective but that there was considerable variation in the ways that emotional regulation was conceptualised, the nature of the samples, and other methodological points such as the presence and length of follow up assessments. In addition, the emotional regulation interventions reviewed tended to be adapted and it was difficult to establish the extent to which interventions were relevant to those from different ethnic and cultural backgrounds. This variation prevents firm conclusions about the 'which, why, how much, when and for whom' of emotional regulation, and precluded a meta-analysis of the included papers.

Theoretical and psychometric structure of emotional regulation

A variety of measures have been used to assess emotional regulation in adults, and different measures again were used to assess emotional regulation in CYP. In addition to this, there is considerable variation in the way that emotional regulation was conceptualised by the developers of these emotion regulation scales. For example, emotional regulation has been variously seen as dichotomous individual differences in approaches to regulating emotions (Gross & John, 2003), as a range of situationally appropriate cognitive, emotional, and/or behavioural coping strategies (e.g., Garnefski & Kraaij, 2006; Grant, Salsman & Berking 2018), as expectancies regarding self-regulation ability (Catanzaro & Mearns, 1990), or the ability of children to manage normative worry adaptively (the CWMS, Zeman et al., 2010). Adult measures assess the adult's own reflection on their functioning, and often enquire about the internal experience of emotional (dys)regulation and the adult's opinions of their success in managing emotions. In contrast, when children's emotional regulation is assessed, the measures tend to be completed by adults in respect of a child and focus on observable social and emotional behaviour presumed to be the result of emotional (dys)regulation (e.g., emotional lability, expression, intensity, and situational appropriateness, (Shields and Cicchetti, 1995, 1997; Beaumont & Sofronoff, 2008). The CWMS is, however, completed by children and assesses their own reflections on their ability to cope with worries that cause them sadness and anger (Zeman et al., 2010). The number of dimensions underlying emotional regulation also varies. Psychometric evaluations of item factor structure in validation studies yielded: a single construct of emotional regulation (e.g., Cantanzaro & Mearns, 1990), dichotomous variables (ERQ, Gross & John, 2003; ERC, Shields & Cicchetti, 1995), or multidimensional solutions, with between three (CWMS, Zeman, Cassano, Suveg & Shipman, 2010) and nine subscales (e.g., CERQ-Short; Garnefski & Kraaij, 2006). In the dichotomised scales developed by Gross and John (2003), and Shields and Cicchetti (1995, 1997) one subscale in each measure assessed emotional regulation, whereas the other measured suppression (Gross & John, 2003) or Lability/Negativity (Shields & Cicchetti, 1995, 1997), thus suggesting quite different phenomena as the second construct in these emotion regulation dichotomies. Clinicians and researchers should be mindful of the conceptualisation of emotional regulation underlying the measures they choose, to ensure they are assessing the phenomena of interest.

Interpretation of emotional regulation

Another important consideration is interpretation of what an increase or decrease in scores might mean. In their validation of the CERQ-Short, (Garnefski and Kraaij, 2007) explain that Acceptance, Catastrophising, Self- and Other-blame, and Rumination are coping strategies associated with depression, ill health, poor adaptation, and distress, whereas Acceptance, and Positive Reappraisal are associated with more optimism and self-esteem, and lower anxiety. Therefore, interpretation of changes in those subscale scores is straightforward. However, they propose that Positive Refocus might have an adaptive short-term function but be less adaptive in the longer term if it prevents people from engaging in attempts to solve a problem, which implies there could be a 'time' dimension to evaluation of changes in scores on this subscale. In addition, they propose that Putting into Perspective involves an element of comparison (including social comparison) that downgrades the importance of issues bothering an individual. However, comparison could perhaps elicit evaluations that the event is worse than previously thought or that others are better off than oneself. It is therefore important to consider the nature of the specific Cognitive Emotion Regulation strategy, the context in which it is used, and its associations with other relevant measures to be confident about whether higher scores indicate a more (or less) adaptive approach to the circumstances in question.

Intervention strategy

Acceptability of intervention

Few studies (n = 4, 12.5%) involved any reports of consultation with participants, clients, or patients about the interventions received. Patient consultation seems particularly pertinent given the many adapted interventions, to establish clients' views about the acceptability of the revised intervention and the extent to which they feel it has been helpful. Critics of programmes such as Improving Access to Psychological Therapies (e.g., Williams, 2015) argue that a tendency toward positivism in evaluation of mental health interventions will lead to numerical data that can be analysed quantitatively to provide evidence of change between groups and across studies, but that this can be at the expense of understanding the experience of the recipients. It is arguable whether a change in questionnaire scores fully represents the diversity of impact that emotional regulation interventions could have on participants' lives. It is likely that informal conversations and anecdotal reports about interventions are happening between clinicians/researchers, and their patients or participants, but these were not systematically recorded or included in published research. The absence of information arising from feedback and consultation with participants is a potential limitation in many of these studies.

Psychological interventions aimed at addressing emotional regulation are intricate and necessitate a well-

defined program theory. This theory outlines how the intervention is believed to function, the circumstances under which it operates (Skivington et al., 2021), and the contextual elements that influence its effectiveness. Neglecting to establish a clear program theory can result in an intervention that is effective in the specific context it was initially tested in but fails when implemented elsewhere (Hoddinott et al., 2010) because the inner workings of the intervention haven't been comprehensively understood. A robust program theory should be developed in collaboration with relevant stakeholders and knowledge users to ensure its suitability and effectiveness within the precise context it's intended for. The concept of co-production, where stakeholders collaborate with researchers in constructing the intervention offers a means to gain insight into how the intervention will or will not function in a particular context. Regarding the systematic review discussed in this paper, none included co-production and only four consulted with the participants involved. This prescriptive approach to developing interventions can result in strategies that seem effective in theory but falter in practice because researchers are unaware of the contextual factors that will impact their intervention when it is put into action in a real-world setting.

Methodological issues

An important point to highlight regarding the reviewed papers is the absence of an intent-to-treat approach within the methodologies. Of the thirty-two papers, a total of fourteen did not employ an ITT approach. ITT refers to the practice of including all the randomised participants in the analysis regardless of whether they dropped out or the level of intervention they received (McCoy, 2017). Interventions that do not use this practice are likely to present biased and unreliable findings regarding the effectiveness of a given intervention. Researchers and practitioners should be aware of this limitation when examining intervention studies because the lack of an ITT approach can be a significant confounding factor.

Fifty percent of included studies reported attrition of >20%, with around a quarter of studies reporting differential attrition between treatment and control arms. Such attrition is also reflected in a meta-analysis which showed that 27.2% of participants with a schizophrenic spectrum disorder or a substance use disorder dropped out of RCTs of psychosocial interventions (Bouchard et al. 2022). The use of stimulants was associated with drop out in that review, but not demographic factors, diagnosis, the use of alcohol and cannabis or treatment duration. Therefore, attrition >20% in research evaluating psychosocial interventions can be due to factors other than the acceptability of the intervention. Researchers and therapists should endeavour to establish reasons for dropout where possible, particularly where attrition is greater in the treatment arm.

Another issue to be mindful of is the variability in controls we found which greatly hinders the use of meta-analytic methods. Effect sizes offer a means to compare various studies that employ different methodologies, but it's important to recognize that they are not a universal solution for accounting for variations in research methods. Consequently, systematic reviews evaluating the effectiveness of strategies to address emotional regulation are inherently limited because the original studies primarily focus on simple changes in specific metrics. This approach, rooted in the field of medicine and the randomized control trial (RCT) framework, is well-suited for medical scenarios where factors like randomization, blinding, and selection of inactive controls tend to work effectively. However, it becomes less suitable when dealing with complex psychological interventions.

Blinding, a key component of a robust RCT design is often unfeasible in psychological interventions because it's difficult to conceal the nature of the intervention from either participants or administrators. Another challenge arises when active controls (comparators) are regularly used to assess psychological interventions. RCTs, do not measure the absolute effectiveness of an intervention. Instead, they measure effectiveness compared to another factor, typically a control group. When an inactive control is used, the measure may be closer to absolute effectiveness, but with active controls pinpointing it becomes difficult. It is important that clinicians are mindful of the nature of the control arm when evaluating the magnitude of differences in outcomes between intervention and control groups in the sources they read and when evaluating their own practice, to avoid over- or under-estimating the benefits of any intervention compared to alternatives.

Another way of assessing change in participant wellbeing due to an intervention is the reliable change index (RCI), which was reported by six included studies (Agako et al.,2021; Berking et al., 2013; González-Robles et al. 2020; Gratz et al., 2014; Lindqvist et al., 2020; Neacsiu et al., 2014). The RCI is a statistical method of accounting for measurement error when evaluating the clinical impact of an intervention and provides a computationally simple way of assessing whether the intervention moves the recipient from the ''problem" range of scores on a measure into the ''normal" range (Jacobson & Truax, 1991). The RCI approach is widely used due to its ease of use (Wise, 2004) and ability to provide an assessment of the intervention's capabilities to affect clinically significant change (CSC), which in turn can inform practice (Blampied, 2022).

However, it is recommended to select the appropriate method of calculating the RCI, accounting for factors such as practice effects (Maassen, Bossema & Brand, 2009; Duff, 2012), changes in standard error (Maassen, 2004) or sources of bias (Morgan-Lopez et al., 2022), and to note that there are debates about the issues and limitations with this approach for establishing clinically significant change (Jabrayilov et al., 2016; Morgan-lopez et al., 2021; McAleavey, 2022; Hageman & Arrindell, 1993). Therefore, although it is a straightforward method of gauging clinically significant change (Blampied, 2022) alone or as a complement to other approaches (Evans, Margison & Barkman, 1998), other measurement error modelling approaches such as structural equation modelling (McAleavey, 2022) or multilevel (or random) coefficients regression modelling (Evans, Marginson, & Barkham, 1998), are more appropriate for complex data sets with multiple time points and sources of bias.

Limitations in testing psychological interventions are well-documented, to the extent that the MRC (Medical

Research Council) and the National Institute for Health Research (NIHR) have updated their guidelines to address this issue. The new framework, as outlined by Skivington et al (2021), prioritizes the development of a program theory alongside effect size statistics. These guidelines emphasize the importance of understanding how an intervention's capacity to induce change is affected by the specific delivery context. As stated in the MRC/NIHR guidelines, ''A purely quantitative approach, relying solely on an experimental design without additional elements like a process evaluation, is seldom sufficient for complex intervention research, where qualitative and mixed methods designs might be necessary to address questions beyond mere effectiveness" (Skivington et al., 2021, p. 7).

Conclusion and recommendations

Emotional regulation interventions seem to have important benefits across a range of outcomes associated with emotional dysregulation. However, the considerable heterogeneity in the conceptualisation of emotional regulation, the characteristics and mental health problems of the participants, the measures used, and the duration of follow up assessment (where one was reported), and adaptations to interventions make it difficult to make firm recommendations about which intervention might be most suitable for people struggling with emotional regulation. Clinicians and researchers should examine the relevant literature closely when selecting interventions and measures for research and practice, to ensure that these are appropriate for the aims and intended outcomes of their work.

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Declaration of interest

One of the authors Andrea Gray, is the mental health development lead for Public Health Wales who contributed towards the development of the Matrics Cymru (Wales) evidence tables. Outside of this the authors have nothing to declare.

Appendix A. Supplementary material

Supplementary material to this article can be found online at https://doi.org/10.1016/j.jbct.2024.100505.

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