Review Article

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Approaches to improving mental health care for autistic children and young people: a systematic review and meta-analysis

Tamara Pemovska[1],* , Sofia Loizou[2],*, Rebecca Appleton[1], Debbie Spain[3], Theodora Stefanidou[1], Ariana Kular[1], Ruth Cooper[2], Anna Greenburgh[1], Jessica Griffiths[2], Phoebe Barnett[1,4,5], Una Foye[2], Helen Baldwin[1], Matilda Minchin[6], Gráinne Brady[6], Katherine R. K. Saunders[2], Nafiso Ahmed[1], Robin Jackson[7,8], Rachel Rowan Olive[9], Jennie Parker[9,10,11], Amanda Timmerman[12], Suzi Sapiets[13], Eva Driskell[14], Beverley Chipp[9], Bethany Parsons[14], Vaso Totsika[6], Will Mandy[12], Richard Pender[12], Philippa Clery[6,15], Brynmor Lloyd-Evans[1], Alan Simpson[2] and Sonia Johnson[1,15]

[1]NIHR Mental Health Policy Research Unit, Division of Psychiatry, University College London, London, UK; [2]NIHR Mental Health Policy Research Unit, King's College London, London, UK; [3]NHS England, London, UK; [4]Centre for Outcomes Research and Effectiveness, Research Department of Clinical, Educational and Health Psychology, University College London, London, UK; [5]National Collaborating Centre for Mental Health, Royal College of Psychiatrists, London, UK; [6]Division of Psychiatry, University College London, London, UK; [7]Lancaster and Morecambe Child and Adolescent Mental Health Services, Lancashire and South Cumbria NHS Foundation Trust, Morecambe, UK; [8]University of Wolverhampton, Wolverhampton, UK; [9]NIHR Mental Health Policy Research Unit Lived Experience Working Group, Division of Psychiatry, University College London, London, UK; [10]School of Health and Psychological Sciences, City, University of London, London, UK; [11]Berkshire Healthcare NHS Foundation Trust, Reading, UK; [12]Department of Clinical, Educational and Health Psychology, UCL, London, UK; [13]Tizard Centre, University of Kent, Canterbury, UK; [14]Independent Scholars and [15]Camden and Islington NHS Foundation Trust, London, UK

Abstract

Autistic children and young people (CYP) experience mental health difficulties but face many barriers to accessing and benefiting from mental health care. There is a need to explore strategies in mental health care for autistic CYP to guide clinical practice and future research and support their mental health needs. Our aim was to identify strategies used to improve mental health care for autistic CYP and examine evidence on their acceptability, feasibility, and effectiveness. A systematic review and meta-analysis were carried out. All study designs reporting acceptability/feasibility outcomes and empirical quantitative studies reporting effectiveness outcomes for strategies tested within mental health care were eligible. We conducted a narrative synthesis and separate meta-analyses by informant (self, parent, and clinician). Fifty-seven papers were included, with most investigating cognitive behavioral therapy (CBT)-based interventions for anxiety and several exploring service-level strategies, such as autism screening tools, clinician training, and adaptations regarding organization of services. Most papers described caregiver involvement in therapy and reported adaptations to communication and intervention content; a few reported environmental adjustments. In the meta-analyses, parent- and clinician-reported outcomes, but not self-reported outcomes, showed with moderate certainty that CBT for anxiety was an effective treatment compared to any comparison condition in reducing anxiety symptoms in autistic individuals. The certainty of evidence for effectiveness, synthesized narratively, ranged from low to moderate. Evidence for feasibility and acceptability tended to be positive. Many identified strategies are simple, reasonable adjustments that can be implemented in services to enhance mental health care for autistic individuals. Notable research gaps persist, however.

Introduction

Autism is clinically defined as a neurodevelopmental condition characterized by social communication differences, sensory sensitivities, and difficulties with behavioral and cognitive flexibility (APA, 2013). It is also conceptualized as a form of neurodivergence, representing natural differences in human minds (Chapman & Botha, 2023). About 1 in 100 children globally is estimated to receive an autism diagnosis (Zeidan et al., 2022) and reported prevalence can differ across studies (Roman-Urrestarazu et al., 2021). Complex referral pathways and lengthy waits for diagnostic assessment often translate into untimely or incorrect diagnosis (NHSE, 2023), probably impacting the accuracy of prevalence estimates.

Autistic children and young people (CYP) experience high rates of co-occurring mental health difficulties (Simonoff et al., 2008), contributing to considerable long-term negative effects on health and quality of life (Lai et al., 2019). An increasing body of research is highlighting the impact mental health difficulties can have on various aspects of life, including education, quality of life, behavior, family, work, and independence beyond what is linked to autism (Adams, Clark, & Keen, 2019a; Adams & Emerson, 2020, 2021; Adams, Young, Simpson, & Keen, 2019b; Den Houting, Adams, Roberts, & Keen, 2020; Robertson et al., 2018). Disentangling mental health difficulties from autistic traits can be difficult due to poor clinician knowledge of autism, diagnostic overshadowing, and a lack of validated measures, resulting in challenges and delays to diagnosis and, subsequently, a lack of or ineffective mental health support (Adams & Young, 2021; Brede et al., 2022; Hus & Segal, 2021; Maddox et al., 2020). There is preliminary evidence for the feasibility and effectiveness of standard and adapted psychological interventions for anxiety and mood-related outcomes for autistic CYP (Linden et al., 2023). Meanwhile, pharmacological interventions trialed in this population have obtained mixed results when prescribed for mental health symptoms (Deb et al., 2021), and clinical guidelines have recommended caution when prescribing them for CYP, especially without concurrent psychological interventions (NICE, 2021).

Mental health care requires tailoring for autistic CYP, as standard care can fail to meet their preferences and needs (Dickson et al., 2021; Lickel, MacLean, Blakeley-Smith, & Hepburn, 2012; NICE, 2021). Mental health services may attempt to address autistic people's needs through implementing bespoke interventions specifically developed for this population, adapted standard interventions, and/or changes to service delivery overall. Adaptations are needed to make the overall experience of contact with services more accessible and acceptable, as well as to ensure that the structure, delivery, and content of interventions are appropriate for autistic young people. These adaptations should also be in line with the person's developmental age and stage (NICE, 2021). Adaptations that have been recommended include offering shorter or longer appointments, incorporating visual means to facilitate discussion, and changing the physical environment to accommodate sensory preferences (National Autistic Society, 2021). However, parents often report lack of clinician knowledge/expertise regarding autism and an inability of mental health services and clinicians to tailor their support to autistic CYP (Adams & Young, 2021). Failure to embed adaptations can result in distress, disengagement from services, and reduced help-seeking (Benevides et al., 2020; Brede et al., 2022; Crane, Adams, Harper, Welch, & Pellicano, 2018). This can negatively impact the wellbeing of families as well as of CYP, increasing carer stress (Read & Schofield, 2010).

More research is needed to explore strategies used in mental health care settings for autistic CYP to guide clinical practice and future research in this area so that needs for effective mental health care can be better met. Thus, this systematic review aimed to identify and examine strategies used to improve mental health care for autistic CYP and, if possible, conduct a meta-analysis, addressing the following research questions:

1) What strategies, including service adaptations, initiatives to detect autism, and bespoke and adapted interventions, have been used to improve mental health care for autistic CYP?

2) What is the acceptability and feasibility of strategies to improve mental health care for autistic CYP?

3) What is the effectiveness of strategies to improve mental health care for autistic CYP?

Methods

This systematic review was conducted by the National Institute for Health and Care Research (NIHR) Mental Health Policy Research Unit, as part of their research program aimed at building evidence to inform policy (MHPRU, n.d.). The protocol, developed in collaboration with a working group, comprising lived experience researchers, academics, clinicians, and policy experts with personal/professional expertise of autism and/or review methodology, was pre-registered on PROSPERO (CRD42022347690). We followed the PRISMA guidelines (Page et al., 2021). See online Supplementary Table S1 for a PRISMA checklist.

This systematic review reports the findings regarding autistic CYP and mixed samples of adults and CYP when only combined outcomes were available. A separate systematic review was conducted regarding autistic adults (Loizou et al., 2023).

Search strategy

A systematic literature search using keywords and subject headings relating to autism and mental health problems and services/treatments was conducted in three electronic databases (Medline, PsycINFO, CINHAL) and two pre-print servers (medRxiv and PsyArXiv) for papers published between 1994 and July 2022. The date range was chosen to cover the Diagnostic and Statistical Manual of Mental Disorders fourth (DSM-IV) and fifth (DSM-5) edition periods, in line with International Classification of Diseases 10th and 11th edition (ICD-10/11). We searched for additional eligible papers through checking the reference lists of identified relevant systematic reviews and a call for evidence from experts including academics and lived experience networks. Online Supplementary Tables S2–S4 present the full search strategy.

Screening

The selection strategy was piloted, and reviewers conducted the title and abstract screening, using Rayyan (Ouzzani, Hammady, Fedorowicz, & Elmagarmid, 2016), with a random 10% of records independently reviewed in duplicate (97.98% agreement). Full texts were screened independently in duplicate in line with Cochrane guidance (Higgins & Thomas, 2023). Discrepancies were resolved by discussion with a third reviewer and the working group.

Eligibility criteria
Population
Papers eligible for inclusion included CYP or mixed samples of CYP and adults (aged 18+ years) where data from autistic CYP could not be disentangled. Participants with an autism diagnosis or who suspected they were autistic or were identified by clinicians as potentially autistic were eligible. Views of carers and clinicians about mental health interventions for autistic CYP were also eligible. Papers with samples including both autistic and non-autistic people were excluded, unless data from autistic people could be isolated, or papers explored detection of autism. There was no minimum sample size required for inclusion.

Strategies

We included papers that assessed any strategies/adaptations to improve mental health care for autistic CYP, including: (1) bespoke mental health interventions originally developed for autistic people, (2) adaptations to existing mental health interventions, and (3) service-level strategies (e.g. strategies to detect autism) within mental health services and/or in mental health care delivered in primary care. Authors were contacted if the setting or the intervention's eligibility and classification as adapted/bespoke were unclear. Papers were eligible regardless of the presence and type of comparison group.

Outcomes

Eligible outcomes were any quantitative or qualitative measure of feasibility (e.g. recruitment adherence, retention rates), service use (e.g. engagement), acceptability of care, experience of and satisfaction with care, and/or quantitative measure of mental health, detection of autism, quality of life, service use, and social outcomes (e.g. social functioning) at end of treatment or follow-up. Papers measuring only physical health outcomes were excluded.

Study types

All study designs and service evaluations were eligible for the first and second research question, and only empirical quantitative studies were eligible for the third research question. Reviews, case studies without group analysis, commentaries, book chapters, editorials, letters, and conference abstracts were excluded.

Data extraction

Reviewers extracted data including study design and aims, setting, sample size, participant characteristics (e.g. age, ethnicity, diagnosis), outcome measures, strategies and adaptations (e.g. type, brief description, parent/carer involvement), and relevant findings (feasibility, acceptability, effectiveness). The data extraction form was first piloted on 10% of the eligible papers, discussed with the working group and updated accordingly. The extracted data were checked by at least one other reviewer, thus at least two reviewers reached consensus of the extracted information. Two researchers independently double-extracted raw end-of-treatment (EOT) outcome data (mean, standard deviation, sample size per group) for the meta-analyses.

Autism-inclusive research assessment

Lived experience researchers in the working group observed that relevant studies might not have been sufficiently inclusive of autistic experiences (e.g. allowing non-verbal communication, using straightforward language, using measures valid for autistic people). Therefore, a lived experience researcher (RRO) developed criteria derived from existing literature and personal experience, labeled the Autism-Inclusive Research Assessment (AIRA), to measure the extent of autism-inclusive practices in research. The criteria were first used in our systematic review regarding autistic adults (Loizou et al., 2023) but were also piloted on papers with CYP in the present review to determine applicability. The five assessment criteria for the AIRA are: (1) reported lived experience involvement in the design, conduct, or write-up of the paper; (2) reported adjustments made to data collection process for papers with qualitative elements (Benford & Standen, 2011); (3) reported adjustments made to data collection tools for papers with quantitative elements (Nicolaidis et al., 2020);

(4) reported adaptations or validity of relevant outcome measures for autistic people for papers with quantitative elements; (5) if the evaluated intervention/strategy in papers with quantitative elements was perceived to contain some focus on masking/changing people's autistic traits, which might have not inherently caused distress or worsened quality of life (Chapman & Botha, 2023), rather than solely focusing on improving mental health. Two researchers extracted all relevant data, and a lived experience researcher was involved as second assessor of the final criterion.

Quality and certainty of available evidence

Reviewers assessed study quality using the Mixed Methods Appraisal Tool (MMAT) (Hong et al., 2018). All scores were checked by a second reviewer and consensus was reached. Reviewers independently double-evaluated the strength of evidence about effectiveness of cognitive behavioral therapy (CBT) for anxiety synthesized via meta-analyses using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system (Guyatt et al., 2008). Additionally, the strength of the narratively synthesized effectiveness evidence of all interventions/strategies was double-evaluated using GRADE adapted for narrative synthesis (Murad, Mustafa, Schünemann, Sultan, & Santesso, 2017).

Evidence synthesis

We conducted a narrative synthesis following Economic and Social Research Council guidelines (Popay et al., 2006). With the input of lived experience researchers, the identified intervention-level and service-level adaptations were grouped into categories and sub-categories according to shared commonalities. This was informed by our previous review relating to autistic adults (Loizou et al., 2023) and refined based on the current included studies.

The included papers were grouped into service-level strategies or interventions to synthesize the extracted outcome data. Service-level strategies were categorized based on their focus. Different interventions were characterized based on type, format, bespoke/adapted therapy, and focus. To distinguish between bespoke and adapted interventions, we relied on authors' descriptions in the papers or their responses when more clarification was needed. We considered interventions to be bespoke (e.g. Facing Your Fears – FYF) if authors reported they were originally designed for autistic people. Authors themselves were primarily involved in developing these interventions/manuals for their study and they were used unmodified. These were considered bespoke interventions regardless of whether they had been based on mainstream CBT or mindfulness principles. We considered the interventions as adapted if authors reported testing adapted existing interventions not originally designed specifically for autistic people. The same approach was used to classify modified versions of interventions originally designed for autistic people, e.g. changed original mode of delivery for FYF to telehealth delivery or developmentally modified version of FYF for use with adolescents.

The extracted data for the AIRA were synthesized descriptively. The feasibility/acceptability findings were synthesized from all contributing study types. We synthesized the effectiveness findings, placing greater importance on randomized controlled trials (RCTs) and non-randomized controlled trials making contemporaneous comparisons rather than before-and-after

comparisons. Upon inspection of the included papers, a meta-analysis was deemed appropriate, as a large subset of pilot RCTs and RCTs appeared to be sufficiently homogenous in outcome, intervention, and population. Three meta-analyses were conducted for ratings respectively by children/care recipients, parents/carers, and clinicians to examine whether bespoke/adapted CBT for anxiety is superior to any control condition (active and non-active) in reducing anxiety symptoms at EOT. Separate analyses were performed, as previous meta-analyses have found differences across raters (Sharma, Hucker, Matthews, Grohmann, & Laws, 2021; Sukhodolsky, Bloch, Panza, & Reichow, 2013).

The R-package 'metafor' (Viechtbauer, 2010) was used to calculate the standardized mean difference (SMD), correcting for small sample sizes (Hedges' *g*) between groups at EOT. Effect sizes were significant if $p < 0.05$, and were tentatively interpreted as small (0.2), medium (0.5), and large (0.8) (Cohen, 1988). Random-effects models were used to account for variability in the average effect size across papers (Hedges, 1992). Heterogeneity was assessed using Cochran's *Q* (significant if $p < 0.05$) (Cochran, 1954) and Higgins' *I* (25% = *low*, 50% = *moderate*, 75% = *high*) (Higgins, Thompson, Deeks, & Altman, 2003).

Sensitivity analysis was performed by removing outliers from the models. Where there were sufficient studies ($k > 10$), meta-regression analyses were conducted to examine the moderating effects of type (adapted, bespoke) and format (individual, group, combined) of CBT on effectiveness. Funnel plots were visually inspected, and Egger's test (significant if $p < 0.05$) (Egger, Smith, Schneider, & Minder, 1997) was conducted to test for publication bias.

Results

Study selection

Figure 1 shows the PRISMA flow diagram. In total, 57 papers were eligible for inclusion and a full list of studies excluded at full-text screening with reasons is presented in online Supplementary Table S5.

Study characteristics

Of the 57 papers, 23 were RCTs (Chalfant, Rapee, & Carroll, 2007; Cook, Donovan, & Garnett, 2017; Factor et al., 2019; Fujii et al., 2013; Kilburn et al., 2020; Langdon et al., 2016; Maskey et al., 2019b; McConachie et al., 2014; Murphy et al., 2017; Reaven, Blakeley-Smith, Culhane-Shelburne, & Hepburn, 2012a; Reaven et al., 2018; Russell et al., 2013; Santomauro, Sheffield, & Sofronoff, 2016; Scarpa & Reyes, 2011; Sofronoff, Attwood, & Hinton, 2005; Storch et al., 2013, 2015, 2020; Sung et al., 2011; Walsh et al., 2018; White et al., 2013; White, Schry, Miyazaki, Ollendick, & Scahill, 2015; Wood et al., 2015), of which 11 were pilot RCTs (Cook et al., 2017; Fujii et al., 2013; Langdon et al., 2016; Maskey et al., 2019b; McConachie et al., 2014; Murphy et al., 2017; Santomauro et al., 2016; Scarpa & Reyes, 2011; Storch et al., 2020; White et al., 2013, 2015) and two were also mixed-method studies including and RCT (Langdon et al., 2016; McConachie et al., 2014), three were non-randomized controlled trials (Hepburn, Blakeley-Smith, Wolff, & Reaven, 2016; McGillivray & Evert, 2014; Reaven et al., 2009), 20 were before-after comparisons (Bemmer et al., 2021; Burke, Prendeville, & Veale, 2017; Dreiling, Cook, Lamarche, & Klinger, 2022; Driscoll, Schonberg, Stark, Carter, & Hirshfeld-Becker, 2020; Drüsedau et al., 2022; Ehrenreich-May et al., 2014; Ekman, Hiltunen, Ekman, & Hiltunen, 2015; Helverschou et al., 2021; Higgins, Slattery, Perry, & O'Shea, 2019; Keefer et al., 2017; Kilburn et al., 2019; Maskey et al., 2019a; Oerbeck, Overgaard, Attwood, & Bjaastad, 2021; Ollendick, Muskett, Radtke, & Smith, 2021; Reaven et al., 2015; Reaven, Blakeley-Smith, Leuthe, Moody, & Hepburn, 2012b; Sofronoff, Silva, & Beaumont, 2017; Solish et al., 2020; Swain, Murphy, Hassenfeldt, Lorenzi, & Scarpa, 2019; Wise et al., 2019), of
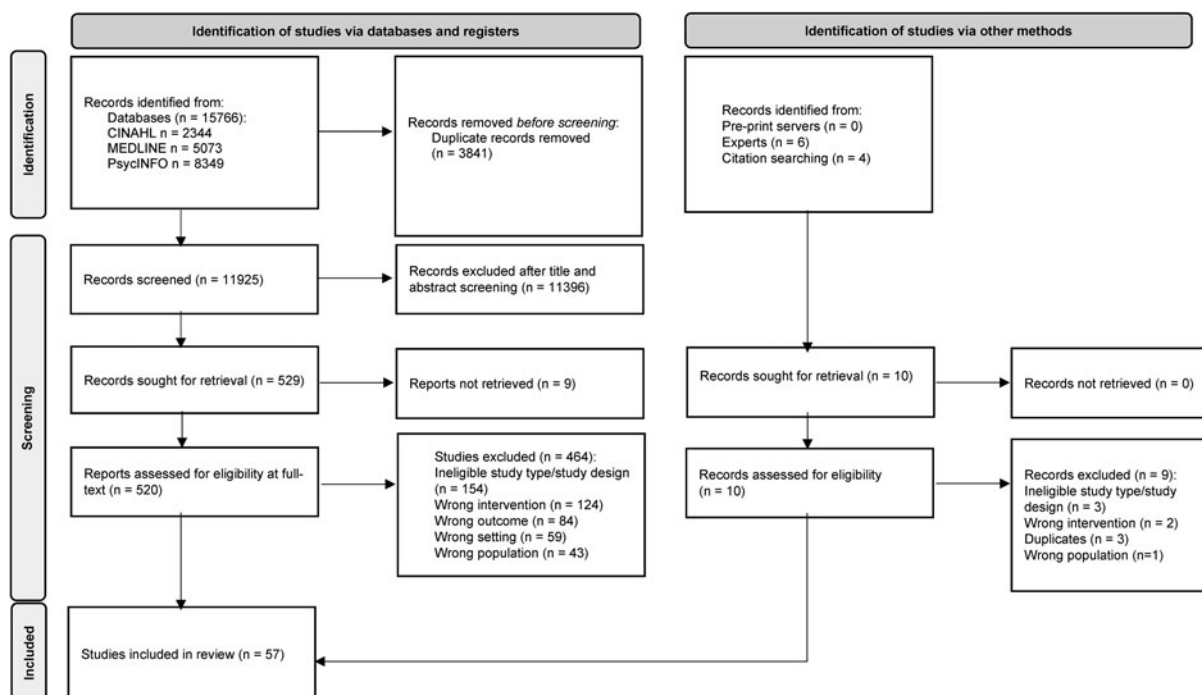

Figure 1. PRISMA flowchart.

which two were also mixed-method studies (Burke et al., 2017; Higgins et al., 2019), two papers compared different samples before and after implementation of a new care pathway (Cervantes et al., 2019; Kuriakose et al., 2018), seven were surveys (Cooper, Loades, & Russell, 2018; Fisher, van Diest, Leoni, & Spain, 2023; Ford et al., 2019; Hollocks et al., 2019; Jones, Gangadharan, Brigham, Smith, & Shankar Background, 2021; Pickard et al., 2020; Stadnick, Brookman-Frazee, Nguyen Williams, Cerda, & Akshoomoff, 2015), of which two were also mixed-method studies (Fisher et al., 2023; Pickard et al., 2020), and two were qualitative only (Petty, Bergenheim, Mahoney, & Chamberlain, 2021; Spain et al., 2017). There were multiple papers that were from the same trials (Cervantes et al., 2019; Keefer et al., 2017; Kuriakose et al., 2018; Pickard et al., 2020; Reaven et al., 2018; Walsh et al., 2018; White et al., 2013, 2015), thus 57 papers reported on 52 studies. All studies were conducted in high-income countries, mainly in the United Kingdom and United States. Study characteristics are reported in Table 1 and online Supplementary Table S6.

Quality appraisal and publication bias

According to appraisal using the MMAT, for RCTs, 13 papers were of high (≥4 criteria met), 5 papers were of moderate (3 criteria met), and 3 papers were of low quality (≤2 criteria met). Appropriate randomization and blind outcome assessors were the main areas of concern for RCTs. For non-randomized studies, 6 were of high, 15 of moderate, and 2 of low quality. These studies often did not meet the criteria for representativeness and confounder adjustment. For quantitative descriptive studies, three were of high, one of moderate, and one of low quality. Nonresponse bias was the main area of concern for these studies. For mixed-method studies, five were of high (of which two combined RCT with qualitative methods), and one of low quality. The two qualitative studies were of high quality. All MMAT ratings are shown in online Supplementary Table S7. Visual inspection of the funnel plots showed outliers (online Supplementary Fig. S1). Egger's test was significant (child/self $z = 2.13$, $p = 0.033$; parent $z = 4.70$, $p < 0.001$; clinician $z = 3.99$, $p < 0.001$), suggesting the presence of publication bias.

Autism-inclusive research assessment

Four out of 57 papers (7%) reported involvement of autistic people in study design or delivery. One of the 10 papers (10%) with a qualitative element reported adjustments to the data collection process (e.g. allowing non-verbal communication). Five out of 55 papers (9%) with a quantitative element reported making some adjustments to the data collection tools (e.g. defining key terms, using straightforward language, adapting Likert scales for greater precision, using visual tools). Thirteen out of 55 papers (24%) with a quantitative element reported using at least one valid or adapted measure for autistic individuals relevant to the review. For 12 of the 50 papers (24%) with a quantitative element that measured outcomes in autistic mental health service users, the intervention/strategy was identified to involve some focus on masking people's autistic traits. However, 36 of the 50 papers (72%) did not include any evidence to suggest such a focus, and this was unclear for 2 of the 50 papers (4%). All extracted data from the AIRA are shown in online Supplementary Table S8.

Sample characteristics

Sample sizes at baseline in the papers ranged from 7 to 132 autistic participants (median 32, $n = 43$ studies), 62–302 participants (median 77, $n = 3$ studies) for studies of strategies to improve the detection of autism, 11–105 parents (median 33, $n = 18$ studies), and 15–103 clinicians (median 42, $n = 8$ studies). Fifty papers included CYP, all of whom were given an autism diagnosis, except for three papers regarding initiatives to improve the detection of autism. Two papers included participants with co-occurring intellectual disability (ID). Forty-seven papers described co-occurring mental health difficulties at baseline. Forty-three papers included CYP with an age range of 3–18 years, and seven papers reported on combined outcomes of CYP and adults with an age range of 13–66 years. Ten papers included clinicians as participants. Detailed sample characteristics are in online Supplementary Table S6.

Data synthesis

Strategies used to improve mental health care in autism

Identified strategies included service-level strategies ($n = 10$) and adapted/bespoke mental health interventions ($n = 47$). From the identified intervention-level and service-level adaptations, those regarding communication and intervention content were most frequently reported, and adjustment to the environment were least included. Most papers focused on CBT-based mental health interventions for anxiety. Additionally, 37 papers described caregiver involvement in therapy, such as being offered separate/combined sessions. Table 1 and online Supplementary Table S6 contain descriptions of the included strategies and caregiver involvement.

Service-level strategies and adapted interventions

Ten papers explored service-level strategies applied to improve mental health care for autistic people across a service. These papers explored initiatives to improve the detection of autism (Ford et al., 2019; Hollocks et al., 2019; Stadnick et al., 2015), strategies for improving clinicians' skills and knowledge of autism (Cervantes et al., 2019; Dreiling et al., 2022; Helverschou et al., 2021; Kuriakose et al., 2018), and general adaptations to standard practice concerning the way mental health services are organized for autistic people (Jones et al., 2021; Petty et al., 2021; Spain et al., 2017).

Twenty-eight papers described studies of adapted mental health interventions to meet the needs of autistic people. These included adaptations of group or individual CBT for anxiety (Bemmer et al., 2021; Burke et al., 2017; Chalfant et al., 2007; Cook et al., 2017; Driscoll et al., 2020; Ehrenreich-May et al., 2014; Ekman et al., 2015; Fujii et al., 2013; Hepburn et al., 2016; Higgins et al., 2019; Kilburn et al., 2019, 2020; Oerbeck et al., 2021; Ollendick et al., 2021; Reaven et al., 2012b; Russell et al., 2013; Storch et al., 2013, 2015, 2020; Sung et al., 2011; Wise et al., 2019; Wood et al., 2015), group CBT targeting emotion regulation (Factor et al., 2019; Scarpa & Reyes, 2011; Sofronoff et al., 2017; Swain et al., 2019), individual CBT for various mental health needs (Cooper et al., 2018), and Eye Movement Desensitisation and Reprocessing (EMDR) (Fisher et al., 2023). Studies with a comparison group most often compared the adapted interventions to non-active controls, and none compared it to a non-adapted version of the same intervention.

Table 1. Study characteristics

Author (Year)	Country	Study design	Population	Age mean (s.d.), range	Baseline N	Strategy	Caregiver involvement in therapy	Setting	Condition targeted
Detection of autism in mental health care									
Ford et al. (2019)	UK	Prospective cohort study	Autistic CYP	5–11 years	CYP: 302	Detection of autism using the DAWBA	Not applicable	Child and Adolescent Mental Health Services	Autism detection
Hollocks et al. (2019)	UK	Survey (Service evaluation)	Autistic CYP	12.8 years (3.6), 6–19	CYP: 77	Detection of autism using the SCQ	Not applicable	Child and Adolescent Mental Health Services	Autism detection
Stadnick et al. (2015)	USA	Cross-sectional survey (service evaluation)	Autistic CYP	10.69 years (3.48), 5–18	CYP: 62	Detection of autism using the ADOS	Not applicable	Outpatient community-based mental health clinics	Autism detection
Strategies for improving clinicians skills and autism knowledge									
Cervantes et al. (2019)	USA	Before-and-after comparison (service implementation)	Autistic CYP	Pre-implementation 35.3% age 4–12 years and 64.7% age 13–17 years; post-implementation 60% age 4–12 years and 40% age 13–17 years; follow-up: 66.7% age 4–12 years, 33.3% age 13–17 years	CYP: 52	ASD-CP consisting of a modular staff training, toolkit, and prescribed practices to be utilized with the person.	Not applicable	Psychiatric emergency care	Mental health care
Dreiling et al. (2022)	USA	Non-randomized service evaluation	Staff working with autistic people	42.22 years (10.6), 25–66	Staff: 86	Project ECHO, a tele-mentoring platform to support mental health professionals	Not applicable	Community services	Mental health care
Helverschou et al. (2021)	Norway	Before-and-after comparison (service evaluation)	Autistic CYP and adults; ID	28.6 years (10.6), 16–66	CYP and adults: 132	AUP network consisting of meetings and seminars to guide mental health professionals in providing specialized mental health care	Not applicable	Specialist hospital-level mental health services	Psychiatric problems
Kuriakose et al. (2018) – linked to Cervantes et al. (2019)	USA	Before-and-after comparison (service implementation)	Autistic CYP	Pre-implementation 35.3% age 4–12 years and 64.7% age 13–17 years; post-implementation: 60% age 4–12 years and 40% age range 13–17 years	CYP: 37	ASD-CP consisting of a modular staff training, toolkit, and prescribed practices to be utilized with the person	Not applicable	Psychiatric emergency care	Mental health care
General adaptations to standard practice									
Jones et al. (2021)	UK	Cross-sectional survey	Staff working with autistic people	–	Staff: 90	Evaluation of strategies and adaptations to inpatient care	Not applicable	Inpatient psychiatric services	Mental health care

Petty et al. (2021)	UK	Qualitative (ethnographic technique)	Staff working with autistic people	25–44 years	Staff: 15	Evaluation of adaptations to improve mental health care.	Not applicable	Specialist autism service	Mental health care
Spain et al. (2017)	UK	Qualitative (thematic analysis)	Staff working with autistic people	–	Staff: 21	Evaluation of general adaptations to standard practice	Not applicable	Inpatient and outpatient services	Mental health care
Group CBT for anxiety									
Bemmer et al. (2021)	Australia	Before-and-after comparison	Autistic CYP and adults	22.77 years (5.31), 16–38	CYP and adults: 84	Adapted group CBT for social anxiety.	Yes	Research clinic	Social anxiety
Burke et al. (2017)	Ireland	Mixed methods (quantitative: before-and-after comparison; qualitative: thematic analysis)	Autistic CYP	10–11 years	CYP: 7	Adapted group CBT for anxiety ('FRIENDS for life' program)	No information	Specialist autism service	Anxiety
Chalfant et al. (2007)	Australia	RCT	Autistic CYP	10.8 years (1.35), range 8–13	CYP: 47	Adapted group CBT for anxiety ('Cool Kids' program) (n = 28) v. waitlist (n = 19).	Yes	School Outreach Service	Anxiety
Cook et al. (2017)	Australia	Pilot RCT	Autistic CYP	5 years (0.83). CBT 5.5 years (0.88); waitlist 5.42 years (0.81)	CYP: 31; Parents: 31	Adapted group parent-mediated CBT for anxiety ('Fun with Feelings' program) for children aged 4–6 years (n = 14) v. waitlist (n = 17)	Yes	University Psychology Clinic	Anxiety
Hepburn et al. (2016)	USA	Non-randomized controlled trial	Autistic CYP	CBT 11.5 years (2.67); waitlist 12.1 years (1.96)	CYP: 33; Parents: 33	Adapted group CBT for anxiety (telehealth 'FYF' program) (n = 17) v. waitlist (n = 16)	Yes	Specialist autism clinic	Anxiety
Higgins et al. (2019)	Ireland	Mixed methods (quantitative: before-and-after comparison; qualitative: thematic analysis)	Autistic CYP	10.25 years (1.26), 9–12	CYP: 12	Adapted group CBT for anxiety ('Special FRIENDS' program)	Yes	Children disability service	Anxiety
Keefer et al. (2017) – linked to Reaven et al. (2018)	USA	Before-and-after comparison	Autistic CYP	11.18 years (2.02)	CYP: 43; Parents: 43	Bespoke group CBT for anxiety ('FYF' program)	Yes	University outpatient clinic	Anxiety
Kilburn et al. (2019)	Denmark	Before-and-after comparison	Autistic CYP	9–13 years	CYP: 9	Adapted group CBT for anxiety ('Cool Kids' program)	Yes	Outpatient clinic at the Centre of Child and Adolescent Psychiatry	Anxiety

(Continued)

Table 1. (*Continued.*)

Author (Year)	Country	Study design	Population	Age mean (s.d.), range	Baseline N	Strategy	Caregiver involvement in therapy	Setting	Condition targeted
Kilburn et al. (2020)	Denmark	RCT	Autistic CYP	11.34 years (1.77). CBT: 11.99 years (1.70); waitlist: 10.68 (1.60)	CYP: 49; Parents: 49	Adapted group CBT for fears and phobias ('Cool Kids' program) (*n* = 25) *v.* waitlist (*n* = 24)	Yes	Outpatient clinic in a general child psychiatric hospital	Fears and phobias
Langdon et al. (2016)	UK	Mixed methods (quantitative: pilot single-blind RCT; qualitative: thematic analysis)	Autistic CYP and adults	35.9 years (14.6), 17–65. CBT 33.1 years (14.6), 20–64; waitlist 38.7 years (14.3), 17–65.	CYP and adults: 52	Bespoke group CBT for anxiety + TAU (*n* = 26) *v.* TAU (*n* = 26)	No information	Community-based settings	Anxiety
McConachie et al. (2014)	UK	Mixed methods (quantitative: pilot RCT; qualitative: thematic analysis)	Autistic CYP	CBT 11.7 years (1.4); delayed therapy 11.8 years (1.3)	CYP: 32; Parents: 32	Bespoke group CBT for anxiety ('Exploring Feelings' program) (*n* = 17) *v.* delayed therapy (*n* = 15)	Yes	Child and Adolescent Mental Health Services	Anxiety
Pickard et al. (2020) – linked to Reaven et al. (2018)	USA	Mixed methods survey	Staff working with autistic people	–	Staff: 34	Bespoke group CBT for anxiety for youth 8–14 years ('FYF' program)	Yes	University-based clinics	Anxiety
Reaven et al. (2009)	USA	Non-randomized controlled trial	Autistic CYP	132 months (22.80), range 97–177 months	CYP: 33; Parents: 33	Bespoke group CBT for anxiety ('FYF' program) (*n* = 10) *v.* waitlist (*n* = 23)	Yes	Community-based services	Anxiety
Reaven et al. (2012a)	USA	RCT	Autistic CYP	CBT 125.75 months (21.47); TAU 125 months (20.45)	CYP: 50; Parents: 50	Bespoke group CBT for anxiety ('FYF' program) (*n* = 24) *v.* TAU (*n* = 26)	Yes	University outpatient clinic	Anxiety
Reaven et al. (2012b)	USA	Before-and-after comparison study	Autistic CYP	15.5 years (13.4), 13.4–18	CYP: 24	Adapted group CBT for anxiety ('FYF' program – adolescent version)	Yes	Research clinic	Anxiety
Reaven et al. (2015)	USA and Canada	Before and after comparison study	Autistic CYP	10.4 years (1.5), 8–13	CYP: 16; Parents: 16; Clinicians: 13	Bespoke group CBT for anxiety ('FYF' program)	Yes	Tertiary paediatric health centre	Anxiety
Reaven et al. (2018)	USA	RCT (3-group parallel design)	Autistic CYP	Manual 132.9 months (20.4); workshop only 130.8 months (27.6); workshop plus 135.5 months (19.5)	CYP: 91; Parents: 91; Clinicians: 34	Bespoke group CBT for anxiety ('FYF' program)	Yes	University-affiliated outpatient clinics	Anxiety
Sofronoff et al. (2005)	Australia	RCT	Autistic CYP	CBT child only 10.56 years (0.99), 9–12; CBT child + parent 10.54 years (1.26), 9–12; waitlist 10.75 years (1.04) 9–12	CYP: 71	Bespoke group CBT for anxiety: child only (*n* = 23) *v.* child + parent (*n* = 25) *v.* waitlist (*n* = 23)	Yes	University psychology clinic	Anxiety

Solish et al. (2020)	Canada	Before-and-after comparison (service evaluation)	Autistic CYP	Specialised hospital 10.08 years (1.71); community 10.87 (1.72)	CYP: 105; Parents: 105 (completers)	Bespoke group CBT for anxiety ('FYF' program)	Yes	Community clinics and specialized hospital	Anxiety
Sung et al. (2011)	Singapore	RCT	Autistic CYP	9–16 years. CBT 11.33 years (2.03); Social recreational 11.09 years (1.53)	CYP: 70	Adapted group CBT for anxiety (*n* = 36)	No	Outpatient mental health clinic for children and adolescents	Anxiety
Walsh et al. (2018) – linked to Reaven et al. (2018)	USA	RCT (3 group parallel design)	Autistic CYP	133.35 (23.59) months	CYP: 80; Parents: 80 (completers); Clinicians: 34	Bespoke group CBT for anxiety ('FYF' program)	Yes	University-affiliated outpatient clinics	Anxiety
Individual CBT for anxiety									
Driscoll et al. (2020)	USA	Before-and-after comparison	Autistic CYP	5.7 years (1.4), 3–7	CYP: 16	Adapted individual CBT for anxiety ('Being Brave' program)	Yes	Outpatient clinics of two urban hospitals affiliated with a medical school	Anxiety
Ehrenreich-May et al. (2014)	USA	Before-and-after comparison	Autistic CYP	12.2 years (1.11), range 11–14	CYP: 20	Adapted individual CBT for anxiety ('BIACA' program)	Yes	University treatment centers	Anxiety
Ekman et al. (2015)	Sweden	Before-and-after comparison	Autistic CYP and adults	Teens 14.9 years (1.5), 13–17; adults 29.8 years (4.4), 23–36	CYP and adults: 18	Adapted individual CBT for anxiety	No information	Private clinic, child and adolescent psychiatric clinic, treatment center for youth	Anxiety
Fujii et al. (2013)	USA	Pilot RCT	Autistic CYP	8.80 years (1.60), 7–11. CBT 8.7 years (1.8); TAU 9 years (1.6)	CYP: 12	Adapted individual CBT for anxiety ('BIACA' program) (*n* = 7) v. TAU (*n* = 5)	Yes	University clinic and an associated autism community clinic	Anxiety
Maskey et al. (2019a)	UK	Before-and-after comparison	Autistic CYP	8–12 years	CYP: 8	Bespoke individual CBT for fears and phobias using flat screen computer delivery of images ('Blue Room')	Can't tell	NHS/university setting	Fears and phobias
Maskey et al. (2019b)	UK	Feasibility RCT	Autistic CYP	CBT 130.13 months (28.38), 89–174; delayed therapy 129 months (21.51), 90–157	CYP: 32; Parents: 32	Bespoke individual CBT for anxiety with virtual reality ('Blue Room') (*n* = 16) v. delayed therapy (*n* = 16)	Can't tell	Recruited from mental health services but delivered in a university setting	Anxiety
Oerbeck et al. (2021)	Norway	Before-and-after comparison study	Autistic CYP	9.5 years, range 8–12;	CYP: 10	Adapted individual CBT for anxiety ('Less Stress' program)	Yes	Child and Adolescent Mental Health Clinics	Anxiety
Ollendick et al. (2021)	USA	Before-and-after comparison study	Autistic CYP	6–14 years	CYP: 9	Adapted individual CBT for specific phobia ('OST')	Yes	Clinic	Phobias
	UK	Single-blind RCT			CYP and adults: 46				OCD

Table 1. (*Continued.*)

Author (Year)	Country	Study design	Population	Age mean (s.d.), range	Baseline N	Strategy	Caregiver involvement in therapy	Setting	Condition targeted
Russell et al. (2013)			Autistic CYP and adults	26.9 years, range 14–65. CBT 28.6 years (11.3), 14–49; anxiety management 25.2 (13.5), 14–65		Adapted individual CBT for OCD (n = 23) v. adapted anxiety management (n = 23)	No information	Specialist autism, OCD clinics and mental health services	
Storch et al. (2013)	USA	RCT	Autistic CYP	8.89 years (1.3), 7–11. CBT 8.83 years (1.31); TAU 8.95 years (1.40)	CYP: 45; Parents: 45	Adapted individual CBT for anxiety ('BIACA' program) (n = 24) v. TAU (n = 11)	Yes	University based mental health clinic	Anxiety
Storch et al. (2015)	USA	RCT	Autistic CYP	2.74 years (1.34), 11–16. CBT 12.75 years (1.24); TAU 12.73 years (1.49)	CYP: 31; Parents: 31	Adapted individual CBT for anxiety ('BIACA' program) (n = 16) v. TAU (n = 15)	Yes	University based multidisciplinary behavioral health clinic specializing in the treatment of pediatric anxiety	Anxiety
Storch et al. (2020)	USA	Pilot RCT	Autistic CYP	10.03 years (2.81), 6–17. FET 10.07 years (2.89); TAU 10 years (s.d. = 2.83)	CYP: 32	Adapted individual FET for anxiety (n = 14)	Yes	Tertiary care clinic specializing in pediatric obsessive compulsive and anxiety disorders	Anxiety
Wise et al. (2019)	USA	Before-and-after comparison	Autistic CYP and adults	17.14 years (1.68), range 16–20	CYP and adults: 7	Adapted individual CBT for anxiety	Yes	University-based health clinic specializing in the treatment of anxiety	Anxiety
Wood et al. (2015)	USA	RCT	Autistic CYP	12.3 years (1.14), 11–15. CBT 12.4 years (1.3); waitlist 12.2 (0.98)	CYP: 33; Parents: 33	Adapted individual CBT for anxiety 'BIACA' program) (n = 19) v. waitlist (n = 14)	Yes	University clinic and associated autism community clinic	Anxiety
Individual and group CBT for anxiety									
Murphy et al. (2017)	UK	Pilot RCT	Autistic CYP	CBT 14.94, (1.63); waitlist 15.56 (1.91)	CYP: 36	Bespoke individual and group CBT for anxiety ('MASSI' program) (n = 17) v. counseling (n = 19)	Yes	Child and Adolescent Mental Health Services	Anxiety
White et al. (2013)	USA	Pilot RCT	Autistic CYP	175 months (15 years). CBT 170 months (14 years); waitlist 180 months (15 years)	CYP: 30	Bespoke individual and group CBT for anxiety ('MASSI' program) (n = 15) v. waitlist (n = 11)	Yes	University-affiliated clinic specializing in autism treatment	Anxiety
White et al. (2015) – linked to White et al. (2013)	USA	Pilot RCT	Autistic CYP	174.05 months (18.66)	CYP: 22 (completers)	Bespoke individual and group CBT for anxiety ('MASSI' program) (n = 11) v. waitlist (n = 11)	Yes	University-affiliated clinic specializing in autism treatment	Anxiety
Interventions targeting emotional regulation									

Study	Country	Design	Population	Age	Sample	Intervention		Setting	Need
Drüsedau et al. (2022)	Germany	Before-and-after comparison	Autistic CYP	10.08 years (1.32), range 7–12	CYP: 30	Bespoke group mindfulness-based intervention ('TüTASS' program)	Yes	Outpatient unit at University Hospital of Psychiatry and Psychotherapy	Mental health difficulties; emotion regulation
Factor et al. (2019)	USA	RCT	Autistic CYP	5.46 (1.01), 4–7. CBT 5.54 years (0.94); waitlist 5.36 years (1.12)	CYP: 23; Parents: 23	Adapted group CBT for emotion regulation ('STAMP' program) for younger children (4–7 years) ($n = 12$) v. delayed therapy ($n = 11$)	Yes	Autism clinic	Mental health difficulties; emotion regulation
Scarpa and Reyes (2011)	USA	Pilot RCT	Autistic CYP	5–7 years	CYP: 11; Parents: 11	Adapted group CBT for emotion regulation ($n = 5$)	Yes	Autism clinic	Mental health difficulties; emotion regulation
Sofronoff et al. (2017)	Australia	Before-and-after comparison	Autistic CYP	9.56 years, 7 years and 11 months-12	CYP: 41; Parents: 38[a]	Adapted group cognitive behavioral emotional and social skills intervention ('SAS' program).	Yes	University clinic	Mental health difficulties; emotion regulation
Swain et al. (2019)	USA	Before-and-after comparison study	Autistic CYP	3.89 months (11.87), 53–90 months	CYP: 18	Adapted group CBT for young children (aged 4–8) ('STAMP' program)	Yes	University associated community clinic and a hospital	Mental health difficulties; emotion regulation
CBT for various mental health needs									
Cooper et al. (2018)	UK	Cross-sectional survey	Staff working with autistic people	–	Staff: 50	Adapted individual CBT	Yes	IAPT and secondary mental health services	Mental health difficulties
McGillivray and Evert (2014)	Australia	Non-randomized controlled trial	Autistic CYP and adults	20.6 years (4.1), 15–25. CBT 20.27 years (4.39); waitlist 20.50 (3.4)	CYP and adults: 42	Bespoke group CBT for anxiety, stress, and depression ('think well, feel well and be well' program) ($n = 26$) v. waitlist ($n = 16$)	No information	Disability service agency	Mental health difficulties
Santomauro et al. (2016)	Australia	Pilot RCT	Autistic CYP	15.75 years (1.37). CBT 16 years (1.33); waitlist 15.5 years (1.43).	CYP: 20 (completers)	Bespoke group CBT for depression ('Exploring depression' program) ($n = 11$) v. waitlist ($n = 12$)	Can't tell	University clinic	Depression
EMDR for PTSD									
Fisher et al. (2023)	Netherlands; UK	Delphi mixed methods survey (3 rounds)	Staff working with	–	Staff: 103	Adapted EMDR	Can't tell	Psychological therapies, community mental health, ID, forensic and tertiary	PTSD

Table 1. (Continued.)

Author (Year)	Country	Study design	Population	Age mean (s.d.), range	Baseline N	Strategy	Caregiver involvement in therapy	Setting	Condition targeted
			autistic people					services, independent practice, education, military, voluntary organizations	

Note: Where age characteristics are not listed in the table this means that they were not reported in the paper. ADHD, Attention Deficit Hyperactivity Disorder; ADOS, Autism Diagnostic Observation Schedule; ASC, Autism Spectrum Conditions; ASD-CP, Autism Spectrum Disorder Care; AUP, Pathway Autism Intellectual Disability and Psychiatric Disorder; BIACA, Behavioral Interventions for Anxiety in Children with Autism; CBT, Cognitive Behavioral Therapy; CYP, Children and Young People; DAWBA, Development and Well-Being Assessment; ECHO, Extension for Community Healthcare Outcomes; EMDR, Eye Movement Desensitisation and Reprocessing; FET, Family-based exposure-focused treatment; FYF, Facing Your Fears; IAPT, Improving Access to Psychological Therapies; ID, Intellectual Disability; MASSI, Multimodal Anxiety and Social Skills Intervention; OCD, Obsessive Compulsive Disorder; OST, One-Session Treatment; PTSD, Post Traumatic Stress Disorder; RCT, Randomized Controlled Trial; SAS, Secret Agent Society; SCQ, Social Communication Questionnaire; STAMP, Stress and Anger Management Programme; TAU, Treatment as Usual; TüTASS, Tübinger Training for Autism Spectrum Disorders.
aThree parents had two children in the study.

Seven top-level adaptation categories were identified from these papers exploring service- and intervention-level adaptations:

- Increasing knowledge and detection of autism ($n = 10$, e.g. use of screening tools, clinician training).
- Adjustments to the physical environment ($n = 6$, e.g. minimizing sensory distractions, providing ear defenders, weighted blankets, fidget toys, and movement breaks).
- Communication accommodations ($n = 20$, e.g. being directive, adjusting the communication pace, using preferred language, using written information on whiteboard, activity books, agendas, and visual aids like drawings, videos, using social stories, and using a computer to reduce face-to-face contact).
- Accommodating individual differences ($n = 16$, e.g. evaluating preferences and needs, encouraging special interests and hobbies, and tailoring treatment to these by being flexible with the treatment manual).
- Structural or procedural adaptations ($n = 15$, e.g. changing the format, duration, or number of sessions, having predictable session routines and structured approach to treatment with details communicated in advance).
- Intervention content adaptations ($n = 24$, e.g. removing or simplifying psychoeducation and cognitive elements of the intervention, incorporating arts-based activities, using role-play, rewards, taking a progressive approach to treatment with opportunity for repetition and practice)
- Involving the wider support network ($n = 18$, e.g. involving parents and child's school to support active transfer of skills/therapy goals from clinic to home and school)

More than one adaptation was identified in 31 out of 38 of these papers exploring service- and intervention-level adaptations, meaning papers crossed several categories. Most papers provided a general rationale for these adaptations as addressing barriers to mental health care. There were limited descriptions of specific adaptations and their rationale. Table 2 shows a breakdown of sub-categories which map to these top-level categories. Online Supplementary Table S9 includes details of the individual adaptations used by each paper.

Bespoke interventions

Nineteen papers described bespoke mental health interventions originally developed for autistic CYP, often in part by the authors themselves, and tested in their unmodified version. These included a novel combined group and individual intervention for anxiety (Murphy et al., 2017; White et al., 2013, 2015), individual interventions for anxiety in a virtual reality environment (Maskey et al., 2019a, 2019b), group interventions for anxiety (Keefer et al., 2017; Langdon et al., 2016; McConachie et al., 2014; Pickard et al., 2020; Reaven et al., 2009, 2012a, 2015, 2018; Solish et al., 2020; Walsh et al., 2018), group interventions for anxiety, stress, and depression (McGillivray & Evert, 2014) and for depression only (Santomauro et al., 2016), all utilizing CBT techniques. Additionally, they included a new group intervention for emotion regulation designed for autistic CYP based on mindfulness principles (Drüsedau et al., 2022).

Acceptability, feasibility, and effectiveness of strategies used to improve mental health care for autistic CYP

Evaluation of service-level strategies

Ten papers evaluated service-level strategies, grouped into three categories depending on their focus. The main findings of service-

Table 2. All service-level and intervention-level adaptations (simplified version) (*N* = 38)

Top-level categories	Sub-categories	Summary	N articles[a]
Increase knowledge and detection of autism (*n* = 10)	Clinician training and skills	Training to provide clinicians with an overview of ASD and to tailor treatment to individual needs and increase self-efficacy, knowledge of autism and skills. Use of skills such as normalizing experiences and prioritizing the therapeutic relationship	6
	Introduction of screening tools for the detection of autism	Use of assessments such as the ADOS, SCQ, and DAWBA to improve the assessment and detection of autism	4
Adjustments to the physical environment (*n* = 6)	Provide environmental and practical adjustments	Provide adjustments to minimize sensory distractions such as a low stimulus area, adjustments to noise, décor, scents, and lighting	5
	Encourage the use of sensory resources and stimming	Provide sensory resources such as tactile objects, include movement breaks and exercises and use multi-sensory activities, encourage use of stimming behavior	5
Communication accommodations (*n* = 20)	Use of clear, simple, and preferred language	Provide clear instructions and guidance, be more directive, monitor, adapt and slow the pace of communication, use preferred language where possible	7
	Use of simple, written material, and visual aids	Use of written information and external cues such as use of a whiteboard, activity books, worksheets, timers, agendas, and calendars. Use of visual aids such as drawings, pictures, videos, and leaflets	16
	Provide communication support	Use of communication passports and social stories to support communication.	1
	Use of technology	Incorporating technology into the intervention to aid communication	2
Accommodate individual differences (*n* = 16)	Evaluate individual needs and preferences	Evaluate preferences, sensitivities, sensory needs, likes and dislikes and coping strategies.	3
	Encourage individual's hobbies and interests	Include and ask about the individual's special interests and hobbies in therapy.	4
	Tailor practice to individual needs and preferences	Tailor care plans and practice to individual differences such as incorporating approaches targeted at neurodevelopmental comorbidities, being flexible with the treatment manual and the session timings and ensuring that resources are appropriate for the person's gender	13
Structural or procedural adaptations (*n* = 15)	Format of intervention	Reduce or increase the number and duration of sessions and exercises, conduct exposure in more varied settings	8
	A structured and predictable approach	Having predictable session routines and a structured approach to treatment, with details communicated in advance	8
Intervention content adaptations (*n* = 24)	Simplified content	Remove or simplify psychoeducation and cognitive elements of the intervention	5
	Creative outlets and activities	Incorporating creativity and arts-based activities into the intervention	3
	Use of role play or modeling	Using role play as a technique to reinforce learning during sessions, or modeling activities e.g. by video, or using a puppet or character	6
	Use of a rewards system	Using reward systems to help reinforce learning	4
	Taking it slow	Taking a slow/progressive approach to treatment, with opportunity for repetition and practice	6
	Consider the role of autism	Consider the role of autism, develop an understanding of autism such as its characteristics and impact on daily life	2
	Integration of emotion-focused strategies	Provide psychoeducation on emotions, arousal and feeling physiologically overwhelmed and exercises to access emotions	7
	Integration of cognitive-behavioral approaches	Provide cognitive and behavioral strategies including building a positive self-image, coping strategies, and making links between behavior, thoughts, and feelings	6
	Integration of social skills training	Integration of social skills training such as entering and maintaining conversations and managing disagreements	6
Involving wider support network (*n* = 18)	Parental involvement	Involving parents in the intervention	17
	Involving school	Involving or incorporating the child's school into the intervention	3

Note: ADOS, Autism Diagnostic Observation Schedule; SCQ, Social Communication Questionnaire; DAWBA, Development and Well-Being Assessment.
[a]Several adaptations were often reported by the same article, meaning papers crossed several categories so the number of papers in this column does not add up to the total 38 contributing papers.

Table 3. Main findings of individual/group and adapted/bespoke mental health interventions/strategies and service adaptations

Study design (N) [Ref.]	Study characteristics (N)	Participant characteristics (N)	Strategy (v. comparison) (N)	Adaptation categories and sub-categories (N)	Main Findings & Certainty of Evidence
Detection of autism (n = 3)					
Survey (3) [Ford et al., 2019; Hollocks et al., 2019; Stadnick et al., 2015]	**Sample size:** 62–302 (3). **Country:** UK (2), USA (1). **Setting:** CAMHS (2), outpatient services (1).	**Diagnosis:** 13.5–57% ASC (3); various mental health difficulties (3). **Demographics:** CYP (3); 75–76% male (2), % male not reported (1); 67% non-White (1), ethnicity not reported (2). **Participants:** Service users (3).	DAWBA (1); SCQ (1); ADOS (1).	**Increase knowledge and detection of autism (3):** Introduction of screening tools for the detection of autism (3).	**Effectiveness:** DAWBA (1) and ADOS (1) can be useful screening tools, but not SCQ (1). – **Certainty of evidence:** Moderate certainty.
Strategies for improving clinicians' skills and knowledge of autism (n = 4)					
Before-and-after comparison (4)[a] [Cervantes et al., 2019; Dreiling et al., 2022; Helverschou et al., 2021; Kuriakose et al., 2018]	**Sample size:** Clinicians 86 (1), CYP (2) and CYP and adults (1) 37–132 (4). **Country:** USA (3), Norway (1). **Setting:** Psychiatric emergency care (2); Community services (1), Specialist hospital-level mental health services (1).	**Diagnosis:** 100% ASC (3); various mental health difficulties (3); 100% ID (1). **Demographics:** Clinicians (1) 6% male; 14% non-White. CYP (2) and CYP and adults (1) 67–76% male; ethnicity not reported (3). **Participants:** Clinicians (1). Service users (2).	Project ECHO (1); AUP network (1); ASD-CP (2).	**Increase knowledge and detection of autism (4):** Clinician training and skills (4).	**Acceptability:** High satisfaction (1). **Feasibility:** High attendance (1). **Effectiveness:** Pre-post improvements in clinicians' self-efficacy, knowledge of autism, and awareness in best practice (1); Pre-post improvements in proportion of psychiatric problems in autistic CYP with ID, sustained at 24–27 months (1); Pre-post reductions in proportion of CYP experiencing a restraint but not in inpatient length of stay, total length of stay (i.e. brief-stabilization unit and inpatient stay), brief-stabilization unit restraints, inpatient restraints, total restraints (i.e. brief-stabilization and inpatient restraints), and total intramuscular medication (1), and pre-18-month follow-up reductions in the number of brief stabilization unit restraints, total restraints and youth with restraints and use of intramuscular medication, but not in inpatient and total length of stay or number of inpatient restraints (1). – **Certainty of evidence:** Low certainty.

General adaptations to standard practice (n = 3)

Qualitative (2); survey (1) [Jones et al., 2021; Petty et al., 2021; Spain et al., 2017]	**Sample size:** 15–90 (3). **Country:** UK (3). **Setting:** Inpatient units (1), specialist autism service (1), inpatient and outpatient services (1).	**Demographics:** 20% male (1), % male not reported (2); 73% White-British (1), ethnicity not reported (2). **Participants:** Clinicians (3).	Evaluation of general adaptations to improve standard mental health care (3).	**Adjustments to the physical environment (3):** Provide environmental and practical adjustments (3); Encourage the use of sensory resources and stimming (2). **Communication accommodations (3):** Use of clear, simple, and preferred language (2); Use of simple, written material and visual aids (2); Provide communication support (1). **Accommodate individual differences (3):** Tailor practice to individual needs and preferences (3); Evaluate individual needs and preferences (2). **Increase knowledge and detection of autism (2):** Clinician training and skills (1); Introduction of screening tools for the detection of autism (1). **Structural or procedural adaptations (1):** A structured and predictable approach (1).	**Feasibility:** Clinicians identified a range of adaptations that were used. 3/3 made modifications to the environment (e.g. reduce noise or scents, adapt meal plans, provide ear defenders) and communication (e.g. avoid jargon, use plain English, use visual cards) and evaluated/tailored practice based on individual needs and preferences (e.g. adapt care plans, offer individualized approach). 2/3 either involved clinicians' autism knowledge/skills (e.g. awareness of gender differences) or introduced autism assessment. 1/3 provided structure/predictability (e.g. ensure client is prepared).

Group CBT for anxiety (n = 21)

RCT (7); Before-and-after (6); Pilot RCT (3); Mixed methods (2); Non-randomized (2); Survey (1)[b] [Bemmer et al., 2021; Burke et al., 2017; Chalfant et al., 2007; Cook et al., 2017; Hepburn et al., 2016; Higgins et al., 2019; Keefer et al., 2017; Kilburn et al., 2019, 2020; Langdon et al., 2016; McConachie et al., 2014; Pickard et al., 2020; Reaven et al., 2009, 2012a, 2012b, 2015, 2018; Sofronoff et al., 2005; Solish et al., 2020; Sung et al., 2011; Walsh et al., 2018]	**Sample size:** Clinicians 13–34 (4), Parents 16–105 (11), CYP (18) and CYP and adults (2) 7–105 (21). **Country:** USA (8), Australia (4), UK (2), Denmark (2), Ireland (2), USA and Canada (1), Canada (1), Singapore (1). **Setting:** Outpatient clinic (11), community services (2), specialist autism service (2), primary health care network and headspace clinical services (1), CAMHS (1), Children disability service (1), School Outreach Service (1), tertiary (1), community and specialised hospital (1).	**Diagnosis:** 100% ASC (20); 100% anxiety (19); ADHD (1). **Demographics:** CYP (18) and CYP and adults (2) 52–96% male (19), % male not reported (1); 0–100% non-White (9), ethnicity not reported (11). Clinicians 10% male, 10% non-white (1) **Participants:** Service users (20), Parents (11), Clinicians (4).	Adapted group CBT for anxiety (5); Bespoke group CBT for anxiety (4); Adapted group CBT for anxiety v. waitlist (4); Bespoke group CBT for anxiety v. waiting list (2); Bespoke group CBT for anxiety standard manual training v. workshop only v. workshop plus (2); Adapted group CBT for anxiety v. SR (1); Adapted group parent-mediated CBT for anxiety v. waitlist (1); Bespoke group CBT for anxiety v. waiting list v. TAU (1); Bespoke group CBT for anxiety (child only) v. brief CBT for anxiety (child + parent) v. waitlist (1).	**Intervention content adaptations (9):** Simplified content (4); Use of role play or modeling (4); Integration of social skills training (3); Taking it slow (2); Creative outlets and activities (2); Integration of cognitive-behavioral approaches (1); Integration of emotion-focused strategies (1). **Structural or procedural adaptations (8):** Format of the intervention (5); A structured and predictable approach (4). **Communication accommodations (7):** Use of simple, written material and visual aids (6); Use of technology (1). **Accommodate individual differences (5):** Tailor practice to individual needs and preferences (5). **Involving wider support network (5):** Parental involvement (5).	**Acceptability:** high satisfaction (15); high sustainability (1). **Feasibility:** high attendance rate (19); low drop-out rate (19); high treatment fidelity (10); qualitative accounts supporting intervention feasibility and accessibility (1). **Effectiveness:** Significant differences in clinician-, parent-, and child-rated anxiety (1); in parent-rated anxiety (1); in parent-rated but not in child-rated anxiety (1); and in parent- and child-reported anxiety reduction and clinician-reported anxiety severity but not in clinician-reported anxiety improvement scores or child-reported anxiety (1), all between CBT and waitlist favoring CBT at post.

Table 3. (Continued.)

Study design (N) [Ref.]	Study characteristics (N)	Participant characteristics (N)	Strategy (v. comparison) (N)	Adaptation categories and sub-categories (N)	Main Findings & Certainty of Evidence
				Adjustments to the physical environment (1): Provide environment and practical adjustments (1); Encourage the use of sensory resources and stimming (1).	Significant differences in clinician-rated anxiety and positive treatment response between CBT and TAU, favoring CBT at post (1). Significant differences in child- and parent-rated anxiety between CBT (child only), CBT (child + parent) and waitlist, favoring CBT (child + parent) at post (1). No significant difference in clinician-rated anxiety post-treatment (1) and both post and at 24-week follow-up (1), and in parent-rated anxiety at post (1), all between CBT and waitlist. No significant differences in child- and clinician-rated anxiety between CBT and SR at post, 3- and 6-month follow-up (1). No significant differences in clinician-rated anxiety between CBT standard manual training, workshop only, and workshop plus at post (1). Significant pre-post reduction in self-reported anxiety (1); in clinician-reported anxiety (1); in parent- and child-rated anxiety and at 4-month follow-up (1); in clinician-, parent- and child-rated anxiety at post and 3-month follow-up (1). Significant pre-post decrease in parent-rated anxiety but not in child-report or parent- and child-reported anxiety to uncertain events (1). Significant pre-post reduction in parent- and child-rated anxiety, except in child-rated amount of worry and distress (1). Improvement in clinician-, parent, and child-rated

					anxiety and social functioning over time (no statistical testing) (1). No change in self-reported anxiety (no statistical analysis) (1). – **Certainty of evidence:** Moderate certainty.

Individual CBT for anxiety (n = 14)

Before-and-after (7); RCT (4); Pilot RCT (3) [Driscoll et al., 2020; Ehrenreich-May et al., 2014; Ekman et al., 2015; Fujii et al., 2013; Maskey et al., 2019a, 2019b; Oerbeck et al., 2021; Ollendick et al., 2021; Russell et al., 2013; Storch et al., 2013, 2015, 2020; Wise et al., 2019; Wood et al., 2015]	**Sample size:** Parents 4–33 (4), CYP (11) and CYP and adults (3) 7–46 (14). **Country:** USA (9), UK (3), Sweden (1), Norway (1). **Setting:** Outpatient services (12), Specialist autism, OCD clinics and mental health services (1), tertiary (1).	**Diagnosis:** 100% ASC (14); 100% anxiety (14). **Demographics:** CYP (11) and CYP and adults (3) 22–100% male; 6–33% non-White (10), ethnicity not reported (4). **Participants:** Service users (14), Parents (4).	Adapted individual CBT for anxiety (6); Adapted individual CBT for anxiety v. TAU (4); Adapted individual CBT for anxiety v. waitlist (1); Adapted individual CBT for OCD v. adapted AM (1); Bespoke individual CBT for anxiety (1); Bespoke individual CBT for anxiety v. waitlist (1).	**Intervention content adaptations (9):** Use of a rewards system (4); Integration of emotion-focused strategies (3); Integration of social skills training (3); Consider the role of autism (1); Use of role play or modeling (1); Integration of cognitive-behavioral approaches (1). **Communication accommodations (8):** Use of simple written material and visual aids (6); Use of clear, simple, and preferred language (3); Use of technology (1). **Involving wider support network (8):** Parental involvement (7); Involving school (1). **Accommodate individual differences (6):** Tailor practice to individual needs and preferences (4); Encourage individual's hobbies and interests (2). **Structural or procedural adaptations (3):** Format of the intervention (2); A structured and predictable approach (1).	**Acceptability:** High satisfaction (3); use of visualization was perceived as helpful by participants (1); no significant differences in treatment satisfaction between adapted CBT for OCD and AM, but significantly more participants in the AM group requested crossover to the CBT group than vice versa (1). **Feasibility:** Low drop-out rate (11); high attendance rate (9); high treatment adherence (2); high treatment fidelity (1); satisfactory homework compliance (1). **Effectiveness:** Significant group differences in clinician-rated anxiety between CBT and TAU (4) and between CBT and waitlist (1), in favor of CBT at post, but not in parent- and child-reported anxiety between CBT and TAU (1/4). No significant group differences in child and parent-rated anxiety between CBT and waitlist post-treatment and at 6-month follow-up (1). No significant differences in clinician-rated OCD between CBT and AM post-treatment (1). Significant pre-post reduction in self – reported anxiety and global functioning (1); clinician-rated anxiety (1); parent- and self-rated anxiety and social

Table 3. (Continued.)

Study design (N) [Ref.]	Study characteristics (N)	Participant characteristics (N)	Strategy (v. comparison) (N)	Adaptation categories and sub-categories (N)	Main Findings & Certainty of Evidence
					functioning but not in quality of life (1); clinician-rated anxiety but not in self-reported anxiety and clinician-rated depression (1); clinician- and parent-rated anxiety but not in child-report (1). A decrease in child-report anxiety for treatment responders at 6-month follow-up, maintained by 2 participants at 12-month follow-up (no statistical analysis) (1). Large proportion of children rated 'much improved' or 'very much improved' based on clinician-rated anxiety post treatment, of which many maintained this status at 4-months follow-up (no statistical analysis) (1), – **Certainty of evidence:** Moderate certainty.
Combined individual and group CBT for anxiety (n = 3)					
Pilot RCT (3)[c] [Murphy et al., 2017; White et al., 2013, 2015]	**Sample size:** 22–36 (3) **Country:** USA (2), UK (1). **Setting:** University clinic (2), CAMHS (1).	**Diagnosis:** 100% ASC (3); 100% anxiety (3). **Demographics:** CYP: 61–77% male (3); 5–18% non-White (3). **Participants:** Service users (3).	Bespoke individual and group CBT for anxiety v. waitlist (2); Bespoke individual and group CBT for anxiety v. counseling (1).	Not applicable.	**Acceptability:** High satisfaction (1); No significant difference in therapeutic alliance between CBT and counseling (1). **Feasibility:** Higher attendance rate in counseling group over CBT (1); low drop-out rate (3); high treatment fidelity (2); high attendance rate (1). **Effectiveness:** No significant differences in parent – and clinician-reported anxiety between CBT and waitlist (1). Significant increase in parent –reported anxiety in the CBT group over a 1-year follow-up but did not return to baseline levels (1). No

| | | | | | significant differences in clinician- and parent-rated anxiety between CBT and counseling at post-treatment, but there were significantly fewer participants in the counseling group that met criteria for separation anxiety at post (1).
– **Certainty of evidence:** Moderate certainty. |

Group interventions targeting emotion regulation (n = 5)

Before-and-after (3); **RCT (1)**; **Pilot RCT (1)** [Drüsedau et al., 2022; Factor et al., 2019; Scarpa and Reyes, 2011; Sofronoff et al., 2017; Swain et al., 2019]	**Sample size:** CYP 11–41 (5), Parents 11–38 (3). **Country:** USA (3), Germany (1), Australia (1). **Setting:** Autism clinic (2), University clinic (2), University clinic and hospital (1).	**Diagnosis:** 100% ASC (5); various mental health difficulties (3). **Demographics:** 82–92% male (5); 0% non-White (2), ethnicity not reported (3). **Participants:** Service users (5), Parents (3)	Bespoke group mindfulness-based intervention (1); Adapted group CBT for emotion regulation *v.* delayed therapy (2); Adapted group CBT for emotion regulation (1); Adapted parent-delivered cognitive behavioral emotional and social skills intervention (1)	**Intervention content adaptations** (4): Creative outlets and activities (2); Taking it slow (2); Simplified content (1); Use of role play or modeling (1); Use of a rewards system (1); Integration of emotion-focused strategies (1); Integration of cognitive behavioral approaches (1). **Involving wider support network (3):** Parental involvement (3); Involving school (1). **Adjustments to the physical environment (1):** Encourage the use of sensory resources and stimming (1).	**Acceptability:** High satisfaction (2). **Feasibility:** High attendance rate (2); Low drop-out rate (2); High drop-out rate (1); Low attendance rate (1). **Effectiveness:** No significant difference between CBT and delayed therapy in parent-reported emotion regulation at post (1); No significant pre-post difference in parent-reported depression or parent- and child-reported quality of life (1); Significant pre-post reduction in parent-reported emotional lability/negativity in CBT group, but not in delayed therapy and no significant pre-post difference in parent-reported emotion regulation in both groups (1); 67% participants classified as treatment responders and there was a significant pre-post increase in parent-reported confidence in their child's ability to manage anger and anxiety (1); Significant improvements in parent-rated anxiety and social and emotional regulation skills from pre to post and from pre to 6-week follow-up (1). – **Certainty of evidence:** Low certainty.

Table 3. (*Continued.*)

Study design (*N*) [Ref.]	Study characteristics (*N*)	Participant characteristics (*N*)	Strategy (*v.* comparison) (*N*)	Adaptation categories and sub-categories (*N*)	Main Findings & Certainty of Evidence
CBT for various mental health needs (n = 3)					
Pilot RCT (1); Non-randomized controlled trial (1); Survey (1) [Cooper et al., 2018; McGillivray and Evert, 2014; Santomauro et al., 2016]	**Sample size:** Clinicians 50 (1), CYP (1) and CYP and adults (1) 23–42 (2). **Country:** Australia (2), UK (1). **Setting:** IAPT and secondary mental health services (1), disability service (1), University clinic (1).	**Diagnosis:** 100% ASC (2); depression (1); various mental health difficulties (1). **Demographics:** Clinicians none reported (1). CYP (1) and CYP and adults (1): 60–76% male (2); ethnicity not reported (2). **Participants:** Clinicians (1); Service users (2).	Bespoke group CBT for depression *v.* waitlist (1); Bespoke group CBT for anxiety, stress, and depression *v.* waitlist (1); Adapted individual CBT for various mental health needs (1).	**Communication accommodations (1):** Use of clear, simple, and preferred language (1); Use of simple, written material and visual aids (1). **Accommodate individual differences (1):** Encourage individual's hobbies and interests (1). **Structural or procedural adaptations (1):** Format of intervention (1); A structured and predictable approach (1). **Intervention content adaptations (1):** Simplified and structured content (1); Integration of emotion-focused strategies (1); Integration of cognitive-behavioral approaches (1). **Involving wider support network (1):** Parental involvement (1).	**Acceptability:** High satisfaction (2). **Feasibility:** Low drop-out rate (2); High attendance rate (1); Most frequently used adaptations included behavioral strategies, plain English, structured and concrete approach, psychoeducation about emotions, written and visual information, and discussing hobbies and interests (> 50%), whereas the least frequently used adaptations were involving family, shorter/longer sessions, avoiding metaphors and cognitive strategies (1). **Effectiveness:** No significant differences between CBT and waitlist in self-reported anxiety, depression, and emotion regulation at post-treatment (2). – **Certainty of evidence:** Moderate certainty.
EMDR for PTSD (n = 1)					
Survey (1) [Fisher et al., 2023]	**Sample size:** 103 (1). **Country:** Netherlands & UK (1) **Setting:** Mixed mental health care settings (1).	**Demographics:** None reported. **Participants:** Clinicians (1).	Adaptations to EMDR for PTSD (1)	**Increase knowledge and detection of autism (1):** Clinician training and skills (1). **Adjustments to the physical environment (1):** Provide environmental and practical adjustments (1); Encourage the use of sensory resources and stimming (1). **Communication accommodations (1):** Use of clear, simple, and preferred language (1); Use of simple, written material and visual aids (1). **Accommodate individual**	**Feasibility:** A range of adaptations were always/ often or sometimes incorporated in EMDR with autistic people including awareness of autism traits and use of specific skills (e.g. aware of possibility of sensory overload), changes to the environment (e.g. encourage stimming and reduce bright lights) and communication (e.g. offer clear guidance, be directive), tailoring practice to individual needs (e.g. be

level strategies are presented in Table 3, with detailed results of individual studies in online Supplementary Table S12. Online Supplementary Table S10 shows the GRADE assessment for effectiveness outcomes.

1. Detection of autism ($n = 3$).

Overall, moderate certainty evidence suggested that some screening tools may be helpful in detection of autism in mental health services (online Supplementary Table S10). The Development and Well-being Assessment (DAWBA) was found to have moderate agreement with practitioner diagnosis of autism in child and adolescent mental health services (CAMHS), suggesting it may be useful to aid the diagnostic process (Ford et al., 2019). Conversely, the Social Communication Questionnaire (SCQ) was found to not be an effective autism screening tool in CAMHS (Hollocks et al., 2019). The Autism Diagnostic Observation Schedule (ADOS) administered in community mental health services was found to identify autistic CYP referred for an autism assessment (Stadnick et al., 2015).

2. Strategies for improving clinicians' skills and autism knowledge ($n = 4$).

Strategies, involving training and guiding clinicians to provide better care across the lifespan to autistic people with co-occurring mental health needs, included the Extension for Community Healthcare Outcomes autism model in community services (Dreiling et al., 2022), the Autism Intellectual Disability and Psychiatric Disorder network in specialist mental health services (Helverschou et al., 2021) and the Autism Spectrum Disorder Care Pathway in psychiatric emergency care (Cervantes et al., 2019; Kuriakose et al., 2018).

The Extension for Community Healthcare Outcomes autism model was found feasible and acceptable to clinicians (Dreiling et al., 2022). All strategies were associated with significant improvements over time; however, causality cannot be concluded since there were no comparison groups. Overall, low-certainty evidence suggested that some strategies for improving clinicians' skills and knowledge of autism (Cervantes et al., 2019; Dreiling et al., 2022; Helverschou et al., 2021; Kuriakose et al., 2018) may be helpful in improving mental health of autistic individuals (online Supplementary Table S10).

3. General adaptations to services ($n = 3$).

Clinicians reported using a range of adaptations in inpatient units (Jones et al., 2021), a specialist autism service (Petty et al., 2021), and inpatient and outpatient services (Spain et al., 2017). All papers described clinicians modifying the environment and communication and reported clinicians evaluating and adapting practice based on individual needs. Only one reported on clinicians providing structure to reduce uncertainty (Petty et al., 2021). None of the papers evaluated the impact of these general adaptations.

Evaluation of interventions

Forty-seven of the included papers, broadly grouped based on similarities in type and focus in four intervention categories, evaluated the effectiveness of interventions in improving autistic individuals' mental health and/or their acceptability/feasibility. The

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differences (1): Evaluate individual needs and preferences (1); Encourage individual's hobbies and interests (1); Tailor practice to individual needs and preferences (1). **Structural or procedural adaptations (1):** Format of the intervention (1); A structured and predictable approach (1). **Intervention content adaptations (1):** Taking it slow (1); Consider the role of autism (1); Integration of emotion-focused strategies (1); Integration of cognitive-behavioral approaches (1). **Involving wider support network (1):** Parental involvement (1).

creative, vary the way you work) modifications to the structure/procedure (e.g. share plan in advance) and content of the intervention (e.g. consider the role of autism) and involving wider network (e.g. obtain information from other people) (1).

Note: ADOS, Autism Diagnostic Observation Schedule; ASC, Autism spectrum condition; AM, anxiety management; CAMHS, Child and Adolescent Mental Health Services; CBT, Cognitive Behavioral Therapy; CYP, Children and young people; DAWBA, Development and Well-Being Assessment; EMDR, Eye Movement Desensitization and Reprocessing; ID, Intellectual Disability; OCD, Obsessive-compulsive disorder; PTSD, Post traumatic stress disorder; Ref., References; SCQ, Social Communication Questionnaire; SR, Social recreational program.

[a]Two papers were from the same service implementation.
[b]Four papers were from the same randomized controlled trial.
[c]Two papers were from the same pilot randomized controlled trial.

main findings of evaluated interventions are presented in Table 3, with detailed results of individual studies in online Supplementary Table S12. Online Supplementary Tables S10 and S11 show the GRADE assessment for effectiveness outcomes.

1. CBT for anxiety ($n = 38$).

Thirty-five out of the 38 papers that tested adapted or bespoke individual, group, or combined individual and group CBT for anxiety, reported feasibility outcomes. All 35 papers reported the interventions were feasible largely based on low drop-out rates, high attendance rates, and treatment fidelity (Bemmer et al., 2021; Chalfant et al., 2007; Driscoll et al., 2020; Ehrenreich-May et al., 2014; Fujii et al., 2013; Hepburn et al., 2016; Higgins et al., 2019; Keefer et al., 2017; Kilburn et al., 2019, 2020; Langdon et al., 2016; Maskey et al., 2019a, 2019b; McConachie et al., 2014; Murphy et al., 2017; Oerbeck et al., 2021; Ollendick et al., 2021; Pickard et al., 2020; Reaven et al., 2009, 2012a, 2012b, 2015, 2018; Russell et al., 2013; Sofronoff et al., 2005; Solish et al., 2020; Storch et al., 2013, 2015, 2020; Sung et al., 2011; Walsh et al., 2018; White et al., 2013, 2015; Wise et al., 2019; Wood et al., 2015). Twenty-three out of 38 papers reported acceptability outcomes of adapted/bespoke individual, group, or combined CBT for anxiety for either CYP, parents, or clinicians. All 23 papers reported the interventions were acceptable based on participant-reported positive experiences and intervention satisfaction (Bemmer et al., 2021; Burke et al., 2017; Cook et al., 2017; Ekman et al., 2015; Hepburn et al., 2016; Higgins et al., 2019; Kilburn et al., 2019, 2020; Langdon et al., 2016; McConachie et al., 2014; Murphy et al., 2017; Oerbeck et al., 2021; Ollendick et al., 2021; Pickard et al., 2020; Reaven et al., 2012a, 2012b, 2015; Russell et al., 2013; Sofronoff et al., 2005; Solish et al., 2020; Walsh et al., 2018; White et al., 2013; Wood et al., 2015).

Facilitators to acceptability reported by participants included perceived positive intervention impact (Higgins et al., 2019; Kilburn et al., 2020; Langdon et al., 2016; McConachie et al., 2014; Oerbeck et al., 2021; Ollendick et al., 2021; Sofronoff et al., 2005; Solish et al., 2020) and perceived usefulness of intervention's information/activities/techniques (Bemmer et al., 2021; Higgins et al., 2019; Langdon et al., 2016; McConachie et al., 2014; Oerbeck et al., 2021; Reaven et al., 2012a, 2012b, 2015; Solish et al., 2020; Walsh et al., 2018). Feeling accepted/supported by the group (Bemmer et al., 2021; Higgins et al., 2019; Langdon et al., 2016; McConachie et al., 2014), interaction with others (Bemmer et al., 2021; Higgins et al., 2019; Langdon et al., 2016; McConachie et al., 2014; Sofronoff et al., 2005), and individual preparatory sessions prior to group sessions (Langdon et al., 2016) also appeared important. Additionally, receiving preparatory handout for upcoming sessions (Higgins et al., 2019), perceived parental confidence with the intervention content and thus being able to support their child (Sofronoff et al., 2005; Solish et al., 2020), understanding assignments (Oerbeck et al., 2021), and getting rewards (Oerbeck et al., 2021) were seen as facilitators. Using visualization was viewed as helpful (Ekman et al., 2015). Clinicians' participation in a short training workshop appeared to facilitate higher acceptability, as opposed to receiving additional ongoing feedback or only a manual (Walsh et al., 2018).

Participants also reported barriers to acceptability, including perceiving the sessions to be too long/short (Bemmer et al., 2021; Langdon et al., 2016), difficulties with group dynamics (Bemmer et al., 2021; Langdon et al., 2016), feeling anxiety limited their learning (Bemmer et al., 2021), feeling the individual sessions involved too much talking (Oerbeck et al., 2021), perceived lack of learning (McConachie et al., 2014), dissatisfaction with visuals (Oerbeck et al., 2021), children's reluctance to talk to parents about content beyond the sessions (Higgins et al., 2019), difficulties with homework assignments (Oerbeck et al., 2021), and difficulties with making phone calls (Bemmer et al., 2021). Practical issues related to transport, parking, heating in session rooms, and timings also appeared to hinder acceptability (Higgins et al., 2019; Langdon et al., 2016). The addition of bi-weekly feedback and consultation next to training workshops might have put clinicians under pressure (Walsh et al., 2018).

Furthermore, clinicians who continued to implement group version of CBT for anxiety for at least four years following training reported tailoring, lengthening, removing, shortening, and supplementing the intervention's components to enhance and adapt it to the learning needs of CYP and carers (Pickard et al., 2020). Positive clinicians' views of the intervention's effectiveness, ease of use, and fit with existing service were perceived as facilitators for sustained use of this intervention. Reported barriers included the intervention no longer being relevant to the service, services being unable to support delivery, clinicians no longer working clinically, inability to obtain funding for intervention, and difficulties with group format of the intervention due to insufficient staffing and challenges with recruiting a group of CYP of the same age and level of support needs (Pickard et al., 2020).

Effectiveness of CBT for anxiety. Thirty-six out of 38 papers evaluating CBT for anxiety reported effectiveness outcomes. Sixteen RCTs/pilot RCTs testing effectiveness of adapted/bespoke individual, group, and combined CBT for anxiety compared to any control group were included in three meta-analyses depending on the rater of the autistic person's anxiety measure.
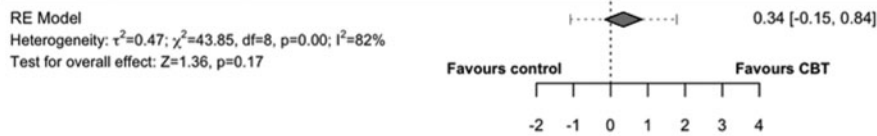
Child/self-rater meta-analysis: CBT was not significantly different from control, including treatment as usual (TAU), waitlist, adapted anxiety management (AM) and social recreation (SR), in reducing child/self-rated anxiety symptoms at EOT ($k = 9$, $g = 0.34$ [95% CI -0.15 to 0.84], $p = 0.173$) (Fig. 2) (moderate-certainty evidence, online Supplementary Table S11). There was significant heterogeneity among studies, $Q(8) = 43.85$, $p < 0.001$, $I^2 = 81.75\%$. On removal of outliers (Chalfant et al., 2007; Langdon et al., 2016), there were no significant differences between groups at EOT ($k = 7$, $g = 0.17$ [95% CI -0.07 to 0.40], $p = 0.169$), but heterogeneity reduced, $Q(6) = 3.21$, $p = 0.782$, $I^2 = 0\%$.

Parent/carer-rater meta-analysis: There was a significant medium effect of CBT compared to control, including TAU, waitlist, counseling, adapted AM, and bespoke CBT (manual training only), in reducing parent/carer-ratings for anxiety symptoms at EOT ($k = 12$, $g = 0.58$ [95% CI 0.07 to 1.08], $p = 0.0246$) (moderate-certainty evidence, online Supplementary Table S11), and significant heterogeneity, $Q(11) = 70.39$, $p < 0.001$, $I^2 = 84.37\%$. After removal of outliers (Chalfant et al., 2007; Murphy et al., 2017; Russell et al., 2013), the effect size was still significant ($k = 9$, $g = 0.44$ [95% CI 0.21–0.66], $p < 0.001$). Heterogeneity reduced, $Q(8) = 4.99$, $p = 0.76$, $I^2 = 0\%$.

Clinician-rater meta-analysis: CBT had a significant small-to-medium effect on reducing clinician ratings for anxiety symptoms compared to control, including TAU, waitlist, counseling, and adapted AM ($k = 12$, $g = 0.48$ [95% CI 0.14–0.81], $p = 0.005$) (moderate-certainty evidence, online Supplementary
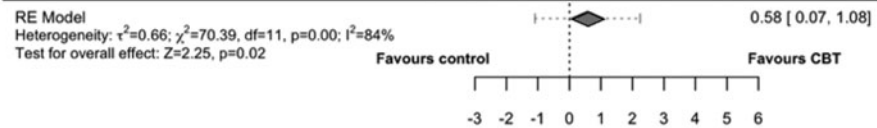
Self-rated

Author(s) and Year	CBT M	CBT SD	CBT N	Control M	Control SD	Control N	Hedges' g	SMD [95% CI]
Sung et al. (2011)	26.5	15.6	28	27.6	13.6	29		0.07 [-0.45, 0.59]
Chalfant et al. (2007)	13.8	11	28	41.4	9.1	19		2.64 [1.85, 3.44]
Kilburn et al. (2020)	33.8	18.7	19	39.7	15.9	19		0.33 [-0.31, 0.97]
Russell et al. (2013)	26.8	15.3	20	30.9	13.4	20		0.28 [-0.34, 0.90]
Storch et al. (2013)	11.6	3.9	24	13.7	3.9	21		0.53 [-0.07, 1.12]
Storch et al. (2015)	23.9	15.2	16	21.9	17.2	15		-0.12 [-0.82, 0.59]
Wood et al. (2015)	19.6	14.7	19	18.3	14.1	14		-0.09 [-0.78, 0.60]
McConachie et al. (2014)	31.5	18.1	17	32.3	27	15		0.04 [-0.66, 0.73]
Langdon et al. (2016)	42.2	12.8	26	36.8	15.7	26		-0.37 [-0.92, 0.18]

RE Model 0.34 [-0.15, 0.84]
Heterogeneity: τ^2=0.47; χ^2=43.85, df=8, p=0.00; I^2=82%
Test for overall effect: Z=1.36, p=0.17

Favours control — Favours CBT (-2 -1 0 1 2 3 4)

Parent-rated

Author(s) and Year	CBT M	CBT SD	CBT N	Control M	Control SD	Control N	Hedges' g	SMD [95% CI]
Cook et al. (2019)	66.1	10.2	13	74.2	10.2	11		0.77 [-0.06, 1.60]
Chalfant et al. (2007)	14	5.1	28	44.2	9	19		4.27 [3.23, 5.31]
Kilburn et al. (2020)	35.8	17.1	22	41.5	12.3	22		0.38 [-0.22, 0.97]
Russell et al. (2013)	25.8	10.5	20	21	13.5	20		-0.39 [-1.01, 0.24]
Storch et al. (2020)	38.6	15.8	14	53.5	14.8	18		0.95 [0.22, 1.69]
Storch et al. (2013)	52	13.4	24	58.4	12.8	21		0.48 [-0.11, 1.08]
Storch et al. (2015)	56.9	17.5	16	58.6	17.6	15		0.09 [-0.61, 0.80]
Wood et al. (2015)	50.2	12.7	19	58.4	9	14		0.71 [-0.00, 1.42]
White et al. (2013)	13.6	5.7	15	16.4	8.9	15		0.37 [-0.36, 1.09]
Murphy et al. (2017)	27.9	14.7	17	22.3	10.5	19		-0.44 [-1.10, 0.22]
Sofronoff et al. (2005)	32.2	14.6	25	35.6	13.3	23		0.24 [-0.33, 0.80]
McConachie et al. (2014)	38.4	16.2	17	42	19.5	15		0.20 [-0.50, 0.90]

RE Model 0.58 [0.07, 1.08]
Heterogeneity: τ^2=0.66; χ^2=70.39, df=11, p=0.00; I^2=84%
Test for overall effect: Z=2.25, p=0.02

Favours control — Favours CBT (-3 -2 -1 0 1 2 3 4 5 6)

Clinician-rated

Author(s) and Year	CBT M	CBT SD	CBT N	Control M	Control SD	Control N	Hedges' g	SMD [95% CI]
Kilburn et al. (2020)	4.2	2.6	20	5.3	2.1	20		0.47 [-0.16, 1.10]
Russell et al. (2013)	17.8	8.4	20	20.8	7.8	20		0.36 [-0.26, 0.99]
Storch et al. (2020)	2	1.9	14	5	0.8	18		2.13 [1.26, 3.00]
Storch et al. (2013)	3.4	1.8	24	4.9	1.5	21		0.89 [0.28, 1.50]
Storch et al. (2015)	10.9	3.9	16	13.9	3.6	15		0.78 [0.05, 1.51]
Wood et al. (2015)	11.6	3.3	19	14	2.6	14		0.78 [0.07, 1.50]
White et al. (2013)	14	3.4	15	15.5	5.3	15		0.32 [-0.40, 1.04]
Murphy et al. (2017)	12.6	5.5	17	12	4.1	19		-0.13 [-0.78, 0.53]
McConachie et al. (2014)	5.6	1.3	17	6.2	1.5	15		0.43 [-0.27, 1.14]
Langdon et al. (2016)	15.5	7.9	26	16.3	7.5	26		0.10 [-0.44, 0.65]
Reaven et al. (2012)	2.2	0.9	20	2.8	1	23		0.60 [-0.01, 1.21]
Reaven et al. (2018)	12.9	4.2	28	11	3.9	33		-0.47 [-0.98, 0.04]

RE Model 0.48 [0.15, 0.81]
Heterogeneity: τ^2=0.24; χ^2=35.13, df=11, p=0.00; I^2=69%
Test for overall effect: Z=2.81, p=0.00

Favours control — Favours CBT (-2 -1 0 1 2 3 4)

Figure 2. Forest plots of meta-analyses comparing cognitive behavioral therapy (CBT) for anxiety with any control group in reducing anxiety symptom severity in autistic individuals.

Note: Continuous rather than dichotomous data were used, as this was the most frequent type of data across studies. Intention-to-treat was favored over completer analysis. In cases of trials with more than two arms (Reaven et al., 2018; Sofronoff et al., 2005), we compared the most intensive arm (treatment) to the least intensive (control). The following clinician-rated outcome measures were acceptable and included in the meta-analysis: the Anxiety Diagnostic Interview Schedule (ADIS), the Pediatric Anxiety Rating Scale (PARS), the Hamilton Rating Scale for Anxiety (HAM-A) and the Yale-Brown Obsessive Compulsive Scale (YBOCS). Four studies (Storch et al., 2013, 2015, 2020; Wood et al., 2015) used multiple clinician-rated outcomes. Given this, we favored primary outcome measures first (if reported in article or in protocol), followed by the most frequently used measure across studies (i.e. ADIS) to ensure consistency. Reaven et al. (2018) and Murphy et al. (2017) reported on individual symptoms on the ADIS, rather than the total, hence scores were combined. Acceptable parent/carer-rated outcome measures were the Spence Children's Anxiety Scale (SCAS), the Multidimensional Anxiety Scale for Children (MASC), the Child and Adolescent Symptom Inventory-4 ASD Anxiety Scale (CASI-anx), the Child Behaviour Checklist (CBCL) and the Children's Obsessive Compulsive Inventory (CHOCI). Child/self-rated outcome measures included the Spence Children's Anxiety Scale (SCAS), the Revised Children's Manifest Anxiety Scale (RCMAS), the Revised Children's Anxiety and Depression Scale (RCADS), the Obsessive Compulsive Inventory – Revised (OCI-R) and the Liebowitz Social Anxiety Scale (LSAS). One trial (Chalfant et al. 2007), used both the RCMAS and the SCAS, but the latter was favored, as it was the most commonly used outcome measure. Storch et al. (2013) reported only subscales of the RCMAS, so the total mean was calculated.
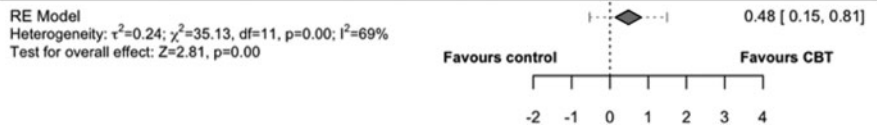
Table S11). There was significant heterogeneity, $Q(11) = 35.13$, $p < 0.001$, $I^2 = 68.69\%$. On removal of outliers (Reaven et al., 2018; Storch et al., 2020), the effect size remained significant ($k = 10$, $g = 0.44$ [95% CI 0.24–0.65], $p < 0.001$) and heterogeneity reduced, $Q(9) = 8.58$, $p = 0.477$, $I^2 = 0\%$.

Meta-regression analyses: Bespoke CBT showed significantly worse clinician-rated anxiety at EOT compared to adapted CBT ($b = -0.72$ [95% CI -1.27 to -0.18], $p = 0.009$), based on six bespoke against six adapted trials. There were no other significant moderators (online Supplementary Table S13).

Seven of the RCTs/pilot RCTs included in the meta-analyses evaluating CBT for anxiety reported non-anxiety outcomes (Kilburn et al., 2020; Langdon et al., 2016; Russell et al., 2013; Storch et al., 2013, 2015, 2020; White et al., 2013). Four indicated significant group differences in social functioning at EOT in favor of adapted/bespoke individual or combined individual and group CBT compared to non-active control (Storch et al., 2013, 2015, 2020; White et al., 2013). The remaining three, evaluating bespoke and adapted group CBT compared to non-active controls (Kilburn et al., 2020; Langdon et al., 2016), and adapted

individual CBT for OCD compared to adapted AM (Russell et al., 2013) at EOT and follow-up, found no such effect. Two trials also showed no effect on depression (Langdon et al., 2016; Russell et al., 2013).

Studies not included in meta-analyses: Three pilot RCTs/RCTs that reported effectiveness outcomes for CBT for anxiety were not included in the meta-analysis due to having <10 participants per group (Fujii et al., 2013) or no EOT data (only follow-up) (Maskey et al., 2019a; White et al., 2015). They reported significant group differences in anxiety at EOT between adapted individual CBT and non-active control (Fujii et al., 2013), but no significant group differences in anxiety and social functioning at 6-months post-treatment between bespoke individual CBT and non-active control (Maskey et al., 2019a). While anxiety worsened over 1-year follow-up after treatment with bespoke individual and group CBT ended, it did not revert to pre-treatment severity 1-year post-treatment (White et al., 2015).

Two of the 36 papers reporting effectiveness outcomes were non-randomized controlled trials and reported an adapted/bespoke group CBT was effective for parent-reported CYP anxiety at EOT compared to non-active conditions (Hepburn et al., 2016; Reaven et al., 2009), but not for CYP-rated anxiety (Reaven et al., 2009).

Fifteen before-and-after comparisons examined the effectiveness of adapted/bespoke individual/group CBT for anxiety (Bemmer et al., 2021; Burke et al., 2017; Driscoll et al., 2020; Ehrenreich-May et al., 2014; Ekman et al., 2015; Higgins et al., 2019; Keefer et al., 2017; Kilburn et al., 2019; Maskey et al., 2019a; Oerbeck et al., 2021; Ollendick et al., 2021; Reaven et al., 2012, 2015; Solish et al., 2020; Wise et al., 2019). Statistically significant improvements in outcomes over time were reported in 14 of these 15 studies (Bemmer et al., 2021; Driscoll et al., 2020; Ehrenreich-May et al., 2014; Ekman et al., 2015; Higgins et al., 2019; Keefer et al., 2017; Kilburn et al., 2019; Maskey et al., 2019a; Oerbeck et al., 2021; Ollendick et al., 2021; Reaven et al., 2012, 2015; Solish et al., 2020; Wise et al., 2019). However, causality cannot be inferred since there were no comparison groups.

Considering all 36 papers that reported effectiveness outcomes of individual (Driscoll et al., 2020; Ehrenreich-May et al., 2014; Ekman et al., 2015; Fujii et al., 2013; Maskey et al., 2019a, 2019b; Oerbeck et al., 2021; Ollendick et al., 2021; Russell et al., 2013; Storch et al., 2013, 2015, 2020; Wise et al., 2019; Wood et al., 2015), group (Bemmer et al., 2021; Burke et al., 2017; Chalfant et al., 2007; Cook et al., 2017; Hepburn et al., 2016; Higgins et al., 2019; Keefer et al., 2017; Kilburn et al., 2019, 2020; Langdon et al., 2016; McConachie et al., 2014; Reaven et al., 2009, 2012a, 2012b, 2015, 2018; Sofronoff et al., 2005; Solish et al., 2020; Sung et al., 2011) and combined (Murphy et al., 2017; White et al., 2013, 2015) CBT for anxiety, which were synthesized narratively, moderate-certainty evidence suggested mixed results that these interventions may be helpful in reducing anxiety among autistic individuals (online Supplementary Table S10).

2. Interventions targeting emotion regulation (*n* = 5).

Three out of five papers evaluating adapted/bespoke group interventions targeting emotion regulation reported feasibility outcomes. Two papers separately reported that an adapted group CBT for autistic children aged 4–7 years with mental health difficulties (Factor et al., 2019) and a bespoke group mindfulness-based intervention for autistic children aged 7–12 years with mental health

difficulties (Drüsedau et al., 2022) were feasible, based on low drop-out rates and high attendance. However, one paper found limited feasibility for a parent-delivered cognitive behavioral emotional and social skills intervention for autistic children as some parents reported difficulties with engaging their child to complete the program, time constraints, and interference with life events (Sofronoff et al., 2017). Two out of five papers reported on treatment satisfaction and showed the interventions were acceptable (Drüsedau et al., 2022; Swain et al., 2019). Children and parents reported they enjoyed and benefited from the group mindfulness-based intervention, although homework and having sessions on a weekly basis contributed to some dissatisfaction (Drüsedau et al., 2022). Parents noted that psychoeducation, support, and skills training components were helpful and reported high satisfaction with the adapted group CBT-based intervention for autistic children aged 4–8 years, with some parents reporting wanting more time for discussion and others noting some difficulties with generalization of skills provided by the intervention (Swain et al., 2019).

Two out of five papers were RCTs. One did not statistically compare the two groups (Factor et al., 2019). The other was a pilot RCT, which preliminarily showed an adapted group CBT for children aged 5–7 years was not effective for emotion regulation but was effective for frequency of anger/anxiety episodes, use of emotion regulation strategies, and parent-reported perceived confidence in their child's ability to manage their own anxiety and anger, all post-treatment compared to waitlist control (Scarpa & Reyes, 2011). The remaining three papers were before-and-after comparisons reporting on intervention effects over time (Drüsedau et al., 2022; Sofronoff et al., 2017; Swain et al., 2019), however, causality cannot be inferred since there were no comparison groups. Overall, low certainty evidence suggested mixed results regarding the effectiveness of some group interventions targeting emotion regulation to improve mental health of autistic CYP ((Drüsedau et al., 2022; Factor et al., 2019; Scarpa & Reyes, 2011; Sofronoff et al., 2017; Swain et al., 2019); Online Supplementary Table S10).

3. CBT for various mental health needs (*n* = 3)

One paper examined therapists' experiences of using CBT with autistic people and adaptations incorporated into their routine practice (Cooper et al., 2018). A range of adaptations were endorsed, including accommodating individual differences, changing the structure and content of interventions, and establishing communication preferences. Adaptations reported as being used less consistently included shorter/longer sessions, avoidance of metaphors, and use of cognitive strategies. Most participants reported using CBT and favored this approach over others.

Two papers reported on pilots of bespoke CBT group interventions for stress, anxiety, and depression in CYP and adult, evaluated through a non-randomized trial (McGillivray & Evert, 2014), and depression in CYP through an RCT (Santomauro et al., 2016). Both interventions appeared to be feasible based on low drop-out rates. One paper examined acceptability and found most participants reported they enjoyed the intervention, finding the group setting most helpful, but with variations in which intervention tools were most helpful to manage depression (Santomauro et al., 2016). There were no statistically significant differences in depression between the CBT interventions and waitlist controls post-intervention (McGillivray & Evert, 2014; Santomauro et al., 2016). However, participants who had scored above the depression, anxiety, and stress threshold pre-

intervention benefited the most from the intervention (McGillivray & Evert, 2014). At three and nine month follow up, gains were sustained in one study (McGillivray & Evert, 2014) but not the other (Santomauro et al., 2016). Overall, moderate certainty evidence suggested mixed findings regarding the effectiveness of some CBT for anxiety, stress, and depression to improve mental health of autistic CYP ((McGillivray & Evert, 2014; Santomauro et al., 2016); Online Supplementary Table S10).

4. EMDR for post-traumatic stress disorder (PTSD) (*n* = 1).

One Delphi study gathered perspectives on EMDR for autistic people and the adaptations therapists incorporated into standard protocols (Fisher et al., 2023). Participants reported tailoring therapy from the assessment onwards, such as by adopting a flexible and creative approach, adjusting the environment to suit sensory preferences, communicating clearly, taking more time in initial phases and before active processing commenced, and acknowledging the contribution of autism to the formulation.

Predictors of outcome

Five studies explored relevant predictors of treatment outcome, such as demographic variables, autism symptomatology, and verbal Intelligence Quotient. Only parental trait anxiety showed an effect on change in child anxiety in one study ((White et al., 2015); Online Supplementary Table S14).

Discussion

This systematic review and meta-analysis explored strategies implemented within mental health services to improve mental health care for autistic CYP. Overall, 57 papers were included. Most tested CBT-based interventions.

Few studies identified service-level strategies largely related to increasing detection and knowledge of autism, and skills in working with autistic people in mental health services through screening tools, specialized care pathways, professional networks, and service-wide general adaptations. Most of the interventions comprised CBT for anxiety, with a few targeting emotion regulation and depression. Reported adaptations involved environmental and communication accommodations, accommodating individual differences, structural/procedural adaptations, intervention content adaptations, and engaging wider support networks (e.g. parents). However, we identified a lack of thorough description of the adaptations made and the rationale for use. Additionally, some adaptations reported, such as those relating to accommodating individual differences, are part of general good clinical practice rather than only specific to autism.

This review, together with our review on autistic adults (Loizou et al., 2023), shows a similar pattern of most papers reporting communication and intervention content adaptations, but few reporting environmental adjustments. Parental and school involvement was an adaptation category specifically relevant to CYP, but evidence of CYP views of such involvement was lacking. While the studies reporting involvement with the child's school did not evaluate this aspect, one study indicated that children were satisfied with the treatment overall (Wood et al., 2015). Parental involvement was evaluated only in one trial, which showed parent groups and training parents as co-therapists to be involved in all aspects of CBT for anxiety enhanced the usefulness of the intervention when compared to a child-only group with minimal parental involvement (Sofronoff et al., 2005). A

previous study reported friends and family were frequently used as sources of support by young autistic people with co-occurring mental health difficulties. However, participants with more severe mental health difficulties reported being reluctant to talk about their needs to friends and family due to stigma (Crane et al., 2018).

The identified bespoke interventions originally developed for autistic CYP were mostly based on CBT principles, with one being mindfulness-based. Most targeted anxiety, and a few emotion regulation, depression, or combination of mental health difficulties. Notably, there were no eligible studies investigating pharmacological interventions, although these are increasingly used for autistic CYP (Bachmann, Manthey, Kamp-Becker, Glaeske, & Hoffmann, 2013; Coury et al., 2012; Deb et al., 2021; Jobski, Höfer, Hoffmann, & Bachmann, 2017; Murray et al., 2014) despite limited evidence of effectiveness (Jobski et al., 2017) and clinical guidelines recommending caution when prescribing them for autistic CYP (NICE, 2021). Additionally, only one study evaluated telemental health, despite it being increasingly used in and since the pandemic (Appleton et al., 2021). Notably, only two studies included participants with co-occurring ID.

Evidence on effectiveness was of higher quality than in the review relating to adults (Loizou et al., 2023), due to more RCTs having been conducted. Nonetheless, the certainty of evidence for effectiveness, based on the GRADE system rating (Guyatt et al., 2008), ranged from low to moderate (online Supplementary Tables S10 and S11), meaning further research is likely to significantly impact our confidence in the findings. The effectiveness results for service-level strategies suggest some screening tools may be helpful in identifying autism and clinician training may improve mental health care. The exploratory meta-analyses examining whether CBT for anxiety was superior to any comparison group in reducing anxiety symptoms severity at EOT among autistic individuals, showed no significant group differences in improving child/self-rated anxiety, significant medium effect of CBT on reducing parent/carer-rated anxiety, and significant small-to-medium effect on decreasing clinician-rated anxiety (all moderate-certainty evidence). Importantly, the presence of publication bias was detected, which warrants caution. However, it should be noted that upon removal of outliers, effect sizes remained relatively stable, suggesting bespoke/adapted CBT for anxiety may be effective in reducing anxiety in autistic CYP when viewed from the perspective of parents/carers or clinicians, but not of children/care recipients, compared to the active and non-active controls.

Inconsistencies in effect sizes with previous meta-analyses may be attributed to methodological differences such as inclusion criteria (e.g. some included non-adapted generic CBT (Sharma et al., 2021) and non-randomized controlled trials (Perihan et al., 2020; Ung, Selles, Small, & Storch, 2015)) or favoring different measures (Kreslins, Robertson, & Melville, 2015; Sharma et al., 2021; Sukhodolsky et al., 2013) and chosing pooled over separate meta-analyses (Perihan et al., 2020; Ung et al., 2015; Wichers, Van Der Wouw, Brouwer, Lok, & Bockting, 2023). Variation of effect sizes across different raters has been reported elsewhere (Kreslins et al., 2015; Sharma et al., 2021; Sukhodolsky et al., 2013). CYP often differ in reporting symptom severity in contrast to parents and clinicians, with higher correspondence reported for assessments of observable mental health concerns, assessments made by informants observing the child in the same setting, and for assessments using dimensional measures comparative to

categorical ones (De Los Reyes et al., 2015; Smith, 2007). Rater blinding and observer bias could be influential factors contributing to informant discrepancies (Hróbjartsson, Emanuelsson, Thomsen, Hilden, & Brorson, 2014). A variety of anxiety measures were used, however, not all are supported for use with autistic individuals (Glod et al., 2017; Jitlina et al., 2017; Lecavalier et al., 2014; May, Cornish, & Rinehart, 2015), particularly not without adjustments.

The only significant moderator for effectiveness was type of CBT, with adapted CBT being superior to bespoke CBT in reducing clinician-rated anxiety in autistic individuals based on equal number of contributing bespoke and adapted trials. This should be carefully interpreted as the study quality of the bespoke trials appears slightly lower than that of the adapted trials, and the distinction between adapted and bespoke CBT potentially lacks robustness. Comparing group, individual, and combined CBT showed no significant difference in parent- and clinician-rated anxiety in autistic individuals counter to another meta-analysis (Sharma et al., 2021), where significant advantage was found for individual CBT for clinician ratings. However, this difference could be due to the uneven number of trials contributing to each intervention format (Sharma et al., 2021).

Evidence for feasibility and acceptability, although sometimes not involving rigorous formal measurement strategies, was largely positive, similarly to the review relating to adults (Loizou et al., 2023). Clinicians reported using a range of service-level adaptations related to the physical environment, communication, accommodating individual needs, and a more structured and predictable approach, suggesting these can be implemented in routine clinical services (Jones et al., 2021; Petty et al., 2021; Spain et al., 2017). Additionally, a tele-mentoring platform to support mental health clinicians was evaluated as acceptable and feasible (Dreiling et al., 2022). The identified mental health interventions were also evaluated as acceptable and feasible. Adaptations concerning communication, intervention structure and content, and accommodating individual preferences were reported as often incorporated by clinicians when delivering CBT and EMDR to autistic people, supporting feasibility (Cooper et al., 2018; Fisher et al., 2023). Limited feasibility based on high drop-out rate was noted only for a parent-delivered behavioral emotional and social skills intervention as some parents struggled to implement the intervention (Sofronoff et al., 2017). A trial found the type of clinician training for bespoke group CBT for anxiety can affect autistic CYP, parent, and clinician acceptability (Walsh et al., 2018). Clinicians' view of the intervention's effectiveness, fit with existing service, ease of use and making further adaptations were reported as important factors that facilitated the feasibility of sustained use of a group CBT with autistic adults (Pickard et al., 2020).

Strengths and limitations

This systematic review provides a comprehensive overview of strategies/adaptations tested in mental health care settings for autistic CYP, which is potentially useful for adapting care to the specific needs of this population. A strength was the co-produced nature of this review, with lived experience researchers involved throughout the project. A novel feature of this research is the inclusion of AIRA assessing the primary research's inclusive practices that we hope will encourage appropriate adaptations in future research involving this population.

Regarding limitations of our review, the meta-analyses lacked inclusion of follow-up outcomes to determine if treatment gains are sustained over time, although few trials measured these. Additionally, our classification of 'bespoke' *v.* 'adapted' interventions depended on authors' descriptions, which may lack robustness if evaluated against independently-rated criteria.

There were several limitations of the included studies that limited the quality of the review. Most autistic participants were male and white, and all studies were conducted in high-income countries, limiting the generalizability of findings. Evidence on effective strategies for autistic individuals with ID was lacking, indicating a potential bias in the selection of study participants (Russell et al., 2019). There was a lack of different types of strategies for CBT, such as pharmacological interventions or other psychological approaches, and there were noticeable gaps in interventions targeting other mental health difficulties besides anxiety. The included RCTs had small sample sizes (the mean CBT participants was 21 and controls 20) and probably lacked statistical power to detect significant group differences. Thus, large, high-quality studies with the potential to shape practice were missing. Importantly, many of the included papers lacked a comparison group, preventing improvements being credited to the intervention alone. Where comparisons were included, none were with a non-adapted version of the same intervention, limiting inferences about effectiveness of adaptations. There was a lack of clarity in the intervention-level adaptations reported in some papers limiting replication in further research and implementation in practice. Assessing the included papers with the novel and lived experience researcher-led AIRA showed co-produced research with involvement from autistic individuals and carers was missing, data collection methods and outcome measures often lacked autism inclusivity, and some interventions, of which most were CBT, appeared to involve some focus on masking autistic traits rather than improving mental health.

Clinical implications and future directions

Better mental health care is a top priority for autistic people (Cusack & Sterry, 2016) and recognized as such by the World Health Organisation (World Health Assembly, 2014), the National Health Service (NHS) Long-Term Plan (NHS, 2019), and the NHS Autism Research Strategy (NHS, 2022). Autistic people experience high rates of mental health difficulties but face many barriers to accessing and benefiting from mental health care. This systematic review provided a list of strategies and adaptations to services and interventions found to be acceptable and feasible to implement in mental health care. Many of the identified adaptations (Table 2 and online Supplementary Table S9) are simple, reasonable adjustments not necessarily requiring further evaluation to be implemented in practice, or specific iterations of general good clinical practice. Tailoring mental health care to individual differences may be especially helpful in achieving effective mental health care, as autistic individuals vary in their support needs and presentation of autistic characteristics (Robledo, Donnellan, & Strandt-Conroy, 2012; Uljarević et al., 2017). A neurodivergence-informed approach to therapy (Chapman & Botha, 2023) and primary co-produced research to strengthen the evidence-base are necessary to strike a balance between personalizing care and following evidence-based practice.

More research is needed to improve autism assessment so autistic CYP can benefit from mental health care. For more robust intervention research in this field, it is important to develop consensus that includes involvement of autistic people, on appropriate mental health outcome measures, meaningful treatment gain,

and likelihood of the intervention to encourage masking over genuine mental health improvements. Identified differences in the magnitude and significance of effect sizes by rater (self, parent, and clinician) suggest that pooling data across raters should be avoided. This review also identified a need for studies comparing autism-friendly adapted interventions and generic non-adapted interventions received in mental health services.

This review together with our review relating to autistic adults (Loizou et al., 2023) can contribute to national guidelines for mental health provision for autistic people to be tested in a small number of well-funded research projects prioritizing co-production and ensuring participation from under-represented groups.

Lived experience commentary written by Robin Jackson and Eva Driskell

We have lived experience as an autistic young person, now a Child and Adolescent Mental Health Services (CAMHS) professional, and as a carer of a child with autism and have spent a decade as service users of CAMHS. The examples we use reflect both of our lived experiences.

The review found that better training is required for CAMHS professionals to see the signs of autism earlier. Our experience supports this along with the need to fast track children to a diagnosis. Children with autism are left in mental distress and miss out on crucial years of education and parents and carers find themselves blamed by the educational establishment (and often the medical professionals) for what is seen as bad behavior rather than a distressed child in need of help.

The review focused on strategies delivered in mental health service settings, but outside of the home, school is where children spend the most time. Evidence of school or parental involvement was lacking, but strategies could be delivered in a school setting alongside training for education professionals to recognize autistic traits and understand sensory issues. We experienced a huge improvement in mental health issues when the right adjustments were made, which also raises the question of whether mental health issues were co-occurring or caused by a lack of understanding and an over-stimulating environment.

Training and understanding of autism for children and young people (CYP) and carers is invaluable and not widely available. Personalized training helped us – a short in-person group course was very useful in explaining the issues and allowed the sharing of experiences. However, consideration of accessibility is needed, including aspects such as language, socio-economic background, and culture.

Neurotypical bias was evident in the research when the views of CYP were dismissed if their self-reported outcome measures found less improvement than clinician or parent reports meaning that the therapies could inadvertently encourage masking, which occurs when autistic traits are hidden to fit in with other people. Using cognitive behavioral therapy could result in autistic CYP learning to mask their traits to better 'fit in'. Although this is measured as success in the papers reviewed, in the long term it can cause further distress and mental health issues.

More research is needed into the causes of mental health issues in autistic CYP and into how diagnosis, training of CYP and carers and environmental adjustments affect mental health. The review found that only 7% of research was carried out with autistic researchers involved. Future research should include autistic researchers to investigate which therapies work best for autistic

CYP and develop new therapeutic approaches to be more effective for this population. Unfortunately, current therapies can be focused on changing the autistic young person's behavior to fit in better with neurotypical society rather than improving the autistic young person's mental health.

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