

LGBTQ+ MENTAL HEALTH INTERVENTIONS

A systematic review of evidence-based cognitive and/or behavioural interventions targeting mental health in LGBTQ+ populations

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1-Sentence-Teaser: Cognitive/behavioural interventions positively affect mental health in LGBTQ+ populations – but literature is limited, heterogenous in methodology, and risk of bias evaluated as high or critical/serious.

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Abstract

Background

Despite a minority stress-related higher risk to develop mental health difficulties, and problematic access to and treatment from healthcare providers, research into mental health support for LGBTQ+ (individuals who identify as lesbian, gay, bisexual, transgender, queer, or with any other non-heterosexual and/or non-cisgender identity) individuals is limited. The aims of this systematic review were to explore evidence-based cognitive and/or behavioural interventions and adaptations targeting mental health in LGBTQ+ populations, before providing recommendations for future clinical and research directions.

Methods

Six databases were searched in February-March 2022 and risk of bias evaluated using the Cochrane RoB 2/ROBINS-I tools. A narrative synthesis following the PICOS (Population, Intervention, Comparison, Outcomes and Study designs) framework and the review questions was used to examine the results.

Results

Sixteen studies met inclusion criteria, including various interventions and adaptations, as well as mental health difficulties, and other emotion- and minority stress-related processes/constructs. Risk of bias was judged as high, and critical/serious, respectively, in all studies. Outcomes included improvements in symptoms of depression (most statistically/clinically significant effects and large effect sizes, particularly in the randomised controlled trials – RCTs), and anxiety, emotion regulation, and internalised homophobia in the pre-post studies.

Conclusion

Cognitive and/or behavioural interventions and adaptations for LGBTQ+ populations feature a range of therapeutic modalities and levels of adaptation, with largely positive effects, in the context of limited and heterogenous literature and risk of bias concerns, as well as

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limitations related to publication bias and inclusion criteria of the current work. Suggestions for future clinical and research directions include a focus on generic therapeutic competencies and metacompetencies, and affirmative, potentially more holistic approaches, as well as more consistency in methodology, more focus on underserved LGBTQ+ populations and intersectionality, and more detailed investigations into mechanisms of change.

Keywords: LGBTQ+, systematic review, mental health, cognitive behavioural interventions

Key messages/highlights:

- Research into evidence-based mental health support for LGBTQ+ individuals is limited.
- Cognitive and/or behavioural interventions and adaptations for LGBTQ+ populations feature a range of therapeutic modalities and levels of adaptation, with largely positive effects, in the context of limited and heterogenous literature and risk of bias concerns.
- Future directions may include a focus on generic therapeutic competencies and metacompetencies, and affirmative, potentially more holistic approaches, as well as more consistency in methodology, more focus on underserved LGBTQ+ populations and intersectionality, and more detailed investigations into mechanisms of change.

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Introduction

Rationale

LGBTQ+ (individuals who identify as lesbian, gay, bisexual, transgender, queer, or with any other non-heterosexual and/or non-cisgender identity) individuals experience a disproportionately higher rate of mental health difficulties compared to heterosexual and/or cisgender individuals (Plöderl & Tremblay, 2015; Pinna et al., 2022). This disparity has been attributed at least partly to stigma-related stressors, with perhaps the most important framework addressing this being the Minority Stress Theory, (Brooks, 1981; Meyer, 1995, 2003; reviewed in Hoy-Ellis, 2021; Tan et al., 2019; Dürbaum & Sattler, 2020) alongside its extensions, particularly Hendricks and Testa's (2012) work exploring gender identity stressors.

Herein, distal (external, objective) factors – victimisation, prejudice, and discrimination, and the likely resulting proximal (internal, subjective) factors – concealment of one's identity, prejudice- and rejection-related anxiety and expectations, and internalised homo- and transphobia, are thought to contribute to a set of differences in cognitions, emotions, and behaviours which drive and maintain mental health disparities transdiagnostically (Meyer, 2003; Nicholson et al., 2022; Pachankis, 2015). The effects of these factors have been widely documented (Gnan et al., 2019; Testa et al., 2017; Newcomb & Mustanski, 2010). A complicating, yet crucial, consideration, is that of the intersection of various sexual identities with other racial, ethnic, social, and gender identities, with individuals with multidimensional minority status facing unique challenges (Balsam et al., 2011; Dale & Safren, 2019).

Various mechanisms have been proposed in the context of minority stress. These include: alterations in emotion regulation, social/interpersonal dynamics (e.g., isolation), and cognitive processes (e.g., negative self-schemas; (Hatzenbuehler, 2009); disruptions of negative valence systems (avoidance, hypervigilance, loss), positive valence systems (approach motivation, reward learning – associated with impulsivity/addictive behaviours), social functioning (disrupted attachment, low agency, social submission, poor social

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communication, low self-knowledge; Pachankis, 2015); and anticipatory emotions/behaviours as well as cognitions around the expectation of rejection (Feinstein, 2020). Biological mechanisms (Flentje et al., 2018; Flentje et al., 2020) and neuroimaging/neural correlates (Nicholson et al., 2022) have also been documented.

Despite these significant vulnerabilities, access to and treatment for mental health seems to be problematic for LGBTQ+ populations (e.g., McCann & Sharek, 2013; Steele et al., 2017; Williams & Fish, 2020). While some limited research has documented poorer psychological treatment outcomes for some LGBTQ+ populations (Beard et al., 2017; Rimes et al., 2018; Rimes et al., 2019), there is generally a paucity of literature (e.g., data pertaining to sexual orientation and gender identity is often omitted in research on psychological interventions for mental health – Heck et al., 2017). This speaks to the need for tailored mental health interventions for this population (some of which have been developed, such as the ESTEEM – Effective Skills to Empower Effective Men – intervention, Pachankis, 2014), and crucially, thorough research into their effectiveness.

Others have reviewed interventions targeting mental health and/or health behaviour in various LGBTQ+ sub-populations. In their systematic review and meta-analysis, Pantalone et al. (2020) focused on behavioural interventions targeting psychosocial syndemics and HIV-related health behaviours for sexual minority men, reporting significant improvements with small effect sizes in mental health, while a systematic review by Melendez-Torres and Bonell (2014) found improvements related to sexual risk behaviour following a CBT (Cognitive Behavioural Therapy) intervention in substance-using men who have sex with men, although the evidence was evaluated to be of moderate quality. Focusing on LGBTQ+ youth mental health, Tasnim et al. (2020, preprint) reported potential improvements with digital interventions, while Hobaica et al. (2018) found support for the effectiveness of a range of intervention modes, including in-person, computerised, online, as well as individual and group. Sheinfel et al. (2019) investigated adapted psychotherapeutic interventions for depression, while Van der Pol-Harney and McAloon (2019) found CBT to be an effective therapeutic

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framework. Bochicchio et al. (2022) also reported preliminary evidence for effectiveness of a variety of psychotherapeutic interventions.

This work has, however, either mainly focused on health behaviour rather than mental health, therefore not including details around intervention components, outcome measures, and their relationship to minority stress (Pantalone et al., 2020); on specific genders or populations known to present with unique challenges (sexual minority men including those HIV-positive or at risk – Pantalone et al., 2020; substance-using sexual minority men – Melendez-Torres & Bonnell, 2014; young people – Tasnim et al., 2020, preprint, Hobaica et al., 2018; Van der Pol-Harney & McAloon, 2019; Bochicchio et al., 2022), therefore making generalisations limited; or on particular diagnoses rather than more widely/transdiagnostically which would be more in line with minority stress factors and mechanisms (Sheinfel et al., 2019).

Few, if any reviews have adopted a wider/more general lens on LGBTQ+ populations of any age, focusing on psychotherapies for mental health and their adaptations, their components, their outcomes, and their relationship to transdiagnostic minority stressors; this review aims to bridge this gap. As CBT has a rich evidence base for several mental health difficulties (Hoffman et al., 2012), and importantly, offers a framework by which to understand and explore minority stressors (i.e, relationships among cognition – e.g., negative self-schemas, emotion – e.g., emotion regulation, anxiety, shame, and behaviour – e.g., isolation, avoidance), the review will focus on this psychotherapeutic model.

Objectives

The aim of this systematic review is to explore the landscape of the scientific literature on evidence-based cognitive and/or behavioural interventions and adaptations targeting mental health in LGBTQ+ populations, by answering the following questions:

1. What evidence-based cognitive and/or behavioural interventions for LGBTQ+ populations exist, and what, if any, specific adaptations do they involve?

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2. What are the outcomes of evidence-based cognitive and/or behavioural interventions and adaptations targeting mental health in LGBTQ+ populations?
3. What recommendations could be made in terms of such adaptations in clinical practice? (Budge et al., 2017; Pachankis, 2018)

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Methods

Guidelines and registration

This systematic review was carried out in accordance with the updated PRISMA guidelines (Page et al., 2021), and registered on PROSPERO (International prospective register of systematic reviews) in April 2022 (CRD42022243466) – please see appendix A for more information regarding deviations from this preregistration. No ethics approval was required due to the nature of the work.

Eligibility criteria

Studies had to be published or in press in peer-reviewed journals, in English; no time limits for publication were enforced. Pre-prints were considered, while grey literature was excluded (see more details on this decision in the Discussion section, and Appendix B). The studies also had to fulfil the criteria outlined in Table 1, following the PICOS framework (Population, Intervention, Comparison, Outcomes, Study designs, Higgins et al., 2021). Please see Appendix B for further explanations regarding the selection of these criteria.

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Table 1*Inclusion and exclusion criteria according to the PICOS framework.*

	Inclusion	Exclusion
Population	LGBTQ+ individuals or individuals reporting distress over minority stress-related issues, of any age, sex, gender, sexual orientation, race, and ethnicity; including people identifying as gay, lesbian, bisexual, pansexual, demisexual, asexual, queer, transgender, genderqueer, genderfluid, non-binary	Studies with HIV-positive participants where no separate results for participants with negative or unclear HIV status were reported, as HIV-positive status is known to be associated with an increased risk of developing mental health issues (NIMH, 2016) and may confound the results, as well as people with substance dependence as a main presenting problem
Interventions	Evidence-based individual and group-based cognitive behavioural interventions; including Cognitive Behavioural Therapy (CBT), behaviour-based interventions such as exposure or exposure and response prevention (ERP), as well as third-wave CBT interventions, including Acceptance and Commitment Therapy (ACT), Mindfulness-Based Interventions such as Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT), Dialectical Behaviour Therapy (DBT), Behavioural Activation (BA), or Compassion Focused Therapy (CFT); delivered in any settings, including out- and inpatient settings, charity organisations, educational settings, or any other community or home settings; and via any medium, including in person, videoconference, telephone, live-chat	Interventions with only a minimal cognitive or behavioural component, and couple-specific interventions; self-help interventions with no direct therapist involvement
Comparison	Active control (i.e., other interventions for mental health; treatment-as-usual), inactive control (i.e., waitlist), or no control group	
Outcomes	Outcomes in the domain of common mental health difficulties; including studies with outcomes related to, e.g., symptoms of depression, anxiety and any anxiety disorders, obsessive-compulsive disorder (OCD) and body dysmorphic disorder (BDD), health anxiety, post-traumatic stress disorder (PTSD), and minority stress, as well as psychological flexibility and quality of life/subjective wellbeing, assessed via validated questionnaires	Studies with outcomes related solely to sex-related health behaviour, as well as drug use
Study designs	Quantitative studies or the quantitative aspects of mixed-method studies;	Qualitative studies, as well as published study protocols and reviews

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including randomised controlled trials (RCTs), controlled/experimental studies such as controlled trials, open trials/studies/pilots, pilot trials/studies, case-control studies, effectiveness studies without a control group (e.g., pre-post effect size), feasibility or acceptability studies

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Information sources

Eligible studies were sourced from: Embase, MEDLINE, PsycINFO, PsychExtra, Web of Science, Cochrane Library (advanced search), via searches between 19.02.2022 and 10.03.2022.

Search strategy

The search terms presented in Table 2 were used to determine MeSH (Medical Subject Heading) terms where applicable, and perform searches using these as well as keyword searches, combined with Boolean logic, OR/AND – a link to the full search strategy/history is available in Appendix C.

Table 2

Search terms, using the PICOS framework

Participants	Asexual; bisexual; demisexual; gay; genderfluid; gender identity; gender minority/ies; genderqueer; lesbian; LGBT; LGBTQIA; men who have sex with men; non-binary; pansexual; queer; sexual and gender minority/ies; sexual minority/ies; women who have sex with women; transgender
Interventions	“Acceptance and commitment therapy”; ACT; “behavioral activation”; “behavior therapy”; CBT; CFT; “cognitive behav* therapy”; “cognitive intervention”; “cognitive therapy”; “compassion focus* therapy”; DBT; defusion; “dialectical behav* therapy”; “exposure and response prevention”; MBCT; MBI; MBSR; mindfulness; “mindfulness based cognitive therapy”; “mindfulness-based intervention”; “mindfulness-based stress reduction”; “psychological intervention”; “psychological therapy”; psychotherapy;
Outcomes	Anxiety; body image; depression; mental health; minority stress; obsessive compulsive disorder; OCD; post-traumatic stress disorder; PTSD; social anxiety; trauma
Comparison/Study designs	Case-control study; clinical trial; controlled study; feasibility study; open trial; pilot study; pilot trial; randomis/zed controlled trial; RCT

Results were exported into RIS and Microsoft Excel files, before being imported into Covidence (Veritas Health Innovation, 2022), a screening and data extraction tool recommended for Cochrane authors.

Selection process

Duplicates were automatically removed in Covidence. Then, using the Covidence screening tool based on the eligibility criteria, references were screened by the first author and categorised as “Yes”, “No”, “Maybe”, starting with titles and abstracts, followed by the full

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texts of the references whose abstracts had been categorised as “Yes” and “Maybe”. A second reviewer followed the same process for a randomly-selected subset of references, at both screening stages (approximately 20%; $n=51$, $n=5$ respectively). Disagreements ($n=5$ at title & abstract screening stage, none at full text review stage) were resolved by discussion and revisiting or clarification of criteria, with consensus reached throughout.

Data collection process

Data were extracted using customised forms on Covidence, based on the Cochrane Data collection forms for intervention reviews. The forms were piloted on one randomly selected study, and further adapted and refined to include outcome collection timepoints and further detail in the results table. All information was presented as found in the respective results sections of the primary reports; the same applies for evaluations of what is considered statistically or clinically significant, and effect sizes (although generally, statistically significant pertains to $p < 0.05$, clinically significant pertains to reductions in scores that either decrease to below clinical threshold of the respective scale or exceed the measurement error of the scales, and effect sizes are considered small ($d/g = 0.2$), medium ($d/g = 0.5$), and large ($d/g \geq 0.8$) according to Cohen (1969), and the included studies seem to have adhered to this).

A subset (12.5%, $n=2$) of the extracted data were checked for accuracy by the second reviewer; no disagreements occurred. A link to a more extensive, raw data table is available in Appendix D.

Study risk of bias assessment

All included studies were assessed for risk of bias. There seems to be no agreed standard to evaluate the quality of psychotherapy outcome research; instead, a heterogeneity of tools are available, with the Cochrane tools or adapted versions thereof more common (Munder & Bath, 2018). Therefore, the Cochrane risk-of-bias tool for randomised trials (RoB 2) (Sterne et al., 2019) for randomised studies, and the Risk of Bias In Non-Randomised Studies - of Interventions (ROBINS-I) tool (Sterne et al., 2016) for non-randomised studies

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were used, consistent with PRISMA guidelines (Page et al., 2021), and to align to the majority of previous research, encouraging consistency and reproducibility.

The tool domains were evaluated categorically as *Low*, *High*, or *Some concerns* (RoB2), or *Low*, *Moderate*, *Serious*, *Critical*, or *No information* (ROBINS-I), in line with the signalling questions and guidance (Sterne et al., 2019; Sterne et al, 2016, respectively). Customised Quality Assessment Templates on Covidence were used. A subset (12.5%, $n=2$) of the studies were also evaluated by the second reviewer; no disagreements occurred.

Synthesis methods

Due to the limited number of included studies and the heterogeneity of results in terms of study designs and outcomes, following scoping/initial searches, the data were deemed not appropriate for quantitative synthesis. Therefore, a narrative synthesis considering the "Synthesis without meta-analysis" (SWiM) guidelines (Campbell et al., 2020), as well as tables and figures, were used to summarise and explain the characteristics of the included studies, following the PICOS framework (Higgins et al., 2021).

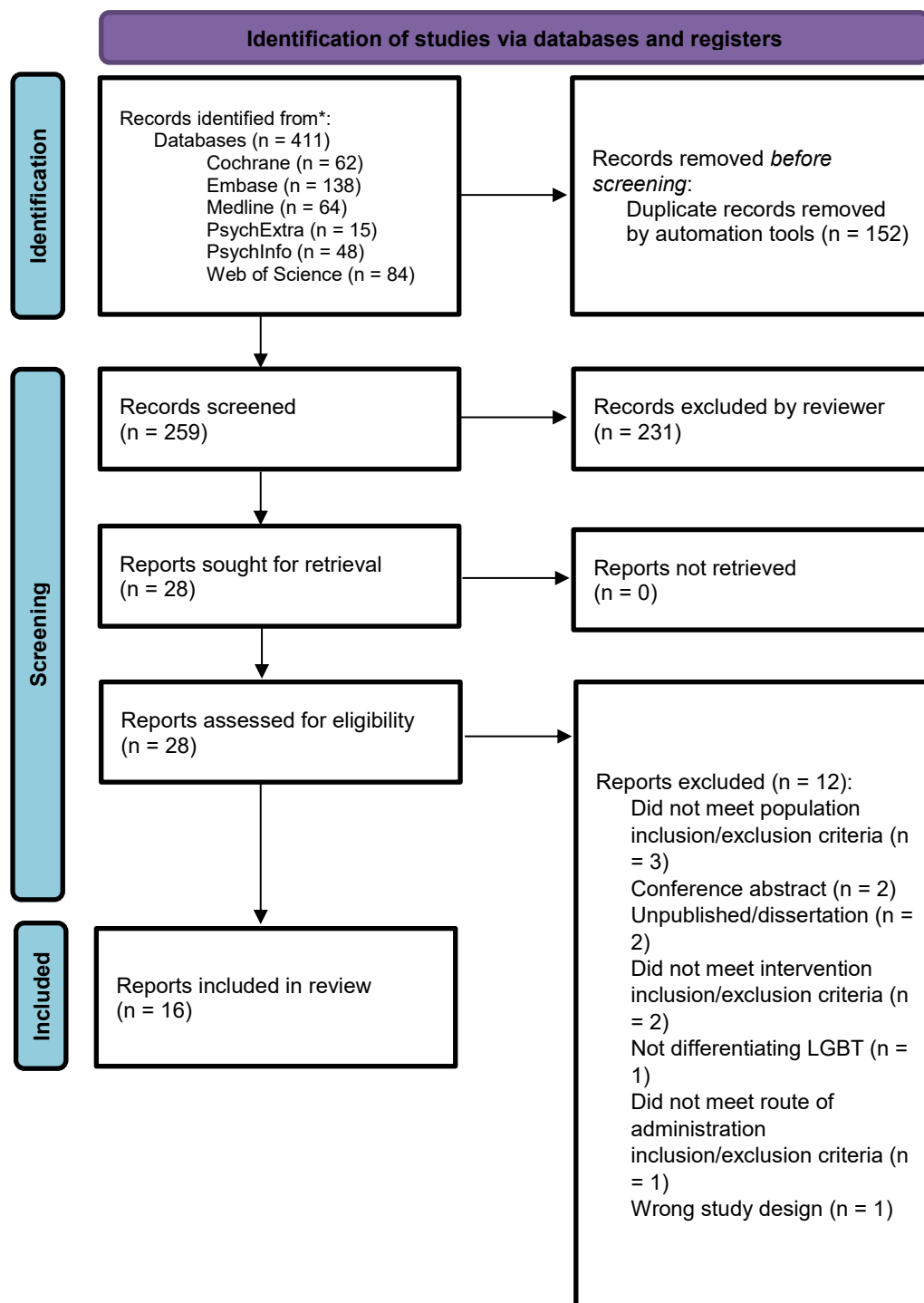
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Study selection

A total of 411 records were identified and imported into Covidence, with 152 records automatically identified as duplicates and removed. Of the remaining 259 records, 231 were excluded following title & abstract screening, resulting in 28 records eligible for full text review. Twelve of these were then excluded as they did not meet the review criteria; see Appendix C for a detailed overview. Therefore, 16 records were included. The PRISMA flow diagram in Figure 1 outlines this process.

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Figure 1. PRISMA Flow Diagram outlining the process of study selection.



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Study characteristics

Table 3 summarises study and sample characteristics. Studies have been numbered for clarity (chronologically, starting with the oldest, grouped by RCTs, then non-RCTs), and will be referred to by their allocated numbers from now on.

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Table 3
Study and sample characteristics

Study; year(s) of data collection; country/countries of data collection	Study designs; Comparisons	Timepoints of outcome collection	Sample size	Participants				
				Age - Mean (SD)/Breakdown	Gender (% or N)	Sexual orientation (% or N)	Ethnicity (% or N)	Mental health
1 - Pachankis et al., 2015; 2013-2014; USA	Randomised controlled trial (crossover - participants were randomized (stratified according to race/ethnicity and anxiety/depression) to either immediate treatment - received treatment between baseline and 3-month assessment -, or waitlist - received treatment between 3-month and 6-month assessment -); Inactive control (waitlist)	Immediate condition: pre-treatment, post-treatment, 3-month follow-up; Waitlist condition: 3-month pre-treatment, pre-treatment, post-treatment	63 (54 completed at least one session)	Immediate condition: 26.19 (4.26); Waitlist condition: 25.69 (4.28)	Male - inclusion criterion;	Gay/queer: 31; 27 Bisexual: 1; 4	Immediate condition; Waitlist condition: American Indian/Alaskan Native: 0; 1 Asian: 0; 3 Black/African American: 6; 4 Pacific Islander: 1; 1 White: 16; 17 Other/mixed: 9; 5 Hispanic/Latino: Yes - 12; 11; No - 20; 20	Immediate pre-treatment mean scores (SD) Depression: CESD - immediate condition: 27.69 (1.83), waitlist condition: 23.19 (2.14) - above cut-off 16 ODSIS - immediate condition: 8.16 (0.76), waitlist condition: 7.08 (0.88) - just above /slightly below cut-off 8 Anxiety: OASIS - immediate condition: 8.03 (0.66), waitlist condition: 6.89 (0.78) - just above/slightly below cut-off 8
2 - Millar, Wang, & Pachankis, 2016; 2013-2014; USA	As above	As above	63 enrolled, 54 completed both pre- and post-treatment assessments	M=26.1 (SD=4.0)	Male - inclusion criterion	Gay/queer (49), Bisexual (4)	American Indian or Alaskan Native (1), Asian (1), Black / African American (7), Pacific Islander (2), White (30), Other/mixed (13) Hispanic / Latino - Yes (22), No (32)	Pre-treatment mean scores (SD) Depression: ODSIS - 7.46 (4.30) - below cut-off 8 Anxiety: OASIS - 7.50 (3.76) - below cut-off 8
3 - O'Cleirigh et al., 2019; 2007-2011; USA	Randomised controlled trial; active control (VCT-only)	Baseline, end of the treatment period (approximately 3-months after randomization), and 6- and 9-month follow-up	43	M=39.19 (SD=11.07)	Male - inclusion criterion	Gay (27), Bisexual (12), Unsure (4)	Caucasian (27), African American (11), Hispanic/Latino (3), Other (2)	Baseline mean scores (SD) PTSD: Davidson Trauma Scale Control - 37.20 (25.29) - below cut-off 40 Treatment - 47.09 (21.27) - above cut-off 40 Report also states 32.6% of participants met diagnostic criteria for PTSD
4 - Pachankis et al., 2020; 2018-2019; USA	As Pachankis et al. (2015) and Milar, Wang, & Pachankis (2016)	As Pachankis et al. (2015) and Milar, Wang, & Pachankis (2016)	60 enrolled, 58 completed at least one session	M=25.58 (SD=3.26)	Women - inclusion criterion; cisgender (56.7%)	Queer (55%)	White (58.3%), racial or ethnic minorities (41.7%)	Immediate pre-treatment mean scores (SD) Depression: CESD - immediate condition: 29.70 (1.84), waitlist condition: 26.86 (1.91) - above cut-off 16 ODSIS - immediate condition: 6.30

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								(0.83), waitlist condition: 7.69 (0.73) - below cut-off 8 Anxiety: OASIS - immediate condition: 8.80 (0.64), waitlist condition: 8.03 (0.46) - just above cut-off 8
5 - Maguen, Shipherd, & Harris, 2005; unclear years of data collection; USA	Pre-post	Pre, post	6	M=47 (SD=9.16), range 32-59	Female (MtF)	N/A	N/A	Depression: 67% (4) scored above clinical threshold for BDI Anxiety: 67% (4) scored above clinical threshold for STAI
6 - Yadavaia & Hayes, 2012; unclear years of data collection; USA	Concurrent, multiple-baseline, across-participants design (several coordinated simple phase changes, in which treatment begins for specific participants at different points in real time and after baseline periods of differing lengths); Pre-post	Pre, post, 4-week and 12-week follow-up	6 enrolled, 5 completed	Age 21-24 (3 participants), age >30 (1 participant), age 56 (1 participant)	Male (3), Female (2)	Gay (2), Lesbian (1), Questioning (1) - one ppt's data not reported due to preferences	Asian/African American/Caucasian (1), African American/Caucasian (1), Caucasian (1), Native American (1) - one ppt's data not reported due to preferences	Mean scores (SD) Depression: DASS-D - 14.4 (8.2) - indicating moderate depression Anxiety: DASS-A - 5.2 (3.9) - indicating normal anxiety
7 - Craig & Austin, 2016; 2014; unclear countries of data collection – likely Canada, possibly USA	Open pilot, pre-post	Baseline (<4 weeks before start of intervention), post, 3-month follow-up	30	M=16.8, range 15-18	Female (54%), gender independent/non-binary (21%), male (18%), trans (10%), and/or two-spirit (8%)	Pansexual (29%), lesbian (25%), queer (21%), bisexual (18%), unsure/questioning (11%), gay (11%), and/or polysexual (2%)	White European (64%), Black/African/Caribbean (25%), East/South/Southeast Asian (24%), Indigenous/First Nations (18%), and/or Latino/a (7%)	Mean scores (SD) Depression: BDI-II - 25.95 (14.51) - indicating moderate depression
8 - Austin, Craig, & D'Souza, 2018; 2014; Canada	Pre-post	Pre, post, 3-month follow-up	8	Age 16 (1 participant), age 17 (1 participant), age 18 (6 participants)	Nonbinary (6), Queer (5), Female (2), Transgender (2), Male (1), Two-spirit (1), Gender independent (1), Other-figuring things out (1)	Queer (5), Pansexual (2), Questioning (2), Asexual (1)	White (Canadian, European) (5), Mixed (2), Asian (1), Black (African, Canadian, Caribbean) (1), Indigenous, First Nations, Inuit, Metis (1), Latin American (1)	Mean scores (SD) Depression: BDI-II - 37.50 (12.29) - indicating severe depression
9 - Jabson Tree & Patterson, 2019; unclear years of data collection; USA	Pre-post	Pre, post, 12-week follow-up	24 enrolled, 17 completed	N/A	Female (11), Male (6)	Bisexual (1), Mostly lesbian/gay/homosexual (2), Only lesbian/gay/homosexual (12), Other (2)	N/A	N/A - no measures related to mental health disorders
10 - Cohen et al., 2020; unclear years of data collection; USA	Case series; Pre-post	Pre, post	7; 6 completed treatment	N/A	N/A	Sexual minority - unclear breakdown	N/A	Depression: 67% (4) scored above clinical threshold for PHQ-9 Anxiety: 50% (3) scored above clinical threshold for OASIS
11 - Hart et al., 2020; unclear years of data collection; unclear	Pre-post pilot	Baseline, post, 3-, and 6-month follow-up	29 starters, 21 completers	M=32.81 (SD=8.95)	Male - inclusion criterion	Gay (18), Bisexual (3)	White (12), Black (2), East/Southeast Asian (0), Middle Eastern/North African (2), Latin	Mean scores (SD) Social Anxiety: Liebowitz Social Anxiety Scale - 62.86

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countries of data collection – Canada or USA							American/Hispanic (2), Mixed Race (3)	(22.76) - indicating moderate social anxiety SIAS - 47.38 (12.31) - above cut-off 34/36 SPS - 33.57 (18.81) - above cut-off 24 BFNE-S - 30.28 (7.11) - above cut-off 25 Report also states 95% of participants meeting diagnostic criteria for social anxiety Depression: CESD - 25.81 (12.76) - above cut-off 16 Report also states 24% of participants meeting diagnostic criteria for major depressive disorder, current episode
12 - Bluth et al., 2021; 2020-2021 (presumed due to mention of Covid-19 pandemic and 2021 year of publication); unclear countries of data collection – USA or Canada	Pre-post	Pre, post, 3-month follow-up	41	M=14.5 (SD=1.49)	Transgender M-F (9), Transgender F-M (18), Non-binary (12), Genderfluid (3), Questioning (2), Agender (1)	N/A	White (33), Black/African American (4), Asian (1), Hispanic/Latino/a (5), Other: Mixed (1)	Mean scores (SD) pre-intervention Anxiety: STAI - 50.77 (13.58) - above cut-off 40 Depression: PHQ-9 - 15.12 (6.77) - above cut-off 10
13 - Craig et al., 2021; 2020; unclear countries of data collection, likely Canada or USA	Non-randomised experimental study; inactive control	Pre, post	46 completers	M=21.17 (SD=4.52)	Non-binary (17), Transgender (14), Cis woman (8), Queer (3), Agender (2), Cis man (1), Two-spirit (0), Other (1)	Queer (12), Lesbian (10), Bisexual (6), Gay (6), Pansexual (6), Asexual (3), Questioning (2), Demi (1), Other (0)	White (35), Asian (5), Black (4), Middle Eastern (2), Indigenous (1), Latinx (0), Multi-ethnic/racial (5), Other (6)	Mean scores (SD) Depression: BDI-II - control: 19.48 (10.67), intervention: 19.30 (11.15) - indicating mild-moderate depression
14 - Pan et al., 2021; unclear years of data collection; China	Pre-post	Baseline, 1-month follow-up	8	Age 16-20 (2 participants), age 21-30 (3 participants), age >30 (3 participants)	Male - inclusion criterion	Gay (6), Bisexual (2)	Asian/Chinese (as per article title)	Baseline mean scores (SD) Depression: PHQ-9 - 10.43 (3.46) - above cut-off 10 Anxiety: GAD -7 - 7.43 (2.57) - below cut-off 8
15 - Jackson et al., 2022; 2018-2019; USA	Pre-post	Baseline, 3-month follow-up	21 starters, 17 completed the 3-month follow-up	Age 18-23 (4 participants), age 24-29 (11 participants), age 30-35 (6 participants)	Male - inclusion criterion; Cisgender man (20), Transgender man (1)	Gay (16), Bisexual (3), Queer (2)	Latino/Latinx (Hispanic) (7), White (Hispanic) (5), Black (Hispanic) 5, Black (non-Hispanic) (4)	Baseline mean scores (SD) Depression: CEDS - 22.10 (11.89) - above cut-off 16 ODSIS - 11 (4.79) - above cut-off 8 Anxiety: OASIS - 12.05 (3.54) - above cut-off 8
16 - Poon et al., 2022; unclear years of data collection; USA	Pre-post; LGBQ-non-LGBQ	Pre, post	39	M=15.21 (SD=1.65)	Female (86.8%)	LGBQ (16), Heterosexual (23)	Non-Hispanic White (71.1%), Hispanic (22.9%), bi- or multiracial (13.1%), Asian, African-American, or other (7.9%)	Pretreatment mean scores (SD) Depression: BDI-II - 28.64 (14.61) - indicating moderate-severe depression

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Study designs and comparisons: Four studies were RCTs, three of which used a crossover design – and therefore, an inactive control (waitlist). The fourth RCT involved an arguably active control group. Of the remaining 12 studies, one was a non-randomised experimental study with an inactive control (waitlist), one used a concurrent, multiple-baseline, across-participants design, and the remaining ten used pre-post designs, with no control groups.

Timepoints of data collection: Most studies collected data at two or three timepoints; there was a lack of clarity as to when these timepoints occurred relative to the start and end of treatment, respectively.

Sample characteristics: Samples sizes varied between a minimum of 6 and a maximum of 63; mean (M) = 30.875, standard deviation (SD) = 20.75 – based on entire sample mentioned rather than completers or participants included in analyses; some data were used in more than one study (Craig and Austin, 2016 and Austin et al., 2018; Pachankis et al., 2015 and Millar et al., 2016) – therefore, while 16 studies are included, there are actually 14 independent samples.

Ten studies provided participants' mean ages, which ranged from 14.5 to 47 years, while four only provided age ranges, from 16 to 56 years. Six studies only included/featured individuals who were born male and/or currently identifying as men; one study only included/featured individuals who identified as women; two studies only included/featured transgender or gender-expansive individuals. Eleven studies featured a majority (over 50%) of gay or queer-identifying individuals; one featured a majority of pansexual-identifying individuals. Ten studies featured a majority of white/Caucasian participants; two only included/featured participants of other backgrounds (Black and/or Hispanic/Latino; Asian/Chinese). Eleven studies featured participants with mean scores above clinical thresholds for depression, or a majority of participants who scored as such; six studies

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featured participants with mean scores above clinical thresholds for anxiety; one included a majority of participants who met diagnostic criteria for social anxiety.

Interventions, adaptations, and results

Table 4 summarises the interventions, adaptations, and results of each of the included studies.

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Table 4
Interventions, adaptations, and results

Study	Interventions	Any LGBTQ+-specific adaptations	Relevant outcomes (complete names and references below)	Relevant analyses; Number of participants included therein	Relevant results summary
1 - Pachankis et al., 2015	CBT: ESTEEM intervention - 10 individually-delivered sessions, based on Barlow's Unified Protocol for the Transdiagnostic Treatment of Emotional Disorders	Yes - focus on the impact of minority stress on mental health, interpersonal functioning, unhelpful behaviours; aim of improving minority stress coping through emotion regulation, cognitive restructuring, assertiveness training	Center for Epidemiological Studies Depression Scale (CESD); Overall Depression Severity & Impairment Scale (ODSIS); Overall Anxiety Severity & Impairment Scale (OASIS); Measure of Gay-Related Stress (MOGS); Gay-related Rejection Sensitivity Scale (GRS); Internalized Homophobia Scale (IHS); Sexual Orientation Concealment Scale (SOCS); Ruminative Responses Scale (RRS); Difficulties of Emotion Regulation Scale (DERS); Rathus Assertiveness Schedule (RAS)	Linear mixed models with maximum likelihood estimation 1) Condition comparison 2) Generalized linear mixed models predicting the odds of meeting clinical cut-offs on CESD, ODSIS, OASIS 3) Pooled data (pre-treatment measures from the baseline assessment for the immediate participants and the three-month assessment for the waitlist participants, and post-treatment measures from the three-month assessment for the immediate participants and the six-month assessment for the waitlist participants) - change comparison across all participants from immediate pre-treatment to post-treatment 4) Follow-up assessment; 63 - intent-to-treat approach	1) Significant improvements in depressive symptoms (on ODSIS, not CESD), marginally significant improvements in anxiety (OASIS) in immediate vs waitlist condition (medium-large effects sizes), no significant condition - time interaction effects for cognitive, affective, and behavioural minority stress processes or for universal processes (small effect sizes) 2) Stronger decreases in the proportion of immediate versus waitlist participants who continued to exceed the cut-off at three months (on CESD, not ODSIS or OASIS) 3) Significant reductions in all primary outcomes, significant (apart from SOCS) reductions in all minority stress processes and universal processes from immediate pre-treatment to post-treatment (large effect sizes) 4) Treatment effects generally maintained at follow-up, few significant differences between post-treatment and follow-up, rumination scores continuing to significantly decrease from post-treatment
2 - Millar, Wang, & Pachankis, 2016	CBT: ESTEEM intervention	Yes - described above	Sexual Orientation Implicit Association Test; Internalized Homophobia Scale (IHS); Overall Depression Severity & Impairment Scale (ODSIS); Overall Anxiety Severity & Impairment Scale (OASIS)	Linear mixed models with maximum likelihood estimation, pooled data as above, two separate models - with implicit IH and explicit IH, and their respective interactions with time; 54 (who completed pre- and post-treatment assessments)	Depression and anxiety showed significant reductions; Participants higher in implicit IH at baseline showed nearly three times greater reductions than those lower in implicit IH on depression and anxiety; At post-treatment, those higher in implicit IH showed reductions on depression and

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					anxiety roughly equivalent to one standard deviation
3 - O'Cleirigh et al., 2019	CBT: 10-session integrated CBT for Trauma and Self-Care (CBT-TSC) intervention with HIV voluntary counseling and testing (VCT) or VCT alone (VCT-only)	Yes - participants in both conditions received HIV/STI voluntary counseling and testing (VCT) at baseline	Mini-International Neuropsychiatric Interview (MINI) - to assess symptoms and a diagnosis of PTSD Davidson PTSD Scale	HLM (Hierarchical Linear Modeling) 43	Davidson Trauma Scale Immediately post-treatment: - Significantly greater reductions in posttraumatic symptom severity for the CBT-TSC condition for the Total Score and the Avoidance subscale - Trend for a difference between the conditions for the Intrusions subscale Follow-up: - Trend for a statistically significant difference between the randomization conditions on the Total Score - Significant reductions in trauma symptom severity for the Avoidance subscale - Trend for a meaningful difference between the conditions for the Intrusions subscale
4 - Pachankis et al., 2020	CBT: EQuIP (Empowering Queer Identities in Psychotherapy), a 10-session intervention adapted for sexual minority women from the ESTEEM protocol	Yes - adapted from the ESTEEM protocol, described above, with a focus on sexual minority women's unique experiences	Center for Epidemiological Studies Depression Scale (CESD); Brief Symptom Inventory (BSI); Overall Depression Severity & Impairment Scale (ODSIS); Overall Anxiety Severity & Impairment Scale (OASIS); Sexual Minority Women's Rejection Sensitivity Scale (SMW-RSS); Sexual Orientation Concealment Scale (SOCS); Lesbian, Gay, and Bisexual Identity Scale - Internalized Homonegativity Subscale; Sexual Orientation Implicit Association Test; Difficulties of Emotion Regulation Scale - Short Form (DERSSF); Ruminative Responses Scale - Brooding Subscale (RRS); Simple RAS - Short Form (SRAS-SF)	As Pachankis et al. (2015); 60 (intent-to-treat)	1) Significant improvements in depressive symptoms (on CESD, ODSIS) and anxiety (OASIS) in immediate vs waitlist condition (large effect sizes), no significant condition - time interaction effects for minority stress processes or for universal processes (small effect sizes) 2) Stronger decreases in the proportion of immediate versus waitlist participants who continued to exceed the cut-off at three months (on ODSIS, not CESD, and on OASIS) 3) Significant improvements in all primary outcomes (large effect sizes), significant improvements in emotion regulation difficulties and rumination and marginally significant reductions in rejection sensitivity (small effect sizes for minority stress processes, small-medium effect sizes for universal processes) 4) Treatment effects generally continued to decrease at follow-up for mental and behavioural health outcomes, minority stress processes, and universal processes, BSI and rumination continuing to significantly decrease from post-treatment
5 - Maguen, Shipherd, & Harris, 2005	CBT: 12 weekly 60-minute sessions	Yes - session dedicated to hormone maintenance, surgeries, health care; session dedicated to disclosure, passing,	Beck Depression Inventory (BDI) State and Trait Anxiety Inventory (STAI) Network Orientation scale (NOS)	N/A - individual scores; 6	Overall: - Anxiety and depression measures: Improvement - Social support: Increases in 4/6

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		socialisation; session dedicated to body issues and intimate relationships etc.	- utilising social support networks in times of need Life Satisfaction Index (LSI)		participants - Life satisfaction indices: Decreased for the majority of participant, perhaps due to the multitude of life changes, including becoming unemployed and homeless
6 - Yadavaia & Hayes, 2012	ACT: 6-10 weekly 50-minute ACT sessions	Yes - explicitly addressing self-stigma around sexual orientation/internalised homophobia	Primary: - Daily Ratings of Thoughts About Sexual Orientation ((a) the degree to which negative thoughts about sexual orientation interfered in the participant's life, (b) the distress associated with those thoughts, (c) the believability of the thoughts, and (d) their frequency); Secondary: - Depression, Anxiety, and Stress Scales-21 (DASS-21); - Short Internalized Homonegativity Scale (SIHS); - Lesbian Internalized Homophobia Scale (LIHS); - WHOQOL-BREF (World Health Organization Quality of Life - Abbreviated Version); - AAQ-II (Acceptance and Action Questionnaire-II)	Hierarchical Linear Modeling (HLM); Mixed Model Repeated Measures; 5	Daily Ratings of Thoughts About Sexual Orientation: Improvements in interference and distress from baseline to the later time points in all participants; similar pattern for believability ratings; inconsistent and smaller changes for frequency ratings During baseline: No significant time effects for time for any of the rated dimensions During treatment: Frequency of thoughts did not change, but believability declined significantly, as did distress and self-reported interference IH: Improvement on SIHS and LIHS from pre-treatment by post-treatment (23%), by the 4-week follow-up (32%), and by the 12-week follow-up (40%) Depression, anxiety stress: No significant change on anxiety (from normal range at baseline); significant reduction in depression and stress (from moderate and mild range, respectively, at baseline) by follow-up; improvements in quality of life and psychological flexibility at 4-week follow-up
7 - Craig & Austin, 2016	CBT: AFFIRM intervention: eight module, manualised affirmative cognitive behavioural intervention	Yes - incorporating affirmative practices into traditional CBT models	Beck Depression Inventory (BDI-II); Stress Appraisal Measure for Adolescents (SAMA) - 3 subscales (challenge, threat, resources); Adolescent Proactive Coping Inventory (PCI-A) - Reflective Coping Subscale (RCS)	Repeated measures ANOVA - general linear model (GLM); T1-T2 = 30; T1-T3 = 17	Depression: Statistically significant reduction from T1 to T2, and from T1 to T3 Reflective coping: Non-significant increase from T1 to T2; significant differences between T1 and T3 Stress appraisal: Threat appraisal: Significant decrease from T1 to T2, persisted to T3 Challenge appraisal: Significant increase from T1 to T2, did not retain statistical significance to T3 Resource appraisal: Significant increase from T1 to T2, did not retain significance to T3
8 - Austin, Craig, &	CBT: 2-day retreat - AFFIRM, described above	Yes - described above	Beck Depression Inventory (BDI-II);	Paired-sample t-tests (T1-T2, T1-T3, T2-T3); T1-T2 - 8, T1-T3, T2-T3 - 6	Depression: Statistically significant reduction from T1

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D'Souza, 2018			Adolescent Proactive Coping Inventory (PCI-A) - Reflective Coping Subscale (RCS)		to T2, from T1 to T3, nonsignificant reduction from T2 to T3; Mean scores at T2 and T3 remained in the BDI-II Severe range Coping: No significant differences from T1 to T2 or from T2 to T3
9 - Jabson Tree & Patterson, 2019	Online MBSR - 8 weeks, paralleled Kabat-Zinn's in-person MBSR	N/A	Perceived Stress Scale (PSS); Daily Experiences with Heterosexism Questionnaire (DEHQ)	1) Paired samples t-tests for changes in stress from baseline to postprogram and baseline to follow-up 2) Repeated-measures ANOVA tested mean values for each measure of stress against one another at the 3 time points; 17	Women: - Perceived stress (PSS): Significant decrease pre-post and pre-follow-up - Overall DEHQ and Vigilance subscale: Non-significant decrease pre-post, significant decrease pre-follow-up - Vicarious trauma subscale of the DEHQ: Significant decrease pre-post and pre-follow-up - Similar but less dramatic results on ITT analyses overall Men: - Perceived stress (PSS): Significant decrease pre-post, but not pre-follow-up, similar but less dramatic results on ITT analyses - DEHQ: No significant difference in either per-protocol or ITT analyses
10 - Cohen et al., 2020	DBT; Other: Weekly 90-minute session over 10 consecutive weeks; participants were enrolled in individual psychotherapy and/or medication management concurrently	Yes - incorporates minority stress theory and adapts the teaching points of existing DBT skills to create Affirmative DBT Skills Training; including psychoeducation on the minority-specific psychological processes of rejection sensitivity, internalized stigma, and sexual orientation concealment	Difficulties of Emotion Regulation Scale (DERS); Overall Anxiety Severity & Impairment Scale (OASIS); Patient Health Questionnaire - Depression Module (PHQ-9); Gay-related Rejection Sensitivity Scale (GRS); Sexual Minority Women's Rejection Sensitivity Scale (SMW-RSS); Internalized Homophobia Scale (IHS); Sexual Orientation Concealment Scale (SOCS)	Clinically significant reliable change determined by Jacobson and Truax's (1991) reliable change index (RCI), with normative data used to calculate RCI acquired through the scales original articles; RCI not calculated for the GRS, SMW-RSS, IHS, and SOCS, as relevant data were not available; 6	Emotion regulation: Improvements in 5/6 participants (statistically significant for ~50% of the participants); Depressive symptoms: Improvements in 4/5 of the participants who reported a clinical level of depression at baseline (statistically significant for ~50% of the participants); Anxiety symptoms: Improvements in 3/4 of the participants who reported a clinical level of anxiety at baseline; GRS/SMW-RSS, IHS, and SOCS: Improvements in the majority of participants
11 - Hart et al., 2020	CBT: Ten 1-hour, weekly sessions of CBT for treatment of social anxiety, related substance use in sexual situations, and HIV prevention	Yes - focus on participants' sexual and relationship history, goals for satisfying relationships and sex etc.	The Mini International Neuropsychiatric Interview version 6.0 (MINI 6.0); Anxiety Disorders Interview Schedule-IV-Lifetime (ADIS-IV), Social Phobia Section; Liebowitz Social Anxiety Scale (LSAS);	Generalized estimating equations with robust estimators and unstructured correlation matrix addressing nonindependence of data across time points; Beta estimates for continuous measures and relative risk ratios (RR) for binary outcomes	Similar pattern of results using both intent-to-treat (N=32) and completer (n=21) samples; therefore, results of latter reported Social anxiety: - Significant reductions in the proportion of participants who met diagnostic

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			<p>The Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS); Center for Epidemiologic Studies-Depression Scale (CESD); UCLA Loneliness Scale Version 3 (UCLA); Brief Fear of Negative Evaluation Scale, Straight-forward Items (BFNE-S)</p>		<p>criteria for social anxiety disorder from baseline to all timepoints - Significant reductions in mean scores on the LSAS, SIAS, SPS, BFNE-S between baseline and all time points</p> <p>Depression and loneliness: - Significant reduction in the proportion of patients with current major depressive episodes pre-post-treatment, non-significant differences for 3- and 6-month follow-up; - Significant reduction in mean scores on the CESD between baseline and all timepoints; - Significant reduction in mean scores on the UCLA between baseline and all timepoints</p>
12 - Bluth et al., 2021	Mindful Self-Compassion for Teens (MSC-T) - 8x1.5h sessions online, held over 8 days (1/day) for the first cohort, then 2x/week for 4 weeks for the second two cohorts	Yes - slight modifications to accommodate the needs of transgender adolescents e.g., omission of body scan practice	<p>Self-compassion scale: Youth (SCS-Y) Student life satisfaction scale (SLSS) Spielberger State Anxiety Scale - Short Form Patient Health Questionnaire-Depression Module (PHQ-9) Interpersonal needs questionnaire (INQ) Brief resilience scale (BRS)</p>	One-way repeated measures ANOVAs; 26	<p>Overall, main effect of time for all constructs across the study</p> <p>Depression: Significant decrease pre-post and pre-3-month follow-up Anxiety: Significant decrease pre-post (not observed at 3-month follow-up) Resilience: Significant increase pre-post (not observed at 3-month follow-up) Mindfulness: Significant increase pre-post and pre-3-month follow-up Self-compassion: Significant increase pre-post and pre-3-month follow-up</p>
13 - Craig et al., 2021	CBT: AFFIRM, described above - Online groups (eight weekly sessions) with 6-14 distinct participants in each age-appropriate (14-18, 19-24, 25+) group	Yes - AFFIRM, described above	<p>Beck Depression Inventory (BDI-II); Brief COPE Inventory (BCI); Proactive Coping Inventory for Adolescents-A (PCI-A)-Reflective Coping Subscale (RCS); Stress Appraisal Measure for Adolescents (SAMA); Hope Scale (HS)</p>	<p>Linear multilevel models with restricted maximum likelihood estimation (REML) to test the effects of Time, Condition, and Time X Condition for all outcomes; age (centred at the mean of the whole sample = 22.34) included as a covariate in the model;</p> <p>Intervention (46), Control (50)</p>	<p>Compared to waitlist control, intervention condition participants experienced: - Significantly reduced depression - Significantly improved likelihood to appraise stress as challenge and to appraise that they had enough resources to deal with the stress - Significantly improved active coping, emotional support, positive framing, planning Marginally significant decrease in self-blame; no significant differences between the intervention and control conditions for substance use and behavioural disengagement - Increases for reflective coping or hope, but not statistically significant</p>
14 - Pan et al., 2021	CBT: ESTEEM, adapted for new contexts or populations	Yes - ESTEEM, described above, but with a different (Asian/Chinese) population	<p>Chinese version of the PHQ-9 Chinese version of the GAD-7</p>	Paired sample t-tests; 7	Reduction in the average score of depression and anxiety symptoms by approximately 7 and 5, respectively (medium-to-large improvement)

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15 - Jackson et al., 2022	CBT: Weekly 90-min group treatment sessions over 10 weeks	Yes - ESTEEM, described above, but adapted to recognise the intersectionality of racism and homophobia	Center for Epidemiological Studies Depression Scale (CESD); Overall Depression Severity & Impairment Scale (ODSIS); Overall Anxiety Severity & Impairment Scale (OASIS); Gay-related Rejection Sensitivity Scale (GRS); Self-Concealment Scale as previously modified for use with GBM; Internalized Homophobia Scale (IHS); Prolonged Activation and Anticipatory Race-Related Stress Scale - Psychological Subscale and Perseverative Cognitive Subscale; Racism-Related Vigilance Scale; Heterosexism in Racial Ethnic Minority Communities Subscale of the LGBT People of Color (POC) Microaggression Scale	t-tests - focusing on Hedge's g effect sizes 21 (baseline), 17 (3-month follow-up)	Depression symptoms and severity, anxiety, psychological distress, suicidal ideation: Decrease (very small effect sizes); Rejection sensitivity and concealment: Decrease (small effect sizes), but not internalised homophobia; Racial minority stress outcomes, including decreased anticipatory stress, race-related rumination, and race-related vigilance, and intersectional stress, including homophobia within one's racial/ethnic community, racism within the LGBT community, and racism in dating and close relationships: Decrease (very small to small effect sizes)
16 - Poon et al., 2022	DBT: 18-week comprehensive DBT-A (adaptation of the DBT model for adolescents and their families, Rathus & Miller, 2002) outpatient program offered to adolescents between the ages of 13-18, delivered with fidelity to the standard model proposed by Miller et al. (2007), including a weekly multi family skills training group, individual therapy, 24/7 phone coaching, and a therapist consultation team	N/A	Difficulties of Emotion Regulation Scale (DERS); Beck Depression Inventory (BDI-II); Beck Anxiety Inventory; The dialectical behaviour therapy ways of coping checklist (DBT-WCCL); Borderline symptoms list (BSL)	1) Repeated-measures bootstrapped t-tests (two-tailed 0.05 p-values for treatment effects) - for LGBQ participants only 2) 2x2 mixed-model ANOVA to test group (LGBQ/non-LGBQ) effects on the outcomes; 16 - LGBQ for 1), 16 - LGBQ +23 - non-LGBQ for 2)	1) Significant improvements on all outcomes, apart from anxiety (mostly large effect sizes) 2) No significant group - time interaction effects on any of the outcomes (changes over time did not differ between LGBQ and non-LGBQ participants); statistically nonsignificant, but small to medium interaction effect sizes on the DERS, BDI-II, and WCCL-Skill Use (sexual minorities may benefit slightly more from DBT-A with respect to emotion regulation, depression, and effective skill use)

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Notes/Reference: Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011);
 Adolescent Proactive Coping Inventory (PCI-A) - Reflective Coping Subscale (RCS; Greenglass et al., 2008);
 Anxiety Disorders Interview Schedule-IV-Lifetime (ADIS-IV), Social Phobia Section (Brown, Di Nardo, & Barlow, 1994);
 Beck Anxiety Inventory (Beck & Steer, 1993);
 Beck Depression Inventory (BDI and BDI-II; Beck et al., 1961; Beck et al., 1996);
 Borderline symptoms list (BSL; Bohus et al., 2007);
 Brief Fear of Negative Evaluation Scale, Straight-forward Items (BFNE-S; Rodebaugh et al., 2004; Weeks et al., 2005);
 Brief resilience scale (BRS; Smith et al., 2008);
 Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983; Meijer, de Vries, & van Bruggen, 2011);
 Center for Epidemiological Studies Depression Scale (CESD; Radloff et al., 1977);
 Chinese version of the GAD-7 (He et al., 2010);
 Chinese version of the PHQ-9 (Zhang et al., 2013);
 Daily Experiences with Heterosexism Questionnaire (DEHQ; Balsam et al., 2013);
 Davidson PTSD Scale (Davidson et al., 1997; Zlotnick et al., 1996);
 Depression, Anxiety, and Stress Scales - 21 (DASS-21; Lovibond & Lovibond, 1995);
 Difficulties of Emotion Regulation Scale and Short Form (DERS; Gratz & Roemer, 2004; DERSSF; Kaufman et al., 2016);
 Gay-related Rejection Sensitivity Scale (GRS; Pachankis et al., 2008);
 Heterosexism in Racial Ethnic Minority Communities Subscale of the LGBT People of Color (POC) Microaggression Scale (Balsam et al., 2011);
 Internalized Homophobia Scale (IHP; Martin and Dean, 1992);
 Interpersonal needs questionnaire (INQ; Joiner, 2005; Van Orden et al., 2010; 2012);
 Lesbian Internalized Homophobia Scale (LIHS; Szymanski & Chung, 2001);
 Lesbian, Gay, and Bisexual Identity Scale - Internalized Homonegativity Subscale (Mohr & Kendra, 2011);
 Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987);
 Life Satisfaction Index (LSI; Neugarten et al., 1961);
 Measure of Gay-Related Stress (MOGS; Lewis, Derlega, Griffin, & Krowinski, 2003);
 Mini-International Neuropsychiatric Interview (MINI and MINI 6.0; Sheehan et al., 1998);
 Network Orientation Scale (NOS; Vaux et al., 1986);
 Overall Anxiety Severity & Impairment Scale (OASIS; Norman, Cissell, Means-Christensen, & Stein, 2006);
 Overall Depression Severity & Impairment Scale (ODSIS; Bentley, Gallagher, Carl, & Barlow, 2014);
 Patient Health Questionnaire - Depression Module (PHQ-9, Kroenke et al., 2001);
 Perceived Stress Scale (PSS; Cohen et al., 1983);
 Prolonged Activation and Anticipatory Race-Related Stress Scale - Psychological Subscale and Perseverative Cognitive Subscale (Utsey et al., 2013);
 Racism-Related Vigilance Scale (Hicken et al., 2013);
 Rathus Assertiveness Schedule and Simple RAS - Short Form (RAS; Rathus, 1973; SRAS-SF; Jenerette & Dixon, 2010);
 Ruminative Responses Scale (RRS; Treynor, Gonzalez, and Nolen-Hoeksema, 2003);
 Self-compassion scale: Youth (SCS-Y; Neff, 2003; Neff et al., 2021);
 Self-Concealment Scale (Larson & Chastain, 1990) as previously modified for use with GBM (Schrimshaw et al., 2013);
 Sexual Minority Women's Rejection Sensitivity Scale (SMW-RSS; Dyar et al., 2016);
 Sexual Orientation Concealment Scale (SOCS; Meyer, Rossano, Ellis, & Bradford, 2002);
 Sexual Orientation Implicit Association Test (Hatzenbuehler et al., 2009);
 Short Internalized Homonegativity Scale (SIHS; Currie, Cunningham, & Findlay, 2004);
 Spielberger State Anxiety Scale - Short Form (ANXSF; Marteau & Bekker, 1992);
 State and Trait Anxiety Inventory (STAI; Spielberger et al., 1970);
 Stress Appraisal Measure for Adolescents (SAMA; Rowley et al., 2005) - 3 subscales (challenge, threat, resources);
 Student life satisfaction scale (SLSS; Huebner, 1991; Diener et al., 1985);
 The dialectical behaviour therapy ways of coping checklist (DBT-WCCL; Neacsiu et al., 2010);
 The Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS; Mattick & Clarke, 1998);
 UCLA Loneliness Scale Version 3 (UCLA; Russell, 1996);
 World Health Organization Quality of Life -Abbreviated Version (WHOQOL-BREF; WHO, 1996)

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Outcome measures: A wide range of outcome measures was used across the studies, with most studies using validated scales

What evidence-based cognitive and/or behavioural interventions for LGBTQ+ populations exist, and what, if any, specific adaptations do they involve?

CBT-based interventions: Eleven studies involved CBT-based interventions, five of which featured the ESTEEM (Effective Skills to Empower Effective Men) intervention, or interventions based on it. ESTEEM was adapted via interviews with key stakeholders, including gay and bisexual men with depression and anxiety and expert providers, from Barlow's (2011) Unified Protocol for the Transdiagnostic Treatment of Emotional Disorders to improve minority stress coping through emotion regulation, cognitive restructuring, and assertiveness training (identifying minority stress experiences; tracking cognitive, affective, and behavioural reactions to minority stress; attributing distress to minority stress rather than to personal failure; assertiveness training for coping with minority stress in safe situations; Pachankis, 2014; Pachankis et al., 2015).

Interventions based on ESTEEM included EQuIP (Empowering Queer Identities in Psychotherapy), which, following interviews with sexual minority women and expert clinicians, revised intervention contents to, for example, focus on sexual minority women's unique experiences, including the intersection of sexism with other forms of oppression, exposure to sexual assault and harassment, or impact of gender norms, and also offered participants the option to choose the gender of their therapist (Pachankis et al., 2020).

ESTEEM was also adapted to more diverse contexts, populations, and ethnicities, with a view to address cultural contexts such as prioritisation of family needs and limited support from the health system (Pan et al., 2021), and to recognise intersectionality of racism and homophobia (Jackson et al., 2022), respectively. Adaptations occurred via key stakeholder feedback and by following the Assessment-Decision-Administration-Production-Topical

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Experts-Integration-Training-Testing (ADAPT-ITT) model (Wingood & DiClemente, 2008), a prescriptive method for adapting existing evidence-based interventions for new contexts or populations (Pan et al., 2021), as well as based on prior empirically supported group treatments for GBM of colour and guidance on psychotherapy for individuals who are both racial and sexual minorities (Jackson et al., 2022).

Three studies featured the AFFIRM intervention, a manualised affirmative cognitive behavioural intervention developed using case studies and community-based research, and participant feedback. AFFIRM targets young people with sexual and/or gender identity minority identities, focusing on improving coping and reducing depression. This occurs by explicitly acknowledging and validating the unique experiences of these populations, providing opportunities to understand and modify cognition (self-awareness, identifying risk, e.g., development of realistic alternative ways of thinking and behaving that affirm identities while integrating healthy ways of coping with internal/external stressors), mood (recognising the link between thoughts and feelings, e.g., how participants have learned to cope with identity-specific stressors), and behaviour (identifying strengths and ways of coping, e.g., connection to peer and adult allies) (Craig & Austin, 2016).

Furthermore, one study featured CBT for Trauma and Self-Care (CBT-TSC) including HIV counselling, another featured CBT for social anxiety including a focus on goals for satisfying relationships and sex, and a last study featured CBT with sessions dedicated to transgender-specific issues.

DBT, mindfulness, ACT: Two studies used DBT, one adapted by explicitly including minority stress psychoeducation; two studies featured mindfulness-based interventions (MBSR; Mindful Self-Compassion for Teens, MSC-T – with slight modifications to accommodate the needs of transgender adolescents). A final study featured ACT, explicitly addressing self-stigma around sexual orientation/internalised homophobia.

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Session numbers ranged from six to 18, with a mode of ten sessions, and had lengths ranging from 50-60 minutes (seven studies) to 120-150 minutes for MBSR. Half of the studies featured group interventions, with one featuring a combination of group and individual sessions, and phone coaching; the remaining seven studies either explicitly stated or implied that interventions were delivered individually.

What are the outcomes of evidence-based cognitive and/or behavioural interventions and adaptations targeting mental health in LGBTQ+ populations?

Condition differences post-intervention

Four studies, three of which were RCTs with inactive controls (#1, #3, #4) and one of which was a non-randomised experimental study (#13), all CBT-based, reported condition differences; #2, although an RCT, focused primarily on the effects of internalised homophobia.

Mental health; depression and anxiety: Three studies (#1, #4, #13) reported significant improvements in depressive symptoms – although on different measures, and the two RCTs also at least marginally significant improvements in anxiety, all of which had medium-large effect sizes, maintained at follow-up where available. The fourth study (#3) focused on PTSD and showed significant improvements on all measures related to this, bar one subscale which showed a trend for significant difference; these effects were maintained or were trending towards this at follow-up.

Mental health; other processes/constructs and minority stress-related processes/constructs: No significant differences were reported in any of the studies.

Pre-post differences

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The remaining 11 studies reported pre-post intervention differences for variables of interest – however, three of the RCTs (#1, #2, #4) and the non-randomised experimental study (#13) also reported pre-post differences.

Mental health; depression and anxiety: Fourteen studies reported results related to symptoms of depression, all of which showed improvements on at least one measure, ten of which (#1, #2, #4, #6, #7, #8, #11, #12, #13, #16) statistically or clinically significant, with medium-large effect sizes, generally maintained at follow-up. Ten studies reported results related to symptoms of anxiety, eight of which showed improvements, four of which (#1, #2, #4, #12) were at least marginally statistically or clinically significant, with medium-large effect sizes, of which two maintained the effects at follow-up. The study that focused on social anxiety (#11) showed significant improvements on all measures related to this.

Mental health; other processes/constructs: Two studies reported results related to emotion regulation, one of which (#16) showed significant improvements with large effect sizes, maintained at follow-up. Three studies reported results related to coping, only two of which (#7, #13) showed significant improvements between at least two timepoints, on different measures.

Minority stress-related processes/constructs: Six studies reported results related to internalised homophobia, three of which reported improvements on at least one analysis, one of which (#1) was statistically significant, with a large effect size, maintained at follow-up. Four studies reported results on rejection sensitivity, all of which showed improvements, but only one of which (#1) reported a significant result, with a large effect size. Finally, four studies reported results related to sexual orientation concealment, two of which reported improvements, none of which appeared to be significant, with small effect sizes.

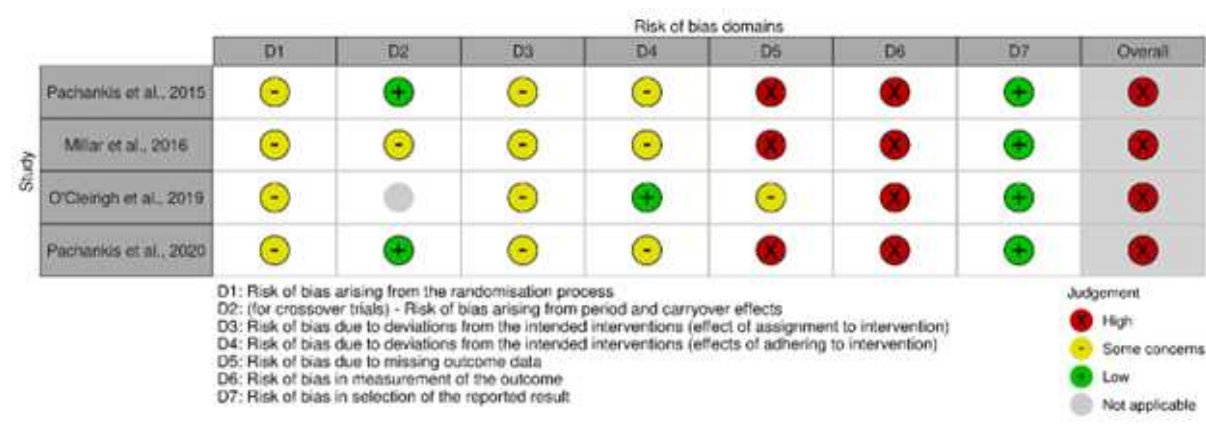
See Tables 3 and 4 and Appendix F for further details in these areas.

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Risk of bias in studies

All four RCTs were judged to be at high risk of bias using the RoB 2 (Sterne et al., 2019), particularly due to high risk being identified in the measurement of outcome and missing data domains, respectively (see Figure 2, generated using the Cochrane visualisation tool - robvis, McGuinness et al., 2020).

Figure 2. Risk of bias assessment for the included randomised studies, using the Cochrane risk-of-bias tool for randomised trials (RoB 2) (Sterne et al., 2019).



Of the 12 non-randomised studies, nine (#5, #7, #8, #9, #10, #11, #12, #14, #15) were judged to be at critical risk of bias using the ROBINS-I (Sterne et al., 2016), and three (#6, #13, #16) were judged to be at serious risk of bias. This was mostly due to critical scores in the confounding domain, as well as serious scores in the measurement of outcomes domain. Half of the studies also scored as serious on the selection of participants domain (see Figure 3, same as Figure 2). See Appendix G for further details.

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Figure 3. Risk of bias assessment for the included non-randomised studies, using the Risk of Bias In Non-Randomised Studies - of Interventions (ROBINS-I) tool (Sterne et al., 2016).

	Risk of bias domains							Overall
	D1	D2	D3	D4	D5	D6	D7	
Maguen et al., 2005								
Yadavaia & Hayes, 2012								
Craig & Austin, 2016								
Austin et al., 2018								
Jabson Tree & Patterson, 2019								
Cohen et al., 2020								
Hart et al., 2020								
Bluth et al., 2021								
Craig et al., 2021								
Pan et al., 2021								
Jackson et al., 2022								
Poon et al., 2022								

Domains:
D1: Bias due to confounding.
D2: Bias due to selection of participants.
D3: Bias in classification of interventions.
D4: Bias due to deviations from intended interventions.
D5: Bias due to missing data.
D6: Bias in measurement of outcomes.
D7: Bias in selection of the reported result.

Judgement
 Critical
 Serious
 Moderate
 Low
 No information

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Discussion

This review investigated evidence-based cognitive and/or behavioural interventions and adaptations for LGBTQ+ populations, complementing previous work (Bochicchio et al., 2022; Sheinfel et al., 2019; Van Der Pol-Harney & McAloon, 2019) by focusing specifically on cognitive and/or behavioural interventions and broadening the criteria to include participants of any age.

Summary and interpretation of evidence

What evidence-based cognitive and/or behavioural interventions for LGBTQ+ populations exist, and what, if any, specific adaptations do they involve?

The studies included in the review featured a range of therapeutic modalities (CBT – 11 studies; DBT – two studies; ACT – one study; mindfulness-based interventions – two studies). Of the CBT studies, eight involved versions of two protocolised interventions aimed specifically at LGBTQ+ individuals (ESTEEM, interventions based on it such as EQuiP, or adaptations to more diverse contexts or populations – five studies, and AFFIRM – three studies; see Table 4). Another four studies explicitly referred to LGBTQ+-specific adaptations, including a focus on stigma around sexual orientation, incorporating minority stress theory, or slight modifications to accommodate LGBTQ+ needs.

What are the outcomes of evidence-based cognitive and/or behavioural interventions and adaptations targeting mental health in LGBTQ+ populations?

When considering post-intervention differences between groups, of the four studies (three RCTs, one non-randomised experimental study) which reported this, three reported significant improvements in depressive symptoms, and the two RCTs also at least marginally significant improvements in anxiety. The fourth study, which focused on PTSD, showed significant improvements on most measures related to this. No significant differences were reported in terms of other mental health or minority stress-related processes/constructs.

When considering pre-post differences, these were reported in the remaining 11 studies as well as in three of the RCTs and the non-randomised experimental study. All the

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14 studies investigating this showed improvement on at least one measure, ten being statistically/clinically significant. For anxiety, eight out of ten studies showed improvements, four thereof at least marginally statistically/clinically significant. The study that focused on social anxiety showed significant improvements on all measures related to this.

Reflections

Studies were heterogenous in terms of study designs, outcome measures, and analyses. Although the studies showed general improvements in certain areas such as depression, this is based on a variety of outcome measures (e.g., in some studies, significant improvements are seen on one outcome measure and not another, and viceversa – Pachankis et al., 2015, and Pachankis et al., 2020, respectively), as well as types of analysis (statistical significance, effect sizes, clinically significant reductions). This, together with the limitations of the studies (see below), raises questions about the strength and consistency of the evidence base.

The included studies also featured a heterogeneity of LGBTQ+ populations, such that the results cannot be generalised to any specific LGBTQ+ population without discussing the intersection of various identities (sexual, gender, racial, ethnic, social). Indeed, six studies focused on men, of which four included both gay and bisexual men, one included gay and bisexual men of colour, and one included sexual minority men in China. One study only focused specifically on women, three specifically on transgender individuals; moreover, most studies were conducted in North America. Therefore, findings may apply more to particular populations such as sexual minority men in North America, raising the question of whether other populations are the focus of enough relevant research.

Thirdly, while a variety of transdiagnostic elements were featured in the studies' interventions, mechanisms of change are not clearly differentiated such that the role of the minority stress-based adaptations remains largely unclear. Indeed, the most notable effects were observed for depression, while measures of minority stress (that is, proximal factors such as internalised homophobia, concealment, rejection sensitivity) showed less reliable

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improvements – or were not even explored at all (of the 16 included studies, only seven included such measures). Measures of other processes/constructs proposed to interact with minority stress (e.g., emotion regulation, unhelpful behaviours) were included in some studies, yet again, yielded unreliable results. While some authors (e.g., Pachankis et al., 2015) discuss that larger sample sizes would reveal such effects, it seems that certain components of non-empirically based treatment may also lead to improvements (Van de Pol-Harney and McAloon, 2019).

Findings of this review were consistent with those of previous systematic reviews in that positive effects on mental health were reported, particularly in terms of symptoms of depression (Bochicchio et al., 2022; Sheinfil et al., 2019; Van der Pol-Harney & McAloon, 2019), with comparable results for various modes of administration, including in-person, online, individual, or group (Hobaica et al., 2018; Bochicchio et al., 2022), and particularly for interventions based on CBT (Van der Pol-Harney & McAloon, 2019). Furthermore, previous reviews also noted the paucity and heterogeneity of existing literature. However, while the cited reviews only explored interventions for young people, the current review expanded these to all ages, providing some evidence that results can be generalisable to adults as well, yet the intersection of these various characteristics and identities necessitates more in-depth exploration.

What recommendations could be made in terms of such adaptations in clinical practice?

The heterogeneity in the studies leads to a limited ability to draw more precise conclusions about the effects of particular interventions for particular groups. Therefore, generic therapeutic competencies and metacompetencies (e.g., around engagement, therapeutic alliance and grasping clients' 'world views', adapting interventions in response to client feedback, formulating and applying CBT models to the individual client etc., Roth & Pilling, 2007) may be especially important. Indeed, such competencies have been deemed important by some LGBTQ+ populations (McNamara & Wilson, 2020).

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Applying these competencies to the needs of LGBTQ+ populations may also specifically mean adopting an affirmative approach, with clinicians being aware of LGBTQ+ issues (O'Shaughnessy & Speir, 2018), including minority stress, and receiving ongoing training on this (Boroughs et al., 2015; McNamara & Wilson, 2020). This may also mean adopting a more holistic approach, as LGBTQ+ individuals may benefit from addressing minority stress regardless of the format and drawing from social support to build resilience or reframe unhelpful beliefs (Alessi, 2014; Kertzner, 2001).

Limitations of evidence/summary and interpretation of risk of bias evaluation

Searches yielded only 16 studies despite broad inclusion criteria. Only four studies used an RCT design, with the majority using a pre-post design with no control group, therefore not being able to establish a causal effect of the interventions. Moreover, sample sizes varied considerably, with some studies featuring very small sample sizes and some studies relying on the same sample, bringing into question statistical power and the relevance, reliability, and generalisability of results where statistical tests were not even used.

Risk of bias was evaluated as high in all four RCTs, and critical in nine of the non-randomised studies, with the remaining three non-randomised studies evaluated as serious. However, due to the nature of psychological interventions, domains regarding blinding participants and study personnel and measuring outcomes are intrinsically restricted. Nonetheless, almost all uncontrolled pre-post studies were evaluated as presenting critical risk of confounding, based on the ROBINS-I detailed guidance (Sterne et al., 2016), which recommends this where confounding is “inherently uncontrollable”. This may have led to a flooring effect.

Limitations of the review process

Only English language and peer-reviewed studies were included, which limited the range of articles, potentially raising publication bias (Cuijpers et al., 2010). Our intention was to focus on the “gold standard” (peer-reviewed) literature as a first step, and research has found that “unpublished studies and studies in languages other than English rarely had any

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impact on the results and conclusions of the review” (Hartling et al., 2017, as cited in Higgins et al., 2023), and “any unpublished studies identified in a given review may be an unrepresentative subset of all the unpublished studies in existence” (Higgins et al., 2023). A funnel plot was considered, but this was not possible, as treatment effects were not available for all included studies. See Appendix B for more details on these decisions.

Additionally, we excluded certain populations (e.g., HIV-positive persons) and studies with outcomes related solely to drug use, and did not explicitly address outcomes related to suicidality or eating disorders. These areas were considered beyond the scope of this review due to the added complexity they would have brought.

Finally, while our search terms were based on our inclusion/exclusion criteria, using the PICOS framework, and in collaboration with a University of Exeter librarian with Psychology as one of her subject specialties, as well as by terms identified during the scoping search, we acknowledge that their use in their current form may have led to some potentially eligible studies not being retrieved. This is because terms such as “minority stress” encompass heterogeneous sets of constructs which may have led to studies not being retrieved unless the constructs were explicitly part of the search string. This, of course, may in turn limit the representativeness of the studies and paint a relatively different picture of the landscape of the literature.

Our rationale for keeping terms rather broad was to keep a similar “detail level” of terms, one which was most likely to retrieve the most relevant results. For example, we kept the term “minority stress” rather broad (rather than including terms related to internalised homophobia, rejection sensitivity, or concealment), the same as we kept terms related to mental health difficulties rather broad (rather than including, for example, in the case of depression, terms related to anhedonia, lack of motivation, or rumination, although specific outcome measures for such areas exist). Indeed, as discussed above, our findings are broadly in line with those of previous systematic reviews in the area, suggesting that the retrieved studies were mostly representative of the topic at hand. We provide a more extensive

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explanation in Appendices B and C. The limited and heterogeneous nature of the evidence also restricted the possibility of exploring the data via meta-analyses and drawing more robust conclusions.

Implications and future research directions

To allow for more robust and more generalisable conclusions to be drawn, more consistency in outcome measures and general methodology is needed. This would allow for more meta-analyses to be conducted, and these should consider the impact of publication bias (Cuijpers et al., 2010). However, less strict methodologies may also offer pragmatic information on how interventions are administered and received in a variety of healthcare settings.

Moreover, as certain LGBTQ+ populations seem to be focused on more than others in the literature, more research needs to be carried out focusing on other LGBTQ+ populations, as well as discussing the intersection of various identities. More detailed investigations into specific mechanisms of change could also provide invaluable information as to the role of minority stress-based adaptations and what intervention aspects and therapeutic competencies are most important in producing positive outcomes, allowing for more investment and/or training in those areas.

Conclusion

The review investigated evidence-based cognitive and/or behavioural interventions and adaptations for LGBTQ+ populations, revealing a range of therapeutic modalities and levels of adaptation. Findings showed largely positive effects, in line with previous systematic reviews – however, in the context of a paucity of the literature, with heterogeneity in terms of study designs, outcome measures, and analyses, as well as risk of bias evaluated as high or critical/serious (despite the possibility of a flooring effect). Limitations in terms of included studies and possible publication bias, as well as limited opportunity for generalisability and further exploration of the evidence to draw more robust conclusions are recognised. Suggestions for clinical practice are around the importance of generic therapeutic

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competencies and metacompetencies, and affirmative, potentially more holistic approaches. Suggestions for future research directions include more consistency in methodology, more focus on underserved LGBTQ+ populations and intersectionality, and more detailed investigations into mechanisms of change.

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Appendices

Appendix A – Further explanation regarding deviations from the PROSPERO protocol

In writing the final article, we have deviated from the PROSPERO protocol in a few, we claim, undistruptive ways, which we outline below. This was due to time and resource constraints – as the work is based on an MSc dissertation of the first author, who then adapted this in their spare time, with no funding, while working full-time in unrelated settings, and due to an attempt to make the narrative of the manuscript more stringent and avoid repetition as suggested during the review process.

- The PROSPERO protocol mentions conducting a thematic analysis in the context of synthesis methods. While using a thematic analysis was an option of synthesising the results which we considered at pre-registration, we then decided to summarise and explain the characteristics of the included studies by conducting a narrative synthesis considering the “Synthesis without meta-analysis” (SWiM) guidelines (Campbell et al., 2020), following the PICOS framework, which seemed to lend itself better to answering the initial, more general question we had included in the manuscript. We have now also restructured the Results section to answer the revised, more specific questions included at the request of the reviewer.
- The PROSPERO protocol mentions that additional information sources such as forward-backward searches of reference lists of relevant review articles and articles eligible for inclusion, as well as contacting eminent authors in the field, would be “considered”, and unfortunately, we were unable to include these additional information sources – as illustrated in Fig. 1 (the PRISMA flow diagram).
- The original questions registered on PROSPERO read:
 1. “What is the landscape of the scientific literature specifically on evidence-based cognitive and/or behavioural interventions targeting mental health in the LGBTQ+ community?”

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2. What are the outcomes of evidence-based cognitive and/or behavioural interventions targeting mental health in the LGBT+ community?/Are evidence-based interventions effective for LGBT+ community members?
3. Is there research on adaptations to such interventions?
4. What are the outcomes of such adapted interventions?
5. What recommendations could be made in terms of such adaptations in clinical practice? (Budge et al., 2017; Pachankis, 2018)”

Following two review rounds, we decided the ones included in the latest version of the manuscript best fulfil the purpose of relaying the findings to the readers in the most helpful and informative way. The new questions are only slightly condensed and re-grouped – we have essentially eliminated the (old) question 1 which was really a broader way of asking most of the subsequent questions, before attempting to combine the (old) questions 2, 3, and 4 into the (new) questions 1 and 2; we kept question 5 unchanged.

With regards to the consequences of these changes for the results, we believe these to be minimal.

We believe that using a narrative synthesis and not a thematic analysis has contributed to the narrative of the manuscript being more stringent and structured, and to answering each of the review questions in turn, both in the Results and in the Discussion sections.

This relates to the final point around review questions – as outlined above, we believe the changes around these have not altered the content of the review, but rather, made possible its organisation in its current form which we believe serves the readers the best as it follows a logical narrative.

Finally, our inability to include additional information sources may have changed the results in that further articles may have been found – however, this relates to Appendix B below; in particular, the second (the possibility that “any unpublished studies identified in a given review may be an unrepresentative subset of all the unpublished studies in existence”;

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Higgins et al., 2023) and fourth (the knowledge that “there is no easy and reliable single way to obtain information about studies that have been completed or terminated but never published”) point.

We also believe that the latter point can be extended to obtaining such further articles from reference lists – this may represent a rather unreliable, and not very systematic, way of obtaining such information – and as mentioned in the first point below, we envisioned this review to be a first step in addressing this wide and rather diffuse topic. We welcome future work building on it.

Appendix B – Further explanation regarding inclusion/exclusion criteria

Regarding our decision to exclude grey literature and work in other languages than English: The rationale behind this was linked to:

- Our intention to find and report the “gold standard” (peer-reviewed) scientific literature as a first step on this subject
- The possibility that “any unpublished studies identified in a given review may be an unrepresentative subset of all the unpublished studies in existence” (Higgins et al., 2023)
- Some (albeit limited) research having found that “unpublished studies and studies in languages other than English rarely had any impact on the results and conclusions of the review” (Hartling et al., 2017, as cited in Higgins et al., 2023)
- The knowledge that “there is no easy and reliable single way to obtain information about studies that have been completed or terminated but never published”
- As well as time and resource limitations

We did consider including the two dissertations our searches retrieved, but concluded that this would likely bring more confusion and bias as they would likely not be representative

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of grey literature on this subject (see above). We did also consider creating a funnel plot, but were unable to, as treatment effects were not available for all included studies, and also, again, unfortunately due to time and resource limitations.

Regarding outcomes: we based our criteria in this domain loosely on the Improving Access to Psychological Therapies (IAPT) – now renamed NHS Talking Therapies for Anxiety and Depression – in the UK's National Health Service (NHS) – and their problem descriptors (National Collaborating Centre for Mental Health, 2023), which are based on the ICD-10 (World Health Organization, 2016) framework – as a well-established framework of common mental health difficulties. Therefore, anxiety refers to any anxiety disorders (including, e.g., generalised anxiety disorder, panic disorder, agoraphobia, social anxiety disorder), and the others are separate. All of these would have been included had they been identified, which was considered during title and abstract screening.

We did not explicitly mention or include suicidality as it is a complex area, can be considered a symptoms of mental health difficulties, and is correlated with this (e.g., Harris & Barraclough, 1997; Hemelrijk et al., 2012), which meant it would have both broadened the scope of the work, and that, where an effect on mental health difficulties was observed, an effect on suicidality would likely be observed as well.

Similarly, including substance use and eating disorders would have significantly broadened the scope of the work – with these difficulties usually treated in more specialist settings than common mental health difficulties as those included here. Also, to note, our exclusion criterion related to substance use was related to studies with outcomes solely related to this area, rather than excluding them altogether. However, both suicidality and substance use are common exclusion criteria in mental health intervention studies (and indeed, in some of the studies included here), which speaks to the complexity of this interaction and to how much broader the scope of the work would have been, which, although interesting, may have led to even more heterogeneity in results, a more difficult to follow narrative, and was also not feasible in this context due to time and resource constraints.

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Finally, we did include outcomes related to minority stress, as this was of interest due to the crucial role this plays in mental health – and as it is a risk factor for mental health difficulties. We kept the term minority stress rather broad, the same as we kept the mental health difficulties terms rather broad – we did not specify, for example, that we may be looking, in the case of depression, for outcomes related to anhedonia, lack of motivation, or rumination, although specific outcome measure for such areas exist.

Appendix C – Full search strategy/history

Can be accessed on: <https://osf.io/ctk48>

Appendix D – Full extracted data table

Can be accessed on: <https://osf.io/34a6y>

Appendix E – Overview of records excluded at full text review stage

Three studies did not meet the population inclusion/exclusion criteria (one included a majority of HIV-positive participants who met criteria for abuse or dependence on methamphetamine, Fletcher & Reback, 2015; one reanalysed data from other published studies which did not focus on gender minorities, using a questionnaire item as proxy to identify gender minority status, without capturing a range of gender identities, Hollinsaid et al., 2020; one did not include LGBTQ+ individuals, Shapiro et al., 1982); two were conference abstracts and the corresponding empirical data could not be located (Cohen et al., 2021; Ramos et al., 2019); two were not peer-reviewed, but dissertations (Simonetti, 2019; Walloch, 2015); two did not meet the intervention inclusion/exclusion criteria (one included a group-based intervention seeking to improve social cohesion, community connectedness, mental and sexual health, therefore appearing to be a support group, Kaplan et al., 2019; another involved psychotherapy from a variety of theoretical frameworks, including psychodynamic and person-centred psychotherapy, Budge et al., 2021); one did not differentiate between

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LGBTQ+ and non-LGBTQ+ participants in the analysis (Harned et al., 2021); one was a computerised intervention appearing to provide no human interaction (Lucassen et al., 2021); one was strictly a feasibility/acceptability study and provided no data on outcomes of interest (Hall et al., 2019).

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Appendix F – Further information regarding Risk of bias in studies

RCTs – evaluated using RoB 2

All included RCTs were judged to be at high risk particularly due to high risk being identified in the measurement of outcome (D6).

The signalling questions in RoB 2 for D6 are:

1. Was the method of measuring the outcome inappropriate?
2. Could measurement or ascertainment of the outcome have differed between intervention groups?
3. If N/PN/NI to 1. and 2.: Were outcome assessors aware of the intervention received by study participants?
4. If Y/PY/NI to 3.: Could assessment of the outcome have been influenced by knowledge of intervention received?
5. If Y/PY/NI to 4.: Is it likely that assessment of the outcome was influenced by knowledge of intervention received?

While for all studies, the answers to 1. and 2. are No, there was an awareness of intervention in the participants, and the participants were the outcome assessors; this could have influenced the outcome (also as the comparator was the waitlist).

While this is the case for virtually all intervention studies with participant-reported outcomes, the RoB 2 tool says, “Inability to blind outcome assessors does not mean that the resulting potential for bias can be ignored: review authors must always assess the risk of bias due to error in measuring the outcome.”

The tool also states, “For participant-reported outcomes, the assessment of outcome is potentially influenced by knowledge of intervention received, leading to a judgement of at least ‘Some concerns’. Review authors will need to judge whether it is likely that participants’ reporting of the outcome was influenced by knowledge of intervention received, in which case risk of bias is considered to be high. [...] level of pain reported at the end of a course of

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acupuncture, in a study comparing acupuncture with no treatment, is likely to be affected by knowledge of the intervention received.”

This then places this domain at high risk of bias, therefore placing the entire study at the same level of risk.

Non-randomised studies – evaluated using ROBINS-I

Nine non-randomised studies (#5, #7, #8, #9, #10, #11, #12, #14, #15) were judged to be at critical risk of bias using the ROBINS-I (Sterne et al., 2016). This was mostly due to critical scores in the confounding domain (D1), as well as serious scores in the measurement of outcomes domain (D6).

The signalling questions in ROBINS-I for D1 are:

1. Is there potential for confounding of the effect of intervention in this study? If N/PN to 1.: the study can be considered to be at low risk of bias due to confounding and no further signalling questions need be considered If Y/PY to 1.: determine whether there is a need to assess time-varying confounding:
2. Was the analysis based on splitting participants' follow up time according to intervention received? If N/PN, answer questions relating to baseline confounding (4 to 6) If Y/PY, proceed to question 3.
3. Were intervention discontinuations or switches likely to be related to factors that are prognostic for the outcome? If N/PN, answer questions relating to baseline confounding (4 to 6) If Y/PY, answer questions relating to both baseline and time-varying confounding (7 and 8)
4. Did the authors use an appropriate analysis method that controlled for all the important confounding domains?
5. If Y/PY to 4: Were confounding domains that were controlled for measured validly and reliably by the variables available in this study?
6. Did the authors control for any post-intervention variables that could have been affected by the intervention?

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7. Did the authors use an appropriate analysis method that adjusted for all the important confounding domains and for time-varying confounding?

8. If Y/PY to 7: Were confounding domains that were adjusted for measured validly and reliably by the variables available in this study?

For most studies, the main reason for a critical rating is the lack of a control group (instead employing a pre-post design) and the lack of any statistical methods to reduce risk around this, rendering confounding inherently uncontrollable. In addition, some studies had very few participants (e.g., 6), only two time-points of data collection, reported significant life changed in the lives of participants (becoming unemployed, homeless) – Maguen et al., (2006). In contrast, the only study with a moderate rating in this domain was Yadavaia & Hayes (2012), which, although featured no control group, achieved some control via concurrent, multiple-baseline, across-participants design.

The signalling questions in ROBINS-I for D6 are:

1. Could the outcome measure have been influenced by knowledge of the intervention received?
2. Were outcome assessors aware of the intervention received by study participants?
3. Were the methods of outcome assessment comparable across intervention groups?
4. Were any systematic errors in measurement of the outcome related to intervention received?

This is very similar to the D6 domain of RoB 2, that is, there was an awareness of intervention in the participants, and participants were the outcome assessors; this could have influenced the outcome.

To note, we were unable to contact study authors with regards to missing information due to time and resource constraints. Indeed, although missing data may have been identified this way and discussed (keeping in mind wordcount limits), the fact that these data were

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missing from original studies may perhaps speak to the quality of the studies available without further investigations.

Funding and ethics information

The review is self-funded, as it has been carried out as part of an MSc, with the intention of publishing it in a peer-reviewed journal upon completion. It was registered on PROSPERO (International prospective register of systematic reviews) in April 2022 (CRD42022243466). As no human data were collected, no ethics approval was required.

Note

In an attempt to use standardised and inclusive language throughout this paper, the abbreviation 'LGBTQ+' was used to refer to individuals with a variety of sexual orientation-related and gender-related identities. However, it is recognised that these terms and definitions are fast evolving; therefore, where available, self-identification was specified. Where other terms related to sexual orientation or gender identity were used, this was to maintain fidelity as to how such issues are referred to in the literature. The same applies for instances of British vs American spelling.