




REVIEW

Evidence from high-income countries on the effectiveness of psychosocial interventions to improve mental health, wellbeing and quality of life for adults living with HIV: a systematic review and meta-analysis

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ABSTRACT

Introduction: There is a need to synthesize recent evidence on the effectiveness of psychosocial interventions to improve mental health, quality of life and wellbeing in adults living with HIV in high-income countries. A systematic review and meta-analysis was conducted to address this research gap.

Methods: Medline, Embase, Psycinfo and Web of science were searched (from 2008 to December 2023). In total, 67 randomized controlled trials (RCTs) of psychosocial intervention among adults living with HIV in high-income countries were eligible.

Results: In the meta-analysis, there was an overall positive effect of interventions on reducing depression ($N = 40$; standardized mean difference [SMD] -0.19 [95% CI: $-0.29, -0.10$]), anxiety ($N = 15$; SMD -0.12 [$-0.23, -0.02$]), stress ($N = 13$; SMD -0.22 [$-0.41, -0.04$]), and other measures of poor wellbeing ($N = 19$; SMD -0.18 [$-0.35, -0.02$]) and increasing levels of coping/self-efficacy ($N = 8$; SMD 0.17 [$0.04, 0.31$]). For depression, interventions that used symptom screening above a threshold score to identify eligible individuals were more effective than those without such an eligibility criterion (SMD -0.29 vs. -0.10 , $p = 0.023$). Interventions compared to standard care controls had a greater effect on depression versus interventions compared to not standard care controls, when the latter category included standard care controls that received intentional support (SMD -0.28 vs. -0.11 , $p = 0.035$). There was also weak evidence of an overall positive effect on: reducing stigma ($N = 7$; SMD -0.17 [$-0.35, 0.02$]), and improving social support/participation ($N = 6$; SMD 0.17 [$-0.02, 0.35$]), mental health quality of life ($N = 12$; SMD 0.09 [$-0.01, 0.19$]), physical health quality of life ($N = 11$; SMD 0.07 [$-0.02, 0.16$]) and quality of social life ($N = 6$; SMD 0.10 [$-0.04, 0.24$]). There was no evidence found for an effect on loneliness, although data were limited.

Discussion: Pooled effect estimates were small or small to moderate. In line with previous literature, there was no evidence of differential effects on depression according to the intervention type (psychotherapeutic vs. other).

Conclusions: Evidence from RCTs suggest that psychosocial interventions are effective in improving mental health for adults living with HIV in high-income settings. Interventions were more effective at reducing depression when targeted at those screening positive for mental health symptoms and when compared to a standard care only control group. There was some evidence that longer, more intensive interventions were more effective.

Keywords: anxiety; depression; HIV; intervention; psychosocial; RCT

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1 | INTRODUCTION

The landscape of HIV treatment and prevention has changed dramatically in the past decades with the development of highly effective and tolerable antiretroviral treatments (ARTs)

[1]. Improvements in virological and clinical outcomes of treatment and knowledge that having an undetectable viral load indicates that HIV cannot be transmitted sexually [2], may have a positive impact on the mental health and wellbeing of people living with HIV. However, HIV-related stigma

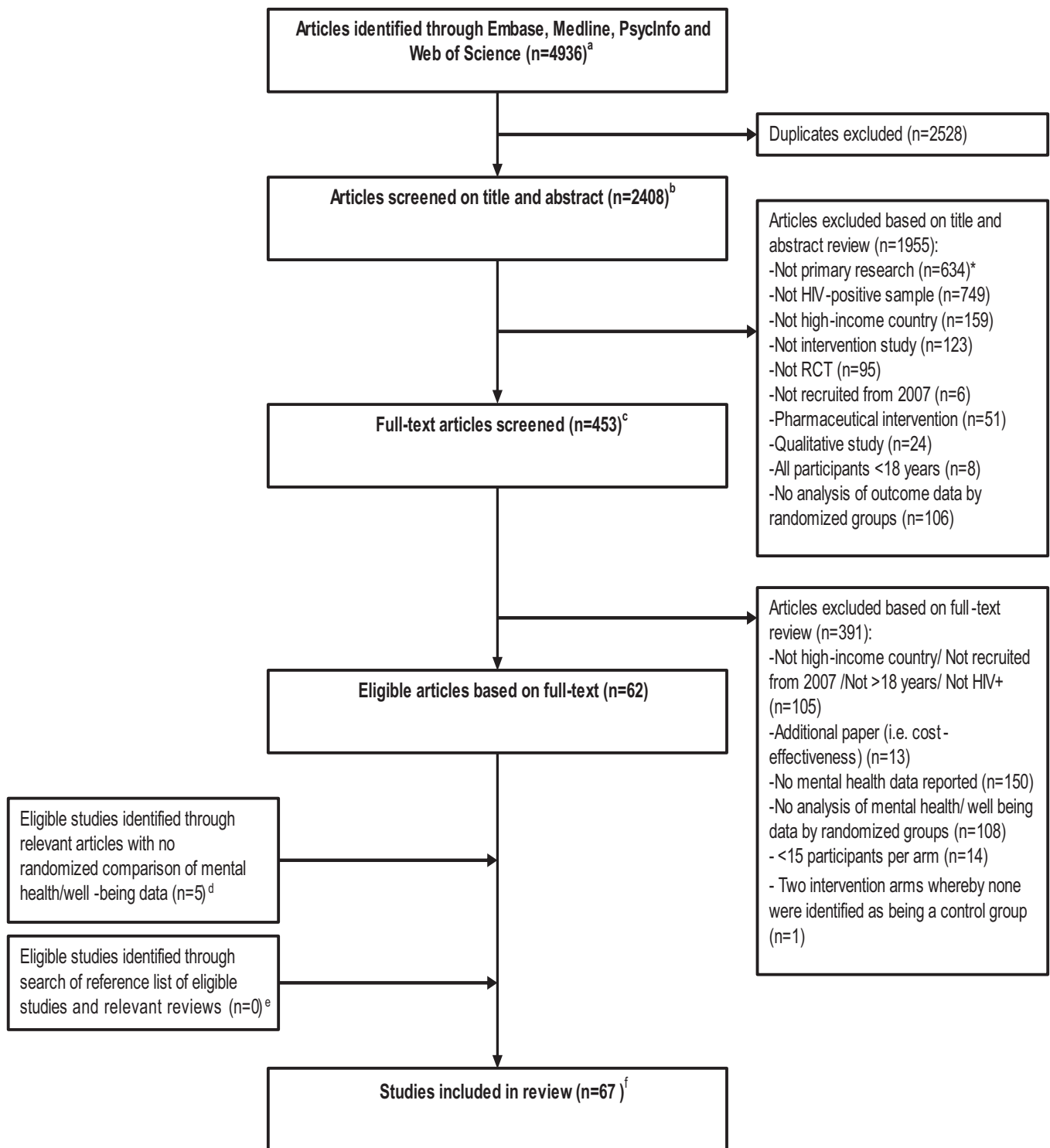


Figure 1. Flow chart of study inclusion and exclusion. ^aA systematic search was undertaken of the electronic databases Embase, Medline, PsycInfo and Web of Science to identify RCTs of psychosocial interventions for people living with HIV in high-income countries published from 2008 up to 14th December 2023. Search terms included those related to: (a) HIV, (b) psychosocial interventions (definition based on a previous review [11], e.g. psychotherapy, counselling, coaching, social support, Cognitive behavioural therapy (CBT), meditation), (c) RCTs (based on a Cochrane recommended search strategy [45]) and (d) high-income countries (based on World Bank Data [46, 47]). Terms related to mental health/wellbeing/quality of life outcomes were not specified in the search strategy. This was to identify studies that did not mention these outcomes in the title, abstract or key words but did report on this data in the paper. Search terms specifically related to studies of people

and discrimination persists and reinforces existing social inequalities in gender, ethnicity and sexuality [3, 4]. Poor mental health, in particular symptoms of depression, remains prevalent among people living with HIV. In a review of depression in people living with HIV in 2019 [5], the prevalence of current depression as measured via symptom questionnaire ranged from 6% to 41% (median of 24.6%) across 22 studies. Lifetime major depressive disorder as measured via structural clinical interviews ranged from 26% to 50% (median of 42%) across five studies. Depression negatively impacts ART adherence, therapeutic and clinical outcomes, and may also play a role in substance use and sexual behaviour [6–10]. In many people living with HIV, provision of effective psychosocial support may be key to improving health and wellbeing outcomes.

Numerous psychosocial interventions that aim to change negative thought patterns, emotions and/or behaviours, and which could potentially impact on mental health outcomes, have been developed and evaluated among people living with HIV. A previous systematic review and meta-analysis investigated the overall effectiveness of psychosocial interventions for people living with HIV, across all countries, for randomized controlled trials (RCTs) published from 1996 to 2014 [11]. The authors found an overall small positive effect when combining 62 studies across measures of depression, anxiety, quality of life and general psychological wellbeing. Studies were conducted in the United States, Canada, China, Iran, Kenya, Nigeria, South Africa, Switzerland, Tanzania, Thailand, The Netherlands, Uganda, Vietnam, Mexico, South Africa and Puerto Rico.

To better understand the effectiveness of psychosocial interventions in a high-income setting, there is a need to synthesize recent evidence from trials in high-income countries. The aims of this systematic review and meta-analysis were to: (i) investigate the overall effectiveness of psychosocial interventions to reduce symptoms of depression and anxiety and improve quality of life and psychological wellbeing in adults living with HIV in high-income countries, and (ii) investigate whether important characteristics of an intervention or trial (type, provider and length of intervention, control group comparator, mental health inclusion criteria, study quality) may influence effectiveness.

2 | METHODS

2.1 | Study selection

A systematic search was undertaken to identify RCTs of psychosocial interventions for adults living with HIV (Figure 1). The healthcare infrastructure may differ between high and middle/low-income settings, and mental health facilities and services may also differ, with implications for the treatment and prevalence of mental health conditions. In view of this, this review was restricted to studies conducted in high-income countries. Studies published from 2008 up to 14th December 2023 were reviewed.

Studies were included in the current review if they met all the following criteria: (i) participants living with HIV (aged 18 years or older); (ii) intervention that included either a psychosocial component, or non-pharmaceutical component that aimed to change thoughts, emotions and/or behaviour; (iii) RCT; (iv) data collected on mental health, quality of life or wellbeing measures, including social support and HIV-related stigma (by validated symptom questionnaire, professional diagnosis or treatment, or self-rated measure); (v) data from high-income country; (vi) recruitment of participants from 2007 onwards (to identify interventions conducted in the modern ART era); and (vii) ≥ 15 individuals randomized and analysed per study arm. Studies identified by the search that included some participants aged under 18 years were included in the review provided that the average age of participants was over 18 years.

The title and abstract of all identified studies were reviewed for eligibility. Two reviewers (ARM and JS) reviewed the full-text of all selected studies. Of note, studies were included regardless of whether mental health, quality of life or wellbeing measures collected were the primary endpoint of the trial. The search strategy, study selection and data extraction are described in further detail in footnotes ^{a–f} under Figure 1.

2.2 | Classification of psychosocial interventions

Each intervention was classified as psychotherapeutic, supportive, general relaxation or physical exercise as defined in

without HIV (e.g. HIV self-testing, PrEP, PEP) and pharmaceutical interventions (e.g. pharmacokinetic, immunogenicity) were used to remove ineligible studies. ^bStage 1: The title and abstract of all identified studies was reviewed for eligibility. Two reviewers (ARM and JS) independently assessed a sample of 100 studies (first and last 50 studies when sorted by author name). Thereafter, one reviewer (ARM) completed the abstract review. ^cStage 2: Two reviewers (ARM and/or JS) reviewed the full-text of all studies selected in stage 1. Disagreement about study selection was resolved via discussion with one or more co-authors. Of note, studies were included regardless of whether mental health, quality of life or wellbeing measures collected were the primary endpoint of the trial. ^dAuthors of recently published papers (2019–2023) were contacted. Forty-six authors were contacted, of whom 27 responded, and five provided data. ^eTitle and abstract of all articles referenced in 67 eligible studies were imported into Endnote ($N = 2499$). All references with “HIV” in the title that were published after 2007 were reviewed ($N = 804$). Of these, 37 were deemed to be potentially eligible and the full-text articles were reviewed. No articles were found to be eligible. Articles were excluded for the following reasons: not HIV-positive sample ($n = 2$), not high-income country ($n = 1$), not RCT ($n = 8$), not from 2007 onwards ($n = 10$), not >18 years of age ($n = 2$), no randomized comparison ($n = 3$), no mental health/wellbeing data collected ($n = 5$), and six articles were based on an eligible study already captured in the systematic review. Previous reviews and meta-analyses on this subject were also searched to identify eligible studies—no eligible studies that were not already captured in the review were identified. ^fA protocol to extract the data from eligible studies was developed [14, 48]. One reviewer (ARM, SMR or JS) initially extracted the data from each study. A second blinded reviewer checked for data extraction errors (FCL, VC, FN). Authors were contacted to retrieve information that was not published.

Table 1. Classification of intervention types^a

Intervention types	Description
Psychotherapeutic	Specific psychological techniques (e.g. CBT, other talk therapies, motivational interviewing)
Supportive	Help from others without specific psychological technique (e.g. social support, information, psychoeducation, financial support, risk-reduction, general counselling)
General relaxation	Mindfulness, meditation, yoga
Physical exercise	Physical activity
Multiple including psychotherapeutic	More than one intervention type including specific psychological techniques
Multiple not including psychotherapeutic	More than one intervention type not including specific psychological techniques

Abbreviation: CBT, Cognitive behavioural therapy.

^aClassifications were derived based on a previous review of psychosocial interventions [11].

Table 1. Interventions that fit into multiple categories were classified either as “multiple including psychotherapeutic” or “multiple not including psychotherapeutic.”

2.3 | Classification of control groups

Control groups were classified as standard care, standard care with waitlist, enhanced standard care or active control groups. All control groups that were described by authors as standard care were included in the first category; however, there was a sub-set that were judged in this review to have included a component that may be additional to standard care. For instance, standard care with a letter to the participants’ primary caregiver, regular phone calls and counselling. This sub-group of “standard care” is referred to as “standard care with intentional support” in this review and is investigated in sensitivity analyses as described in the Statistical methods section below.

2.4 | Classification of outcome measures

Data were extracted on all mental health, wellbeing and quality of life measures (Table 2). These outcome measures were grouped into one of nine categories: (i) depression; (ii) anxiety; (iii) stigma; (iv) stress; (v) loneliness; (vi) coping/self-efficacy; (vii) social support/participation; (viii) quality of life; and (ix) other wellbeing measures. For categories (i)–(v), higher scores relate to higher symptomatology/poorer wellbeing. For categories (vi)–(viii), higher scores relate to lower symptomatology/greater wellbeing. In the latter category (ix), the direction of scores was made consistent such that higher scores on questionnaires related to higher symptomatology, that is poorer wellbeing. For some measures, this necessitated reversing data from the intervention and control arms to cal-

culate effect estimates that fit the interpretation of outcomes in this category.

2.5 | Risk of bias

Twelve criteria for assessing the level of possible risk of bias were developed based on the Cochrane Collaboration’s Tool for assessing risk of bias [12] and a review about defining empirically supported psychological treatments [13]. Criteria consisted of:

- (i) Random allocation to arms (yes, no, not mentioned)
- (ii) Concealment of allocation (yes, no, not mentioned)
- (iii) Power calculation (yes, no, not mentioned)
- (iv) Treatment manual (yes, no, not mentioned)
- (v) Provider training (yes, no, not mentioned)
- (vi) Provider protocol adherence checked (mentioned and achieved, mentioned, not mentioned)
- (vii) Intention-to-treat analysis, meaning participants were analysed as part of the study arm they were randomized to at baseline (yes, no)
- (viii) 30% or less loss-to-follow-up in both arms at the initial follow-up time point (yes, no)
- (ix) Attrition bias considered (yes [assessed characteristics of participants lost vs. not lost to follow-up, imputation methods for missing data, <10% loss-to-follow-up in both arms], somewhat [discussed only], no [no discussion])
- (x) Appropriate measurement of the outcome (yes, no [i.e. not validated questionnaire])
- (xi) Outcome measurement was the same in both arms (yes, no)
- (xii) No evidence of selective reporting (yes, no [results selected on the basis of multiple eligible outcomes, e.g. scales, definitions, time points or multiple analyses])

Studies that received a judgement of “yes” scored 1 and studies that received a judgement of “no” or “not mentioned” scored 0. On criterion (vi), studies that received a judgement of “mentioned and achieved” scored 1, studies that received a judgement of “mentioned” scored 0.5, and studies that received a judgement of “not mentioned” scored 0. On criterion (ix), studies that received a judgement of “somewhat” scored 0.5, and judgement of “yes” scored 1 and “no” scored 0. Computer and self-help interventions were not judged on criteria (iv)–(vi). Scores were added up for each study and the percentage of eligible criteria met was calculated. Studies with 0–49% of criteria met were considered to be of lower quality and, therefore, higher risk of bias, 50–74% of medium quality, and 75% plus of higher quality.

2.6 | Statistical methods

Most studies reported results in terms of mean scores in the relevant outcomes for intervention and control groups. Therefore, Cohen’s *d* was used to produce a standardized mean

Table 2. Classification of outcome measures

Outcome category	Questionnaire scales
Depression	Center for Epidemiological Studies-Depression (CES-D); Beck's Depression Inventory (BDI); Patient Health Questionnaire (PHQ); Depression Anxiety Stress Scales (DASS); Geriatric Depression Scale (GDS); Hospital Anxiety and Depression Scale (HADS); Hamilton Depression Rating Scale (HAM-D); Hopkins Symptom Checklist (HSC SCL); Montgomery-Asberg Depression Rating Scale (MADRS); PROMIS Depression Scale (PROMIS) Quick Inventory of Depressive Symptomatology (QIDS); Mental Health Inventory Survey (MHI); Profile of Mood States (POMS)
Anxiety	General Anxiety Disorder (GAD-7); Beck Anxiety Inventory (BAI); The State-Trait Anxiety Inventory (STAI); Hospital Anxiety and Depression Scale (HADS); Mental Health Inventory Survey (MHI); PROMIS Anxiety Scale (PROMIS); Depression Anxiety Stress Scales (DASS); Structured Interview Guide for the Hamilton Anxiety scale (SIGH-A); HIV health-related anxiety; Patient-Reported Outcomes Measurement Information System
Stigma	Internalized HIV/AIDS-Related Stigma Scale (IHSS); HIV Stigma Scale (HSS); Stigma Scale for Chronic Illnesses (SSCI); Earnshaw and Chaudoir HIV stigma mechanisms
Stress	Perceived Stress Scale (PSS); Depression Anxiety Stress Scales (DASS); Life Experiences Survey (LES) ^a ; HIV-related Life-Stressor Burden questionnaire; Parenting Stress Index-Short Form (PSI-SF)
Loneliness	Modified-UCLA Loneliness Scale; 3-Item Loneliness (3IL) Scale
Coping/self-efficacy	Coping Self-Efficacy Scale (CSES); Brief COPE; Patient Activation Measure (PAM); Distress Tolerance Scale (DTS); Health education impact questionnaire (HeiQ); Positive outlook self-efficacy scale (POSE) ^b ; Silencing the Self Scale (STSS) ^c ; Brief resilience scale
Social support/participation	Social Provisions Scale (SPS); Medical Outcomes Study (MOS); Provision of Social Relations Scale (PSRS); Health education impact questionnaire (HeiQ); Inventory of Interpersonal Problems (IIPs) ^d ; Multidimensional Scale of Perceived Social Support (MSPSS); Patient-Reported Outcomes Measurement Information System (PROMIS); Positive outlook self-efficacy scale (POSE) ^e

(Continued)

Table 2. (Continued)

Outcome category	Questionnaire scales
Quality of life	Medical Outcomes Study-HIV (MOS SF-12, SF-36); EuroQoL 5 Dimensions Index (EQ-5D); HIV/AIDS Targeted Quality of Life Instrument (HAT-QoL); Multidimensional Student's Life Satisfaction Scale (MSLSS); Patient-Reported Outcome Quality of Life-HIV (PROQOL-HIV); Health-related quality of life (WHOQOL-HIV)
Other wellbeing measures	Differential Emotions Scale (DES); Clinical Global Impression (CGI); Brief Symptom Inventory (BSI); Health Education Impact Questionnaire (HeiQ); Mental Health Inventory (MHI); Beck Hopelessness Scale (BHS); Five Facet Mindfulness Questionnaire (FFMQ); HIV Symptom Distress Scale (SDS); Mindful Attention and Awareness scale (MAAS); Nottingham Health Profile (NHP); Positive and Negative Affect Schedule (PANAS); Positive Outlook Self-Efficacy Scale (POSE) ^f ; Profile in Mood States (POMS); Quality of Wellbeing (QWB); Rosenberg Self-Esteem Scale (RSES); Satisfaction with Life Scale (SWLS); Subjective Wellbeing (SWB); Symptom Distress Scale (SDS); Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)

Of note, the same questionnaire may appear in multiple outcome categories as different subscales were used to measure the various conditions/symptoms.

^aModified to include only those events which were moderately to severely stressful for people living with HIV.

^bPOSE subscales concerning relationships, knowledge and communication.

^cSilencing the self (STS): higher scores = greater silencing of self, therefore, the mean (SD) scores for intervention and control arms were reversed so that a positive effect estimate reflects that the intervention improved the outcome, that is less silencing of self, to be consistent with other measures in this category.

^dHigher scores = more interpersonal difficulties.

^ePOSE subscale concerning social participation.

^fPOSE subscale concerning emotions/emotional distress.

difference (SMD) and 95% confidence interval (CI) comparing intervention with control group (Cohen's $d = \frac{\bar{x}_1 - \bar{x}_2}{s_p}$; difference between two sample means (mean in intervention group minus mean in control group)/pooled standard deviation) for each relevant outcome, for each trial. Separate meta-analyses were conducted for each of the nine outcome measure categories defined above. Therefore, each trial could contribute to multiple outcome categories. If an individual trial used more than one outcome measure from a specific category, then the outcome that was more frequently used across the reviewed studies was included and the others were ignored. For instance, if a study used the BDI and the PHQ-9 questionnaires to measure depression, then the BDI was used as it was reported more frequently by the studies overall. In this way, no study was included more than once in any specific meta-analysis. For all outcomes, data were included from the

follow-up time point closest to 3 months if there was more than one follow-up in a study.

Six forest plots of findings from meta-analyses are presented. Depression and anxiety outcome measures are presented separately, grouped by the intervention classification. The remaining outcomes are presented in three forest plots, grouped by outcome measure. Quality of life outcomes are presented in one forest plot. Other outcomes measured by questionnaires on which higher scores signify worse mental health symptomatology are presented together in a forest plot (stress, stigma, loneliness and other wellbeing measures), and the remaining outcomes in another forest plot (coping/self-efficacy and social support). A final forest plot presents the overall SMD from meta-analysis for each outcome measure.

For each of the nine outcome measure meta-analyses, the percentage of between-study heterogeneity was considered

to be moderate if the I^2 statistic was 50–75%, and high if 75% and greater [14]. Higher levels of heterogeneity were accounted for by DerSimonian and Laird weighted random-effects meta-analysis that allows for between-study heterogeneity.

2.7 | Additional analyses for the outcome of depression

The possibility of publication bias in the meta-analysis on depression (the most frequent outcome) was assessed using a funnel plot and Egger's test.

Sensitivity analyses were conducted to investigate overall SMD for depression across studies that had follow-up time periods of: (i) up to 3 months; (ii) 4–6 months; and (iii) 7 or more months. The maximum time point over each period was included in the analysis.

A meta-regression was conducted to investigate possible differences in intervention effectiveness on depression as there was some suggestion of borderline moderate between-study heterogeneity (I^2 statistic = 40%) and the number of trials investigating depression exceeded 10. Nine pre-defined intervention-level factors were considered in the depression meta-regression: (i) type of intervention (psychotherapeutic vs. not psychotherapeutic); (ii) intervention provider (psychologist vs. not psychologist); (iii) type of control group (standard care/standard care with waitlist vs. active control/enhanced standard care); (iv) mental health/wellbeing screening for study inclusion (yes vs. no); (v) mode of delivery (face-to-face vs. online/telephone); (vi) number of intervention sessions (1–8 vs. 9+); (vii) duration of each session in minutes (1–60 vs. 61+); (viii) overall length of intervention (from first to last session) in days (1–60 vs. 61+); and (ix) judgement of study quality (medium/low vs. high). Meta-regression produces β coefficients that can be interpreted as unit changes in SMD.

Four supplementary meta-regression analyses were conducted to compare intervention effectiveness on depression for:

- (i) CBT versus non-CBT interventions
- (ii) Motivational interviewing versus non-motivational interviewing interventions
- (iii) Standard care controls versus not standard care, with the latter group including active control, enhanced standard care and waitlist controls
- (iv) Standard care controls versus not standard care, with the latter group including active control, enhanced standard care and “standard care with intentional support,” see footnote ^a under Table 4

Supplementary meta-regression analyses (iii) and (iv) were conducted as it was considered likely that intervention effect size on depression would be dependent on the type of control group comparator, such that smaller effects would be reported in studies with an active control group and enhanced standard care, and potentially in those with waitlist controls. In a sensitivity analysis, the main meta-analysis on depression was repeated after adjusting the effect size for all studies that

did not use a standard care control group by the β coefficient found in meta-regression for (a) standard care/standard care with waitlist versus not standard care (active control/enhanced care) controls and (b) standard care versus not standard care, with the latter group including active control, enhanced standard care and “standard care with intentional support” (see iv. above).

A final sensitivity analysis was carried out to investigate the effect of using Hedges' g , which may account for small sample sizes [15], to calculate effect sizes in the meta-analysis on depression.

This systematic review was performed according to the methods recommended by the Cochrane Collaboration [14]. All analyses were performed using STATA statistical software [16], and reported according to the PRISMA guidelines [17].

3 | RESULTS

3.1 | Identification and characteristics of included studies

Figure 1 presents the flow chart of study inclusion and exclusion. In total, 67 RCTs were included in this review; 66 were individually randomized parallel group-controlled trials and one was a cluster randomized trial [18]. Sixty-two studies contributed to at least one meta-analysis as detailed below. Study characteristics are described in Table 3. Study sample size at baseline ranged from 23 to 463 participants who were randomized. Studies were from the following countries: the United States, Canada, the UK, Brazil, Italy, Spain, Australia, the Netherlands and Norway; the vast majority of studies were conducted in the United States (83.6%). Table 4 presents a summary with the frequency of key characteristics. Table 5 presents the frequency of specific interventions included in intervention classifications.

3.2 | Frequency of outcome measures

The questionnaire scales used to measure each outcome are presented in Table 2. Depression was the most common measure of mental health in this review. Forty-five studies collected data on depressive symptoms, all of which were based on validated questionnaires. Mean scores (SD) were reported, or sent by authors upon request, in 40 studies, and are included in the meta-analysis. Five studies did not present mean scores or proportions [19–23], and data were not available upon the author's request. Three of these studies contributed data to the meta-analysis of other outcomes; quality of life [23], stigma [21, 22], social support/participation [21] and coping/self-efficacy [21]. The remaining two studies did not contribute data to meta-analyses in this review [19, 20].

Nineteen of the 22 studies that did not collect data on depressive symptoms contributed to the meta-analysis of at least one other outcome measure. The remaining three studies did not contribute data to meta-analyses in this review; median scores reported [24], no SD reported [25] and no data reported [26]. In total, 15 studies contributed data on anxiety symptoms to the meta-analysis, 13 on stress, seven on stigma, four on loneliness, eight on coping/self-efficacy, six on social support/participation, 19 on other measures of wellbeing, and

Table 3. Characteristics of the 67 included studies

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Barroso et al. [30]	U.S.	Information unavailable ^a	Women living with HIV (with internalized HIV stigma) N = 100	Internalized HIV Stigma Scale (score 40+)	Information (online), iPod touch with video including the experiences of being a woman living with HIV	Supportive	iPod touch with nothing loaded on it	Computer	84	1, 3	CSES, RSES, IHSS
Barroso et al. [34]	U.S.	Information unavailable ^a	People living with HIV (score >5 HIV-Related Fatigue Scale) N = 30	No	Cognitive Behavioral Stress Management app	Psychotherapeutic	Lifesum app (healthy lifestyle app)	Computer	70	1, 2, 5	STAI-Trait, STAI-State, BDI-II, LES
Berko et al. [49]	U.S.	2020	People living with HIV (aged 50+ years with at least a minor degree of self-reported loneliness) N = 214	3-Item Loneliness (score 4+)	Mindfulness audio lessons (online)	General relaxation	Standard care with waitlist	Computer	25	1	GAD-7, CES-D-10, 3IL
Blashill et al. [27]	U.S.	2013–2016	GBMSM living with HIV (with body image disturbance) N = 44	Body Dysmorphic Disorder modification of the Yale-Brown Obsessive-Compulsive Scale (score 16+)	CBT-body image self-care	Psychotherapeutic	Standard care with adherence support (enhanced standard care)	Healthcare worker	84	3, 6	MADRS
Bogart et al. [33]	U.S.	2018–2019	Latinx GBMSM living with HIV (not currently taking ART, missed at least one dose in the past month, or <2 HIV care visits in the past 12 months) N = 76	No	CBT and dialectical behaviour therapy, with psychoeducation	Multiple incl. psychotherapeutic	Standard care with waitlist	Peer	56	4, 7	Brief COPE dysfunctional, Brief COPE functional, IHSS
Bogart et al. [50]	U.S.	2018–2020	African American men and women living with HIV (missed at least one ART dose in the past month/detectable viral load in the last 6 months) N = 245	No	Motivational interviewing	Psychotherapeutic	Standard care	Peer	183	7, 13	IHSS
Bonato et al. [24]	Italy	2017	People living with HIV (with no medical conditions contraindicating physical exercise) N = 38	No	Physical exercise training using a smartphone app	Physical exercise	Physical exercise using hard copy training programme	Multiple not incl. psychologist (computer and exercise coach)	112	4	POMS

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Brown et al. [51]	U.S.	2009	Women living with HIV N = 60	No	Stress management (online), with relaxation training	Multiple not incl. psychotherapeutic	Standard care with waitlist	Computer	1	1	CES-D, CSES, BSI, POMS, HIV-related Life-Stressor Burden, PSS, Stress management knowledge
Brown et al. [18]	U.S.	2010–2012	Adolescents and young adults (aged 18–24 years with depressive symptoms) N = 4 sites (22 participants at intervention sites and 20 at control sites) ^c GBMSM living with HIV N = 80	Quick Inventory of Depressive Symptomatology-Self-Report (QIDS-SR, score 7+)	Combination CBT and medication management algorithm	Multiple incl. psychotherapeutic	Standard care	Multiple incl. psychologist (psychologist and healthcare workers)	168	2, 3, 6	Remission from depression, QIDS-SR, QIDS-C, BHS, MSLSS
Brown et al. [37]	U.S.	2006–2007	GBMSM living with HIV N = 80	No	Information (group discussion), with stress management training	Multiple incl. psychotherapeutic	Standard care with waitlist	Peer	Information unavailable ^a	3	CSES, SPS, PSS
Carey et al. [52]	U.S.	2016–2017	People living with HIV (self-reported ART non-adherence/viral load >20 copies/ml, condomless sex or >1 sexual partner in the past 6 months, and depressive symptoms) N = 42	PHQ-4 (score 2+)	Mindfulness training (tele)	General relaxation	Health coaching, with general health educational content (tele)	Trained facilitator	56	3	GAD-7, PHQ-9, PSS
Carriero et al. [53]	U.S.	2013–2017	GBMSM living with HIV (urine or hair sample reactive for methamphetamine) N = 110	No	Contingency management programme and positive affect intervention incl. mindfulness training Access to personal health records via Apple iPod touch, training in eHealth, information, individual coaching session with a staff coach	Multiple not incl. psychotherapeutic	Attention-control using neutral writing exercise	Multiple not incl. psychologist (counsellor and trained facilitator)	35	3	DES positive affect, DES negative affect, FFMQ
Carroll et al. [41]	U.S.	2014–2017	People living with HIV N = 360	No		Supportive	Standard care	Multiple not incl. psychologist (trained facilitator and peer)	Information unavailable ^a	12	PAM, MOS SF-12

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Cote et al. [54]	Canada	2012	People living with HIV N = 88	No	HIV treatment, virtual nursing assistance and education (web-based intervention)	Supportive	Invited to consult list of websites with information on ART	Computer	28	6	MOS
Cunningham et al. [55]	U.S.	2012–2016	People being released from prison who are living with HIV N = 356	No	Peer navigation	Supportive	Standard care (with information on antiretrovirals)	Peer	168	3, 6, 12	MOS SF-12
DeMarco et al. [56]	U.S.	Information unavailable ^a	African American women living with HIV (age 40+ years) N = 111	No	Group writing and information	Supportive	Peer-led support group	Peer	28	1, 6	STSS, HSS
Drozdz et al. [57]	Norway	2011	People living with HIV (not infected via substance use) N = 67	No	Metacognitive therapy and positive psychology (online)	Psychotherapeutic	Standard care	Computer	35	1, 3	CES-D, SWLS, PANAS, SWB
Flentje et al. [58]	U.S.	Information unavailable ^a	GBMSM living with HIV (with ≥1 occasion of drinking 5+ drinks in a single setting or of using an illicit substance in the past 3 months) N = 42	No	Psychoeducation and coping skills for minority stress	Supportive	Writing exercise focused on neutral content	Psychologist	63	2, 4	GAD-7, PHQ-9
García et al. [59]	Canada	2016–2018	People living with HIV (with symptoms of poor sleep/mental health) N = 63	"One or more of the following symptoms: sleep problems, fatigue, pain, or anxiety or depression symptoms"	Autogenic training	General relaxation	Standard care	Healthcare worker	84	3, 6	PHQ-9, STAI, PROQOL-HIV

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion				Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
				Intervention	Intervention	Intervention	Intervention						
Giordano et al. [23]	U.S.	2010–2013	People living with HIV (who have been hospitalized; either newly diagnosed or out of care) N = 460	Peer mentoring	Supportive	Didactic sessions on safe sex and drug use	Peer	72	6	PHQ-8, MOS SF-36			
Gonzalez-Garcia et al. [60]	Spain	2011–2012	People living with HIV (diagnosed with HIV for ≥15 years, on ART for ≥5 years) N = 40	Mindfulness-based cognitive therapy with psychoeducation	Multiple incl. psychotherapeutic	Standard care	Psychologist	56	2, 5	BAI, BDI-II, NHP, PSS			
Gupta et al. [61]	U.S.	2015–2018	People living with HIV (HIV viral load <75c/ml and depressive symptoms) N = 54	CBT (online)	Psychotherapeutic	Standard care with information about depression diagnosis and encouragement to follow-up with primary care or HIV provider, and letter sent to primary provider	Computer	168	3, 6	PHQ-9, HSC SCL-20			
Guy et al. [62]	U.S.	2011	GBMSM living with HIV (drank >14 drinks per week or ≥5 on a single occasion at least monthly) N = 180	Motivational interviewing	Psychotherapeutic	Standard care	Counsellor	14	3, 6, 12	CES-D			

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(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Han et al. [63]	U.S.	2017	Women living with HIV (overdue for a Pap test) N = 123	No	Health literacy education and phone counselling	Supportive	Educational brochure related to cervical cancer	Trained facilitator	197	3, 6	PHQ-9
Hart et al. [64]	Canada	2012–2017	GBMSM living with HIV (reporting condomless sex in the past 3 months) N = 183	No	Motivational interviewing, with information and group discussion	Multiple incl. psychotherapeutic	Standard care	Peer	56	3	Modified UCLA Loneliness, CES-D
Hecht et al. [65]	U.S.	2005–2009	People living with HIV (not on ART and low likelihood of starting within 12 months) N = 177	No	Mindfulness-based stress reduction	General relaxation	Education/HIV disease self-management skills (group sessions)	Trained facilitator	56	3, 12	BDI-II, DES negative affect, DES positive affect, PSS
Heckman et al. [39]	U.S.	2008–2010	People living with HIV (aged 50+ years with depressive symptoms) N = 361	GDS (score 10+)	Two intervention arms (i) Supportive expressive group therapy (tele) (ii) Coping effectiveness training (tele), with group discussion	Multiple incl. psychotherapeutic	Standard care	Psychologist	84	3, 4, 8	GDS
Heckman et al. [66]	U.S.	2010–2014	People living with HIV (with depressive symptoms) N = 167	PRIME-MD	Interpersonal psychotherapy (tele)	Psychotherapeutic	Standard care	Psychologist	63	4	BDI-II, IIPs, PSRS
Hersch et al. [26]	U.S.	2010–2011	People living with HIV (HIV viral load >48 copies/ml and detectable viral load) N = 168	No	ART adherence counselling (online), with information	Multiple incl. psychotherapeutic	Standard care with waitlist	Computer	Information unavailable ^a	3, 6, 9	SDS, PANAS, HIV/AIDS Stress Scale
Himelhoch et al. [40]	U.S.	2010–2011	People living with HIV (with depressive symptoms) N = 34	PHQ-9 (score 12+)	CBT (tele)	Psychotherapeutic	CBT (face-to-face)	Psychologist	98	2, 3	QID-SR, HAM-D

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Jagers et al. [67]	U.S.	Information unavailable ^a	People living with HIV N = 93	No	Exercise training	Physical exercise	Sedentary activity at the same exercise centre (e.g. reading a book, talking, watching TV)	Healthcare worker	42	1	POMS, SDS, PSS
Johnson et al. [68]	U.S.	2004	Mothers or primary care-givers living with HIV (with children aged 4–12 years) N = 80	No	Parenting skills group intervention (information, with stress management)	Multiple incl. psychotherapeutic	Information on reducing health-related stress, addressing the general stressors associated with living with HIV (group sessions)	Trained facilitator	42	6	PSI-SF
Klein et al. [69]	U.S.	2011	African American women living with HIV N = 168	No	Information (watching a multimedia programme)	Supportive	Standard care, participants reviewed HIV education brochures	Computer	Information unavailable ^a	3	PSS
Lee et al. [70]	U.S.	2014–2015	People living with HIV (aged 45+ years and unemployed, retired or on disability, and reporting fatigue in past week) N = 53	No	Motivational interviewing (strategies for reducing fatigue)	Psychotherapeutic	Workbook focused on dietary strategies to reduce fatigue (designed to be credible, but with no empirical evidence)	Trained facilitator	1	1, 2, 3	HADS depression, HADS anxiety, DES
Lee et al. [71]	U.S.	2013–2017	GBMSM living with HIV (urine or hair sample reactive for methamphetamine) N = 110	No	Positive affect treatment, with online meditation exercises and contingency management programme (received i-Pod)	Multiple incl. psychotherapeutic	Neutral writing exercise (received i-Pod)	Multiple not incl. psychologist (counselor and computer)	Information unavailable ^a	3, 6	DES
Lovejoy et al. [72]	U.S.	2009–2010	People living with HIV (aged 45+ years) N = 100	No	Motivational interviewing (tele) targeting sexual risk behaviour	Psychotherapeutic	Standard care	Clinicians enrolled in a doctoral programme in clinical psychology	28	3, 6	DASS

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Magidson et al. [73]	U.S.	2009–2012	People living with HIV (receiving substance use treatment) N = 61	No	Behavioural activation and motivational interviewing to address substance use	Psychotherapeutic	Supportive counselling, avoiding behavioural activation or directive techniques (goal setting and activity planning)	Psychologist	30	3, 6, 12	BDI
Millard et al. [74]	Australia	2012–2013	GBMSM living with HIV N = 136	No	Group discussion (enhancing skills, confidence and ability, online and offline)	Supportive	Standard care	Peer	49	8, 12	HeiQ, PROQOL-HIV, POSE
Moirira et al. [75]	U.S.	2014–2016	People living with HIV (new to care) N = 34	No	Acceptance-based behaviour therapy (to facilitate the acceptance of HIV status)	Psychotherapeutic	Standard care	Psychologist	14	1, 3, 9	MSFSS
Moskowitz et al. [76]	U.S.	2008–2014	People living with HIV (newly diagnosed) N = 159	No	Behavioural and cognitive skills for increasing positive affect	Supportive	One-to-one contact with facilitator with no didactic portion or skills practice	Trained facilitator	98	5, 10, 15	CES-D, DES negative affect, DES positive affect
Murphy et al. [77]	U.S.	2007–2008	Mothers living with HIV (who had not disclosed to their 6–12 year old child) N = 80	No	Information (preparing mothers for disclosure through behavioural exercises)	Supportive	Standard care	Trained facilitator	21	3, 6, 9	MHI, MOS SF-36, GAD-7

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention			Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
					Intervention	Intervention classification	Intervention					
Murphy et al. [78]	U.S.	2011–2012	Mothers living with HIV, with child aged 6–14 years N = 62	No	Information (parenting and self-care, group discussion)	Supportive	Standard care	Researcher	28	3, 6, 12	GAD-7, MHI	
O’Cleirigh et al. [19]	U.S.	2013–2015	People living with HIV (smoking >5 cigarettes per day and motivated to quit) N = 53	No	CBT for smoking cessation plus nicotine replacement therapy	Psychotherapeutic	“Enhanced standard care” (weekly check-in sessions plus nicotine replacement therapy)	Multiple incl. psychologist (doctoral-level clinical psychology interns and postdoctoral fellows)	63	2, 6	STAI-State, SIGH-A, CES-D, MADRS	
Oliveira et al. [79]	Brazil	2014–2016	People living with HIV N = 23	No	Exercise training	Physical exercise	Recreational sessions composed of light activities such as stretching, recreational games and dancing	Trained facilitator	112	4	BAI, BDI, WHOQOL-HIV	
Ownby et al. [80]	U.S.		People living with HIV (aged 50+ years with mild neurocognitive disorder) N = 46	No	Computer-delivered cognitive training and transcranial direct current stimulation	Supportive	Watching educational videos	Researcher	14	1	CES-D, MOS SF-36	
Pyne et al. [81]	U.S.	2007–2008	People living with HIV (in VA healthcare system with depressive symptoms) N = 276	PHQ-9 (score 10+)	Counseling and/or pharmacotherapy	Supportive	Standard care	Healthcare worker	Information unavailable ^a	6, 12	Depression free days, HSC SCL-20, QWB, MOS SF-12	

Continued

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Rao et al. [31]	U.S.	2013–2015	African American women living with HIV N = 239	No	Information to foster social support and reduce stigma (group discussion)	Supportive	Breast cancer education workshop	Multiple not incl. psychologist (social worker and peer)	2	4, 8, 12	SSCI
Roth et al. [25]	U.S.	2008–2009	People living with HIV N = 463	No	Behavioural change and motivational techniques	Psychotherapeutic	Standard care	Healthcare worker	Information unavailable ^a	12	MOS SF-12
Saberi et al. [21]	U.S.	2018–2019	People living with HIV (aged 18–29 years) N = 50	No	Video-counselling (including motivational interviewing and problem-solving therapy) and text messaging focused on mental health, substance use and HIV care	Psychotherapeutic	Standard care with waitlist	Multiple incl. psychologist (social worker and psychology fellow)	121	4, 8	GAD-7, PHQ-9, Brief Resilience Scale, PROMIS, Earnshaw and Chaudoir HIV stigma mechanisms
Safren et al. [82]	U.S.	2009–2012	People living with HIV (with depressive symptoms/antidepressant medication use) N = 240	CGI (score 2+) and current diagnosis of depression or antidepressant medication use	Two intervention arms (i) CBT and (ii) information & supportive psychotherapy, with adherence counselling	Multiple incl. psychotherapeutic	Standard care with a session of adherence counselling, a letter sent to the participant's treatment provider, and referral by the assessor for depression treatment if clinically indicated at follow-up visits	Psychologist	77	4	CES-D, CGI

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Scharer et al. [83]	U.S.	2014–2015	African American men and women living with HIV (not taking or adhering to ART) N = 34	No	Motivational interviewing focused on ART adherence	Psychotherapeutic	Stress Reduction Skills Programme	Multiple not incl. psychologist (social worker and counsellor)	28	3, 6	BSI, MOS SF-12
Schnall et al. [20]	U.S.	2016–2018	People living with HIV (experienced ≥2 HIV-related symptoms in the past week) N = 80	No	Information (mHealth web-app to assess symptoms, text message with tailored self-care strategies and short video of strategies on app)	Supportive	Information (app without self-care strategies)	Computer	84	3	PROMIS-29 anxiety, PROMIS-29 depression, MOS SF-26
Schulte et al. [84]	U.S.		Mothers or primary care-givers living with HIV (who had not disclosed their HIV status to their 6–14 year old child) N = 176	No	Psychoeducation aiming to build self-efficacy for disclosure	Supportive	Standard care with wait-list (group-based intervention delivered)	Trained facilitator	21	3, 9, 15	HIV health-related anxiety, GAD-7, CES-D, MOS SF-36
Scott et al. [85]	UK	2018–2019	People living with HIV (with depressive symptoms, and self-reported neuropathic pain symptoms in their feet) N = 38	PHQ-9 (score 10+ & ≤23)	Information (online), acceptance and commitment therapy with therapist feedback, and mindfulness practices	Multiple incl. psychotherapeutic	Standard care with waitlist	Multiple incl. psychologist (clinical psychologist and computer)	56	2, 5	PHQ-9

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Shah et al. [86]	U.S.	Information unavailable ^a	People living with HIV (aged 45+ years with functional limitations) N = 67	No	Physical activity counselling, with supportive telephone counselling sessions	Multiple not incl. psychotherapeutic	Standard care	Multiple incl. psychologist (physician, experienced mental health therapist and student)	84	3	BDI-II, MOS SF-36
Shuter et al. [87]	U.S.	2015–2016	People living with HIV (current cigarette smokers) N = 100	No	Information (mobile website with educational/motivational quit-smoking sessions, and text messages and offer of nicotine patches)	Supportive	Standard care with brief structured advice to quit smoking, a self-help brochure and an offer of nicotine patches	Computer	42	4	GAD-7, CES-D, Modified UCLA Loneliness, PSS-4
Sibinga et al. [88]	U.S.	2015–2017	People living with HIV (aged 13–24 years old) N = 74	No	Mindfulness-based stress reduction (MBSR)	General relaxation	Health education	Trained facilitator	56	3, 6, 12	MAAS, FFMQ
Simoni et al. [38]	U.S.	2009–2011	People living with HIV (Latinos of Mexican descent, sub-optimally adherent to ART, with depressive symptoms) N = 253	BDI-IA (score 10+)	CBT focused on adherence (and electronic pill box)	Psychotherapeutic	Standard care with notification letter to provider, and asked to return for brief monthly visits if had experienced problems with the pillbox or participation in the study.	Student	180	6, 9	MADRS, BDI-IA

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Stanton et al. [89]	U.S.	2014–2017	People living with HIV (current cigarette smokers showing readiness to quit) N = 442	No	Group therapy, with information, deep breathing techniques and nicotine patches	Multiple incl. psychotherapeutic	"Enhanced standard care" (standardized brief advice to quit, self-help brochure and nicotine patches) Dietary advice promoting low saturated fat diet	Multiple incl. psychologist (psychologist, social worker and peer)	42	4, 7	GAD-7, DTI, Modified UCLA Loneliness, PSS-4, PC-PTSD
Stradling et al. [90]	UK	2013–2015	People living with HIV (with LDL cholesterol >3 mmol/l) N = 60	No	Motivational interviewing, with psychoeducation focused on Mediterranean style diet	Multiple incl. psychotherapeutic		Healthcare worker	183	6, 12	WEMWBS, EQ-5D
Uebelacker et al. [91]	U.S.	2017–2020	People living with HIV (with depressive symptoms and self-reporting chronic pain) N = 187	QIDS (score 9+)	Behavioural activation, coaching, with psychoeducation (including in-person and telephone sessions)	Multiple incl. psychotherapeutic	Health education (including in-person and telephone sessions)	Psychologist	21	3, 6, 9	Patient-Reported Outcomes Measurement Information System, QIDS, MOS SF-36
van Luenen et al. [43]	Netherlands	2015	People living with HIV (with depressive symptoms) N = 188	PHQ-9 (score >4 and <20)	CBT (Internet-based), with coaching, motivational interviewing, psychoeducation and telephone coaching	Multiple incl. psychotherapeutic	Standard care with waitlist, and with weekly call by a personal coach (monitored depressive symptoms and suicidal thoughts), and patients with severe depressive symptoms or suicidal ideation were referred to their general practitioner or HIV treatment centre	Multiple incl. psychologist (coach and computer)	70	2, 3, 6	GAD-7, CES-D, PHQ-9

(Continued)

Table 3. (Continued)

Study	Country	Recruitment period	Population and number randomized	Mental health symptoms and/or well-being screening for study inclusion	Intervention	Intervention classification	Control	Intervention provider ^b	Length of intervention (days)	Follow-up time points (months)	Measures used
Vance et al. [92]	U.S.	2017–2019	People living with HIV (aged 40+ years with HAND) N = 135	No	Cognitive training (online)	Supportive	Standard care	Multiple not incl. psychologist (trained facilitator and computer)	Information unavailable ^a	3	CES-D, MOS-HIV
Weibel et al. [93]	U.S.	2008	Women living with HIV N = 89	No	Peer-led group discussion focused on symptom management	Supportive	Received a copy of HIV symptom strategies manual	Peer	49	1, 3, 4	HAT-QoL
Williams et al. [94]	U.S.	2007–2011	African American men living with HIV (engaged in unprotected anal/vaginal sex with a male and female partner in the past 3 months, and had a history of CSA) N = 117	No	Information focused on sexual risk reduction (group discussion), with stress management	Multiple incl. psychotherapeutic	Health promotion focused on general health and lifestyle	Peer	21	3, 6	BDI-II, PDS
Wimberly et al. [95]	U.S.	2014–2016	People living with HIV (returning from jail, with problematic substance use or dependence) N = 75	No	Yoga (Hatha)	General relaxation	Standard care	Yoga teacher	84	3	PSS
Yigit et al. [22]	U.S.	2013–2017	People living with HIV (initiating HIV care) N = 372	No	Motivational interviewing to facilitate adjustment to living with HIV, supportive telephone calls	Multiple incl. psychotherapeutic	Standard care	Counselor	336	11	Brief COPE, HSS, PHQ-8

Abbreviations: BDIIA, Beck Depression Inventory; CGI, Clinical Global Impressions scale; CSA, childhood sexual abuse; GBMSM, gay, bisexual and other men who have sex with men; HAND, HIV-associated neurocognitive disorder; PHQ, Patient Health Questionnaire; PLWH, people living with HIV; QIDS-SR, Quick Inventory of Depressive Symptomatology-Self-Report.
^aNot reported in the article and no author response upon contact.
^bThe category “psychologist” includes psychotherapists and psychiatrists; “healthcare worker” includes clinicians, nurses and social workers.
^cThis was a cluster trial whereby sites were randomized not individual participants.

Table 4. Frequency of key characteristics of the 67 studies reviewed

	Psychosocial intervention studies among PLWH (N = 67) n (%)
Country	
U.S.	56 (83.6%)
Canada	3 (4.5%)
Australia	1 (1.5%)
Brazil	1 (1.5%)
UK	2 (3.0%)
Italy	1 (1.5%)
Spain	1 (1.5%)
The Netherlands	1 (1.5%)
Norway	1 (1.5%)
Population (demographic group)	
PLWH	42 (62.7%)
BAME PLWH	3 (4.5%)
GBMSM	8 (11.9%)
BAME GBMSM	2 (3.0%)
Women	4 (6.0%)
BAME women	3 (4.5%)
Mothers/primary care givers	4 (6.0%)
Prison population	1 (1.5%)
Intervention classification	
Psychotherapeutic	17 (25.4%)
Supportive	21 (31.3%)
General relaxation	6 (9.0%)
Physical exercise	3 (4.5%)
Multiple incl. psychotherapeutic	18 (26.9%)
Multiple not incl. psychotherapeutic	2 (3.0%)
Control condition	
Standard care ^a	27 (40.3%)
Standard care with waitlist ^a	9 (13.4%)
Enhanced standard care	3 (4.5%)
Active control	28 (41.8%)
Intervention provider	
Psychologist ^b	9 (13.4%)
Counsellor	2 (3.0%)
Healthcare worker ^c	6 (9.0%)
Peer	10 (14.9%)
Student	2 (3.0%)
Researcher	2 (3.0%)
Yoga teacher	1 (1.5%)
Trained facilitator	10 (14.9%)
Computer	11 (16.4%)
Multiple incl. psychologist	6 (9.0%)
Multiple not incl. psychologist	8 (11.9%)

(Continued)

Table 4. (Continued)

	Psychosocial intervention studies among PLWH (N = 67) n (%)
Intervention format	
Face-to-face (individual)	30 (44.8%)
Face-to-face (group)	10 (14.9%)
Online/app/telephone ^d	27 (44.3%)
Mental health screening	
Yes	16 (23.9%)
No	51 (76.1%)

Abbreviations: BAME, Black, Asian and other ethnic minorities; GBMSM, gay, bisexual and other men who have sex with men; PLWH, people living with HIV.

^aFive studies described a standard care control group that received intentional support, for example letter to primary caregiver, phone calls, counselling.

^bIncluding psychotherapists and psychiatrists.

^cIncluding nurses and social workers.

^dMain component includes online intervention.

for mental, physical, social and general quality of life; 12, 11, 6 and 7 studies, respectively, contributed data to the meta-analyses.

3.3 | Effect of psychosocial interventions on depression

Higher scores on measures of depression relate to higher levels of symptomatology, therefore, negative effect estimates indicate that the intervention improved symptoms of depression compared to control. Across 40 studies, the overall SMD was -0.19 [95% CI: -0.29 , -0.10], see Figure 2, indicating that the interventions reduced symptoms of depression compared to control. There was some suggestion of borderline moderate between-study heterogeneity ($p = 0.006$; $I^2 = 40.0\%$). Possible reasons for statistical heterogeneity between the results of the studies are discussed below. SMDs across studies ranged from -1.41 to 0.44 . In sensitivity analysis, findings were very similar when using Hedges' g to calculate effect sizes.

In a sensitivity analysis examining three different follow-up time periods for the outcome of depression, the overall SMD was:

- (i) -0.19 [-0.27 , -0.11]; $p < 0.001$, across the 32 studies that had follow-up periods of 0–3 months
- (ii) -0.27 [-0.43 , -0.10]; $p = 0.001$, across the 24 studies that had follow-up periods of 4–6 months
- (iii) -0.11 [-0.21 , -0.02]; $p = 0.024$, across the 11 studies that had follow-up periods of 7 or more months (8 months for 2 interventions, 9 months for 3 interventions, 12 months for 4 interventions and 15 months for 2 interventions)

Table 5. Frequency of specific interventions included in intervention classifications

Intervention	Psychotherapeutic (N = 17) n (%) ^a	Supportive (N = 21) n (%) ^a	General relaxation (N = 6) n (%) ^a	Physical exercise (N = 3) n (%) ^a	Multiple incl. psychotherapeutic ^b (N = 18) n (%)	Multiple not incl. psychotherapeutic ^c (N = 2) n (%)
Cognitive behavioural therapy (CBT)	5 (29.4%) ^d	/	/	/	3 (16.7%)	/
Motivational interviewing (MI)	8 (47.1%) ^e	/	/	/	4 (22.2%)	/
Other talk therapies	2 (11.8%)	/	/	/	8 (44.4%)	/
Cognitive behavioural stress management	1 (5.9%)	/	/	/	4 (22.2%)	/
General counselling	/	3 (14.3%)	/	/	2 (11.1%)	2 (100.0%)
Peer support	/	3 (14.3%)	/	/		
Information/psychoeducation	/	13 (61.9%) ^e	/	/	13 (72.2%)	
Cognitive training	/	2 (9.5%)	/	/		
Mindfulness training	/	/	5 (83.3%)	/	4 (22.2%)	1 (50.0%)
Exercise training	/	/	1 (18.3%) ^e	3 (100.0%)		1 (50.0%)

^aColumn percentages add up to 100%.

^bSeventeen studies included a psychotherapeutic intervention component as well as another type of intervention. Studies in this column are counted twice. Of note, one study included CBT, MI and psychoeducation [43] and is counted three times, and one study included talk therapy, psychoeducation and mindfulness practices [85] and is counted three times. The percentages shown do not add up to 100%.

^cTwo studies included a supportive intervention component as well as another type of non-psychotherapeutic intervention; physical exercise intervention and mindfulness training. Studies in this column are counted twice.

^dNot delivered by a professional psychologist.

^eYoga.

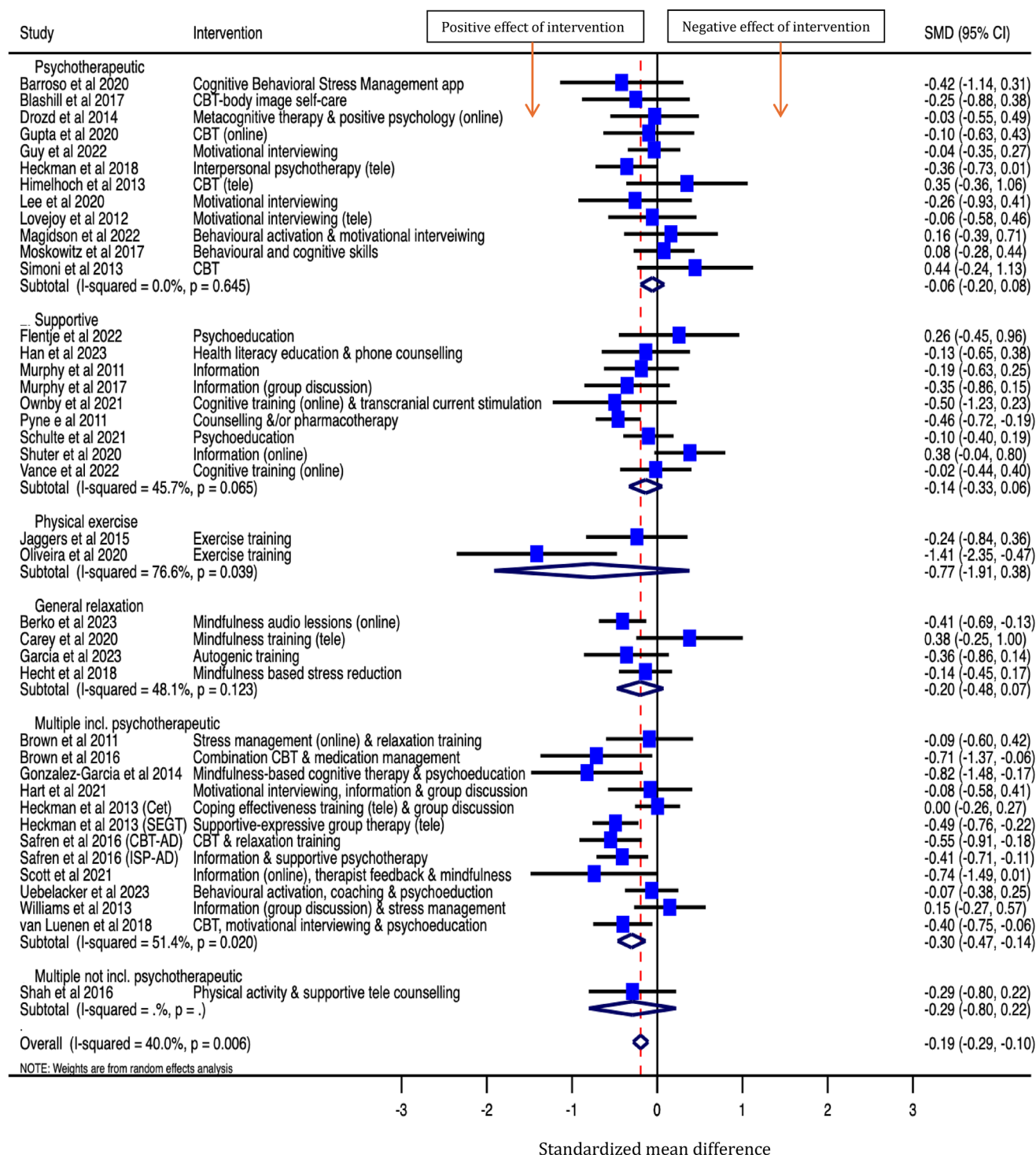


Figure 2. Effect of psychosocial interventions on symptoms of depression among people living with HIV (N = 40 interventions).

Table 6 presents findings from the meta-regression for the outcome of depression. Of studies that collected data on depression, 16 screened for poor mental health symptoms as an inclusion criterion, of which 12 screened for depressive symptoms specifically (the other four screened for: internalised HIV stigma; loneliness; symptoms of obsessive-

compulsive disorder; various symptoms including depression [27]). A greater effect on depression was found in studies that used mental health screening as an inclusion compared to those that did not (SMD -0.29 vs. -0.10, $p = 0.023$). There was also some evidence of a greater effect on depression for interventions that were conducted over 61 days or

Table 6. Investigating key intervention characteristics as moderators of intervention effect on depression

	Meta-analysis for depression measures Overall SMD [95% CI]	Unadjusted meta-regression on depression measures	
		β coefficient [95% CI]	p-value
Intervention type			
Psychotherapeutic	−0.19 [−0.31, −0.08]	−0.03 [−0.24, 0.18]	0.747
Not psychotherapeutic ^a	−0.20 [−0.35, −0.04]	0	
Intervention provider			
Psychologist ^b	−0.26 [−0.42, −0.10]	−0.13 [−0.33, 0.08]	0.220
Not psychologist ^c	−0.16 [−0.27, −0.05]	0	
Control group			
Standard care ^d	−0.22 [−0.33, −0.11]	−0.12 [−0.33, 0.09]	0.256
Not standard care ^e	−0.14 [−0.31, 0.02]	0	
Mental health/wellbeing screening for study inclusion			
Yes	−0.29 [−0.42, −0.15]	−0.22 [−0.40, −0.03]	0.023
No	−0.10 [−0.21, 0.01]	0	
Mode of delivery			
Face-to-face	−0.18 [−0.31, −0.05]	0	0.539
Online/telephone	−0.23 [−0.35, −0.10]	−0.06 [−0.27, 0.14]	
Number of intervention sessions ^f			
1–8	−0.11 [−0.22, −0.00]	1	0.062
9+	−0.29 [−0.48, −0.11]	−0.21 [−0.44, 0.01]	
Duration of each session (minutes) ^f			
1–60	−0.19 [−0.34, −0.05]	0	0.882
61+	−0.21 [−0.38, −0.05]	0.02 [−0.23, 0.27]	
Overall intervention length (days) ^f			
1–60	−0.12 [−0.23, −0.01]	0	0.096
61+	−0.26 [−0.41, −0.11]	−0.17 [−0.37, 0.03]	
Study quality ^g			
High	−0.18 [−0.28, −0.08]	0	0.442
Medium/low	−0.24 [−0.43, −0.05]	−0.09 [−0.31, 0.14]	

Abbreviations: CI, confidence interval; SMD, standardized mean difference.

^aSupportive (help from others, without specific psychological technique), general relaxation, physical exercise.

^bPsychologist/psychotherapist/psychiatrist, counsellor.

^cPeer, computer, student, other healthcare worker, other trained facilitator and any other provider, for example researcher.

^dIncludes waitlist control groups described as standard care by authors and those described by authors as “standard care” control group that received intentional support.

^eActive control groups and “enhanced standard care” controls.

^fFindings were similar when including this factor as a continuous variable in the meta-regression.

^gBased on up to 12 risk of bias criteria assessed in each study.

more (vs. ≤ 60 days) and that consisted of nine or more sessions (vs. < 9) ($p \leq 0.1$). Results from the meta-regression did not find evidence of a difference in intervention effect on depression for the other factors investigated: intervention type and provider, control group, mode of delivery, duration of each session and study quality ($p \geq 0.2$). The β coefficient for “standard care” versus “not standard care” control group was -0.13 and is utilized in a sensitivity meta-analysis as presented below.

In supplementary meta-regression analyses, there was no difference in effectiveness between CBT versus non-CBT interventions ($\beta = -0.10$ [−0.38, 0.17], $p = 0.447$), or

motivational interviewing versus non-motivational interviewing interventions ($\beta = 0.15$ [−0.16, 0.47], $p = 0.333$). Including waitlist control group studies in the “not standard care” control category did not impact on findings presented in Table 6. When the five “standard care with intentional support” studies were included in the “not standard care” control category, interventions with “standard care” control comparators had a greater effect on depressive symptoms than those with “not standard care” control groups (SMD -0.28 vs. -0.11); $\beta = -0.19$ [−0.39, -0.00], $p = 0.049$.

In a sensitivity meta-analysis, after adjusting the intervention effect (SMD and 95% CI) on depression by (i) -0.12 and

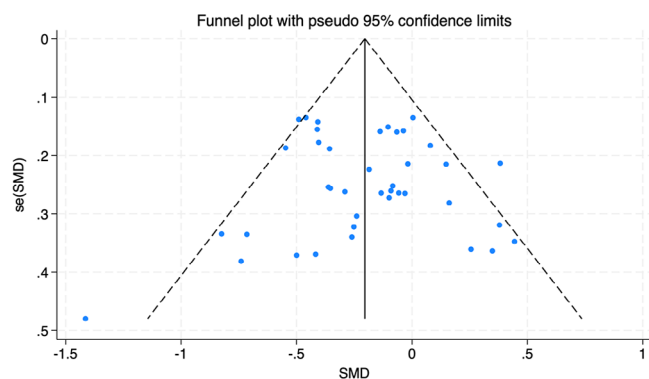


Figure 3. Investigating publication bias in 40 studies that contributed to the main depression analysis (Egger's test p -value = 0.640).

(ii) -0.19 (β coefficient for control group in meta-regression, see Statistical methods), the overall SMD was:

(i) -0.24 [$-0.33, -0.15$]

(ii) -0.29 [$-0.38, -0.20$]

There was no clear evidence of publication bias among studies included in the main meta-analysis investigating intervention effectiveness on depression (Egger's test p -value = 0.640), see Figure 3.

3.4 | Effect of psychosocial interventions on other outcome measures

Across the 15 studies that collected data on anxiety, the interventions reduced symptoms of anxiety compared to control: overall SMD [95% CI] was -0.12 [$-0.23, -0.02$] (Figure 4).

Across the 13 studies that collected data on stress, the interventions reduced stress compared to control: overall SMD was -0.22 [$-0.41, -0.04$]. Across the seven studies that collected data on stigma, the overall SMD was -0.17 [$-0.35, 0.02$]. Across the four studies that collected data on loneliness, the overall SMD was -0.001 [$-0.15, 0.15$]. Across the 19 studies that collected data on other wellbeing measures, the interventions reduced poor wellbeing compared to control: overall SMD was -0.18 [$-0.35, -0.02$] (Figure 5).

For the remaining measures, higher scores relate to greater wellbeing, therefore, positive effect sizes indicate that the intervention improved wellbeing. Across the eight studies that collected data on coping/self-efficacy, the interventions increased coping/self-efficacy compared to control with an overall SMD of 0.17 [$0.04, 0.31$]. Across the six studies that collected data on social support/participation, the overall SMD was 0.17 [$-0.02, 0.35$] (Figure 6).

Across the 11 studies that collected data on physical quality of life, the overall SMD was 0.07 [$-0.02, 0.16$]. Across the 12 studies that collected data on mental health quality of life, the overall SMD was 0.09 [$-0.01, 0.19$]. Across the six studies that collected data on quality of social life, the overall SMD was 0.10 [$-0.04, 0.24$], and across the seven studies that collected data on general quality of life, the overall SMD was -0.06 [$-0.20, 0.07$] (Figure 7).

3.5 | Overall effects of psychosocial interventions on each outcome

Figure 8 presents the overall SMD of psychosocial interventions on the outcome categories from meta-analyses. There is a clear pattern suggesting an overall positive effect of psychosocial interventions.

3.6 | Quality of included studies

Quality assessment based on up to 12 criteria for determining possible risk of bias is presented in Figure 9. Of the 62 studies that contributed data in meta-analyses, 66.1% were judged as being of high quality, 32.3% of medium quality and one study (1.6%) of potentially lower quality, see Table 7.

4 | DISCUSSION

There is evidence in this review of RCTs of an overall small to moderate positive effect of psychosocial interventions on reducing symptoms of depression, anxiety, stress and other measures of poor wellbeing, and increasing levels of self-reported coping/self-efficacy, over the short to medium-term, among people living with HIV in high-income countries. In meta-regression relating to the depression outcome, interventions in studies that included only participants who met a threshold score for poor mental health symptoms had a significantly greater positive impact on depressive symptoms. This effect was as expected—the inclusion criteria ensured that the intervention was targeted at those with the greatest potential for benefit. If people with lower scores (better mental health) are included, there is less room for reduction in depression scores. There was also some evidence that longer interventions with a greater number of sessions were more beneficial than shorter ones. There was no evidence of a difference in intervention effectiveness for the other factors investigated, including the type of intervention (psychotherapeutic vs. other; CBT vs. other; motivational interviewing vs. other), see the Limitations section for a discussion of control groups.

Psychosocial interventions also appeared to have a beneficial effect on stigma and social support/participation, with a similar magnitude of effect size; however, the overall SMDs were not statistically significant. Effect sizes were smaller, and statistically non-significant, for measures of quality of life, and there was no difference found between study arms in reporting of loneliness, albeit data were available from only four studies.

These findings are in line with a systematic review of studies among people living with HIV, published between 1996 and 2014 ($n = 62$) [11]. The authors found an overall small positive effect of psychosocial interventions on mental health (depression, anxiety, quality of life and other psychological wellbeing measures) compared to a control condition (Hedges' $g = 0.19$ [95% CI: $0.13, 0.25$], $p = 0.001$). This effect was also found to lessen over time. Greater intervention effects on depression were found for psychologist-delivered interventions, in studies with mental health as a primary focus of the intervention, and as in our review, in studies with depressive symptoms as an inclusion criterion. The current review extends that conducted previously by including recent

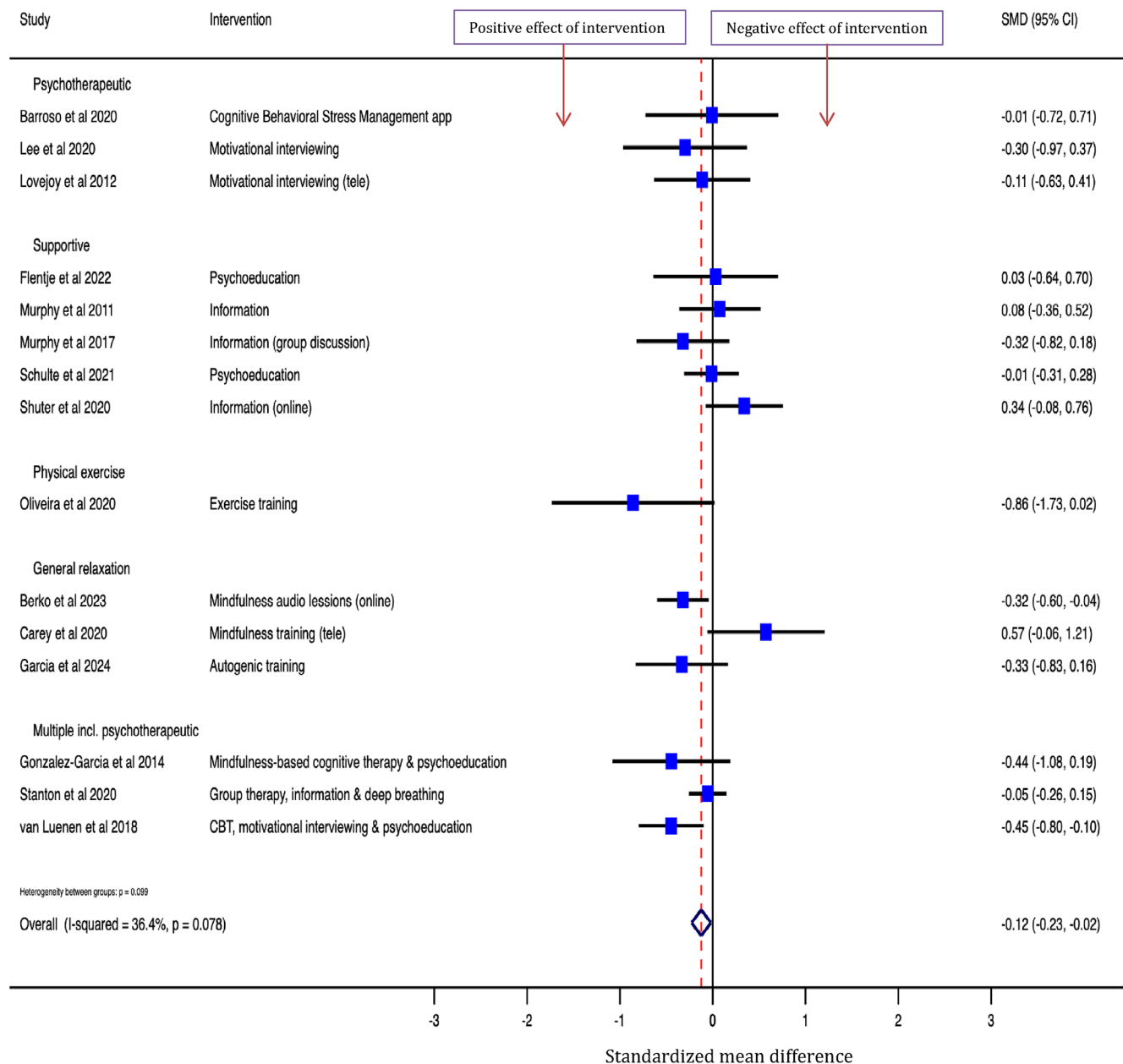
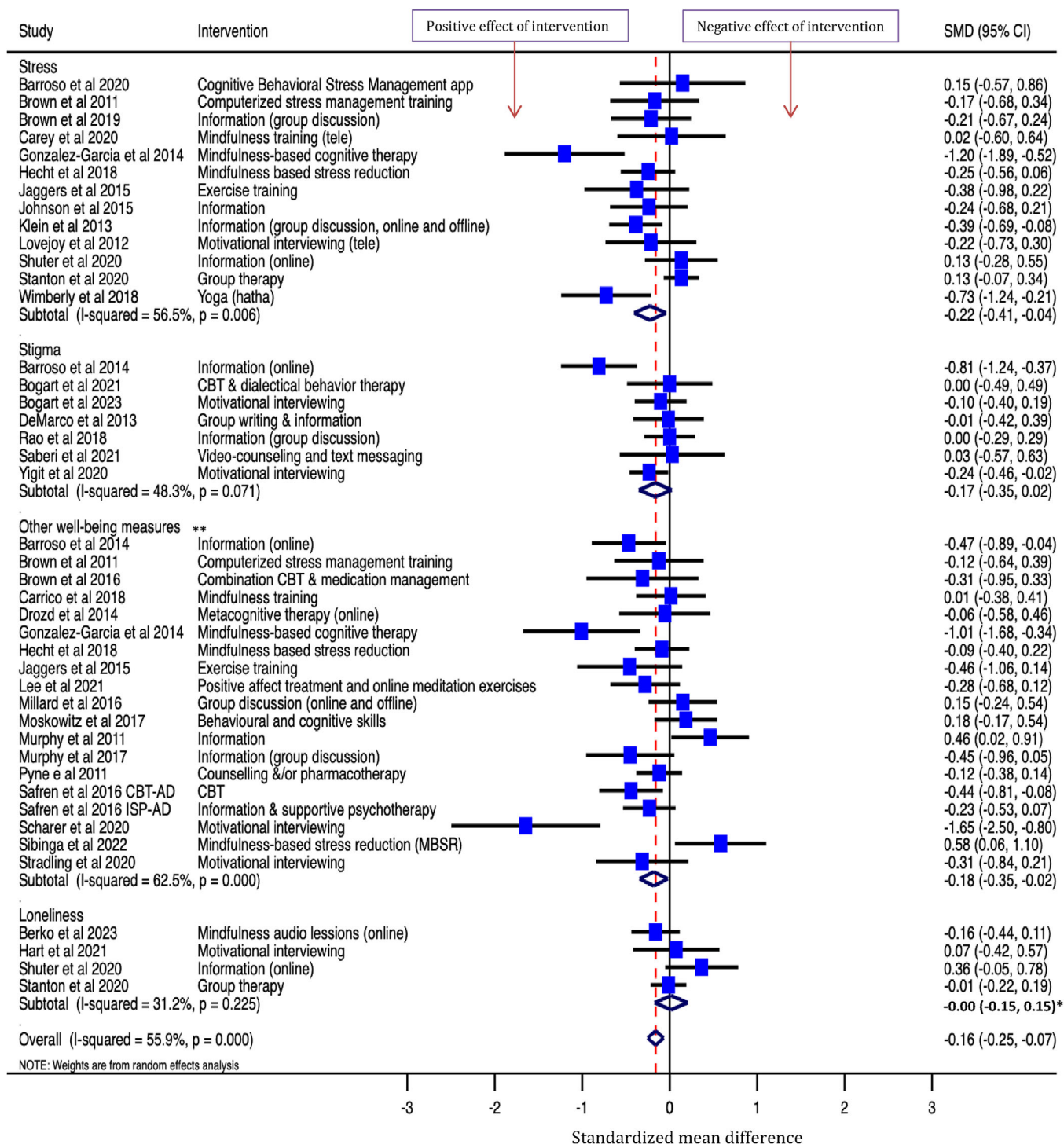


Figure 4. Effect of psychosocial interventions on symptoms of anxiety among people living with HIV ($N = 15$ interventions).

data and separating outcome data into specific constructs, that is depression, anxiety, coping and self-efficacy, stress, stigma, loneliness, social support/participation and quality of life (mental, physical, social and general). The current review also incorporated a broader range of psychosocial interventions by including physical intervention studies (e.g. exercise training) and by not excluding articles with no mention of mental health/wellbeing/quality of life in the title, abstract or key words. Findings from this review are specific to high-income countries.

Depression was the outcome measure most frequently investigated across psychosocial intervention studies in this review ($N = 45$ interventions). There was no evidence found

for a difference in effect on depression between the various psychosocial (or psychotherapeutic) intervention types. Recognition in the literature that different types of psychological therapy often achieve similar results when compared to control [11, 28] has given rise to the hypothesis that there are important factors common to all forms of therapy, specifically the therapeutic alliance—the collaborative relationship between patient and therapist [29]. Experience and competence in mental healthcare is considered vital to the therapeutic alliance [29]. Most studies included in this meta-analysis (51 out of 62) involved some form of help from another person (as opposed to being exclusively self-help/online), but it was not possible to assess the magnitude of effect size



The final overall estimate presented includes multiple outcomes from individual studies.

*Weights are from fixed effects analysis given that the I^2 was 31.2% for the loneliness meta-analysis.

**Coded with higher scores indicating poorer well-being.

Figure 5. Effect of psychosocial interventions on stress (N = 13), stigma (N = 7), loneliness (N = 4) and other wellbeing measures (N = 19) among people living with HIV.

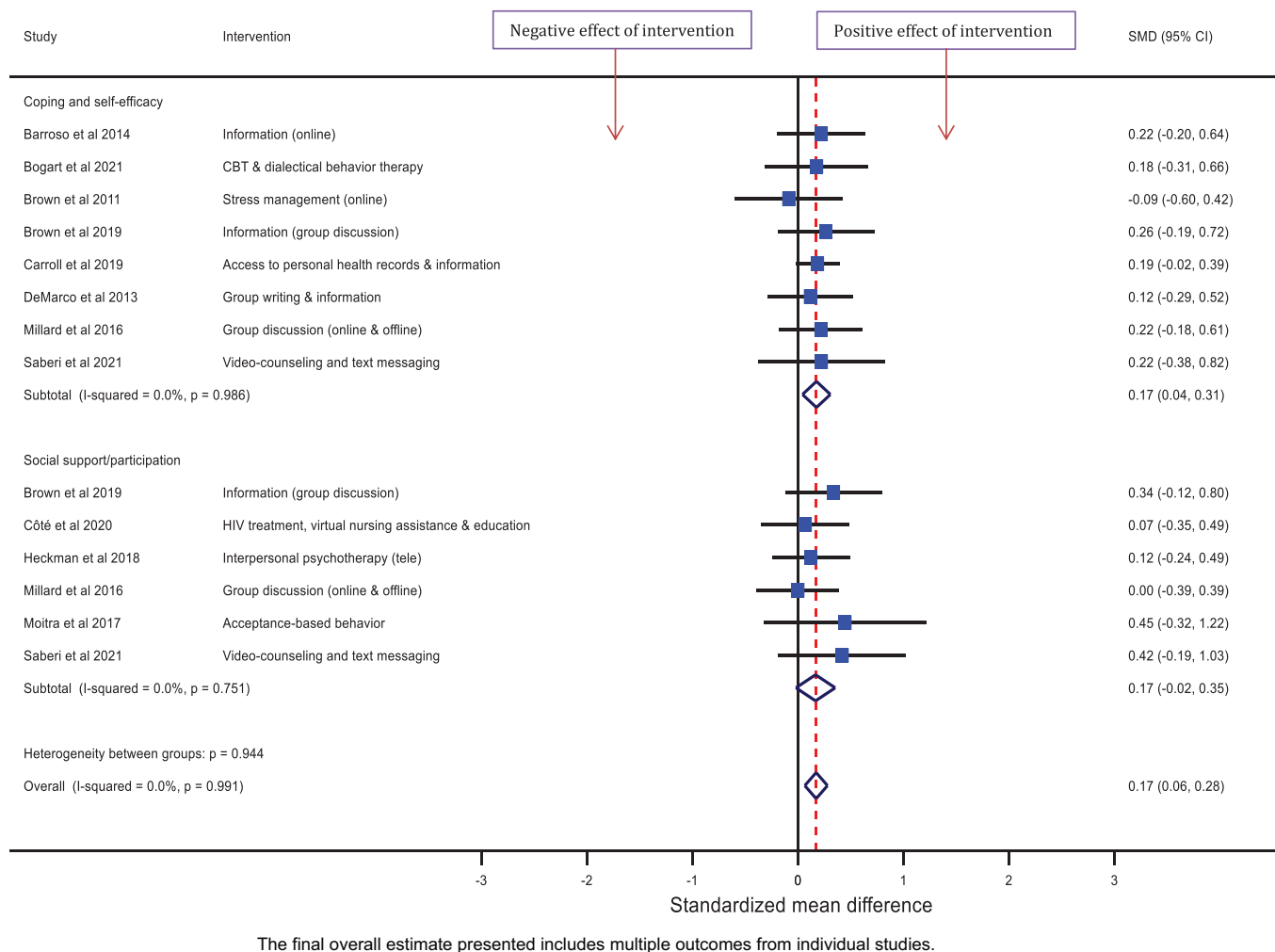


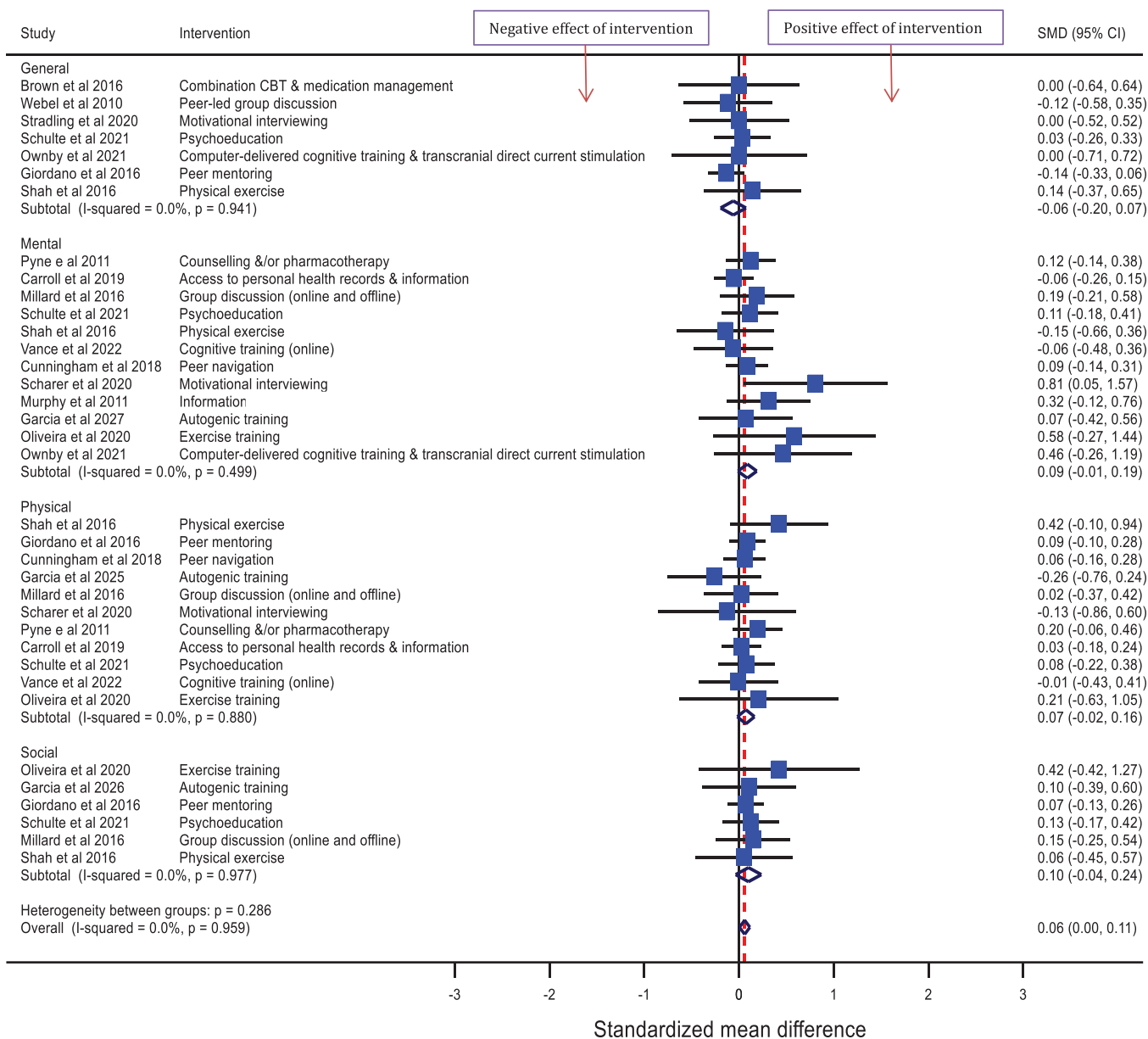
Figure 6. Effect of psychosocial interventions on measures of coping/self-efficacy (N = 8) and social support (N = 6).

according to the amount of experience of the provider. Psychologist (vs. non-psychologist) delivered interventions were associated with a greater reduction in depressive symptoms, although a statistically significant difference was not found, but there might have been a lack of power to detect a difference.

A small number of psychosocial intervention studies (N = 7) were identified in the current review that included stigma as an outcome. The overall effect size for stigma in the meta-analysis was in line with estimates for other outcomes but was not statistically significant. Only three of the seven studies focused on stigma as the primary endpoint; interventions were provision of information online [30], motivational interviewing [22] and group discussions [31]. Historically, HIV research typically acknowledged Goffman in reference to stigmatization, and stigma came to be seen as something inherent in a person living with HIV [32]. Most studies responding to HIV-related stigma have delivered information to segments of the general population in an effort to change attitudes to what was perceived as an undesirable attribute. More recently, however, stigma has been reframed

as a constantly changing (and often resisted) social process [32]. HIV-related stigmatization may, therefore, be thought of as a function of social inequality in society, in which relations of power and control diminish certain population groups and elevate others. The stress of intersectional stigma, heightened discrimination based on combinations of gender, sexuality and ethnicity, is increasingly acknowledged in HIV research [33], as is the importance of internalized HIV stigma, the process by which people internalize or endorse society's negative beliefs about HIV [4]. The ways in which stigmatization and discrimination have been addressed in intervention studies among people living with HIV may have been limited by past approaches to conceptualizing and investigating stigma.

The number of studies in this review that investigated stress as an outcome was also relatively small (N = 13), with only one investigating HIV-related stress [34]. There was a small overall reduction in stress in the meta-analysis, which was statistically significant. Very few studies in this review (N = 4) included loneliness as an outcome, even though loneliness represents a critical concern for people living with chronic health conditions including HIV [35] and has been



The final overall estimate presented includes multiple outcomes from individual studies.
^a Includes measures of general health quality of life and general quality of life, see questionnaire scales in Table 2.

Figure 7. Effect of psychosocial interventions on measures of quality of life; general^a (N = 7), physical (N = 11), mental (N = 12) and social (N = 6).

linked to disruptions in immune function, increased inflammation and altered glucocorticoid release, with implications for poor health outcomes [36]. Six studies had outcomes related to social support/participation, across which there was a small non-significant positive effect. Several interventions in this review (15%) included a group-based element, providing a possible forum for participants to expand their social networks and garner support from others with shared experience. It has been suggested that the follow-up time for such studies is too short to capture potential improvements in social support/participation that develop over time [37].

In this review, half of the studies (53.7%) included a standard care control group, the remainder analysed an active or enhanced standard care control group who were given some form of intervention. There may be ethical considerations when randomizing individuals with unmet psychological need to standard of care, possibly explaining the use of active controls. However, comparison with an active control group is likely to dilute the effectiveness of the intervention, leading to more conservative estimates of intervention effect. In addition, some studies in this review described their control group as standard care, but there was some indication that

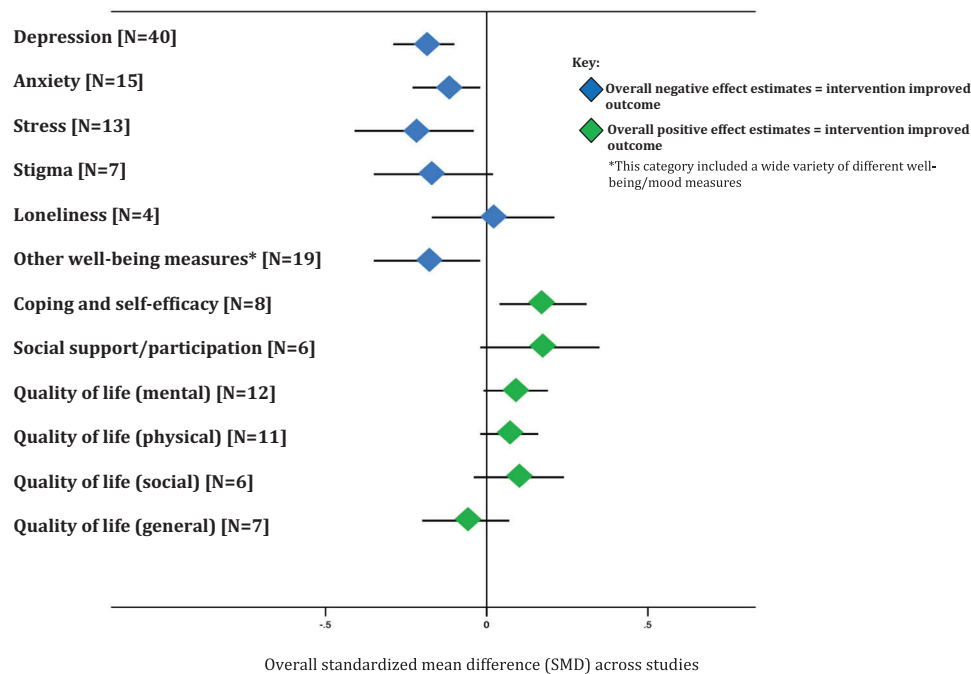


Figure 8. Overall effects of psychosocial interventions on each outcome measure.

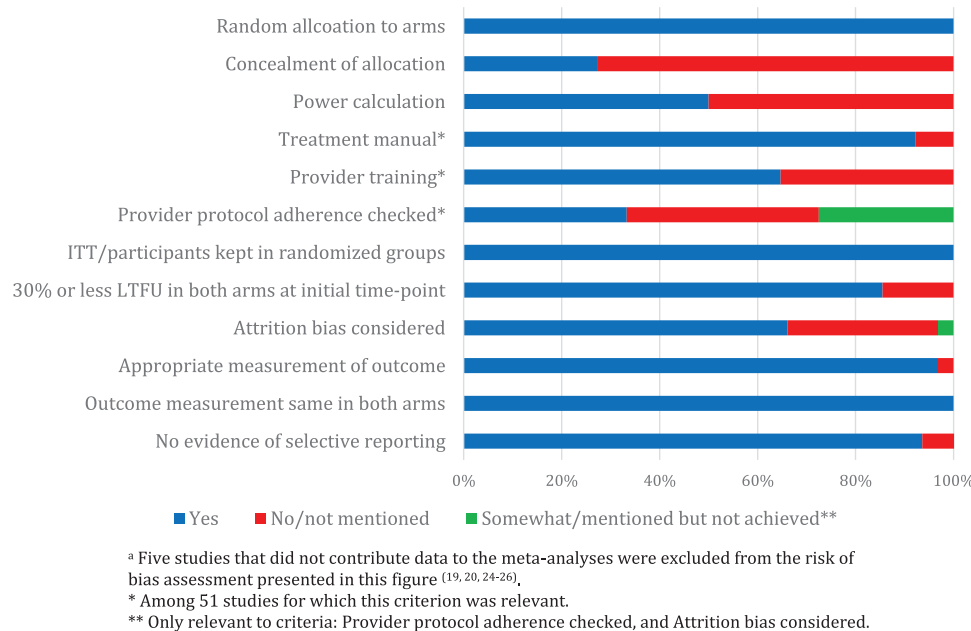


Figure 9. Risk of bias criteria assessed in 62^a studies included in analyses.

participants may have received care above and beyond that which is typically given. Studies with waitlist control groups were also described as standard care, but the anticipation of intervention may affect participants' mental health and well-being. This has implications for the categorization of control groups and may suggest that intervention effect sizes tend to be underestimated. In a supplementary meta-regression

analysis, interventions that were compared to standard care controls had a significantly greater effect on depression versus interventions compared to not standard care (including enhanced standard care) control groups (when the latter category included "standard care with intentional support" controls). After adjusting for the effect of control group type, a sensitivity meta-analysis revealed that the overall SMD for

Table 7. Risk of bias criteria (up to 12)^a considered in 62^b studies included in analyses and percentage of criteria met

Study	1. Random	2. Conceal	3. Power	4. Manual	5. Training	6. Adherence	7. ITT	8. ≤30% LTFU	9. Attrition	10. Measurement	11. Outcome	12. Selective	Percentage criteria met (no. of criteria met/no. of relevant criteria)
Jaggars et al. 2015	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	4/17% (5/12)
Murphy et al. 2017	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	50% (6/12)
Johnson et al. 2015	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	50% (6/12)
Shah et al. 2016	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	58.3 (7/12)
Gonzalez-Garcia et al. 2014	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	58.3% (7/12)
Oliveira et al. 2020	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	62.5% (7.5/12)
Pyne et al. 2011	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	62.5% (7.5/12)
Sibinga et al. 2022	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Lee et al. 2020	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Brown et al. 2019	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Shuter et al. 2020	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Lovejoy et al. 2012	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Murphy et al. 2011	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Han et al. 2023	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Barroso et al. 2020	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Webel et al. 2010	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Fientje et al. 2022	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Millard et al. 2016	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Gupta et al. 2020	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Scharer et al. 2020	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Hecht et al. 2018	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Lee et al. 2021	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Williams et al. 2013	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Rao et al. 2018	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Giordano et al. 2016	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Moitra et al. 2017	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Bogart et al. 2021	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
DeMarco et al. 2013	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Brown et al. 2011	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Vance et al. 2022	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Drozdz et al. 2014	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Garcia et al. 2023	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Owby et al. 2021	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Simoni et al. 2013	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Wimberly et al. 2018	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Hart et al. 2021	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Schulte et al. 2021	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)
Carroll et al. 2019	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	66.7% (8/12)

(Continued)

Table 7. (Continued)

Study	1. Random	2. Conceal	3. Power	4. Manual	5. Training	6. Adherence	7. ITT	8. ≤30% LTFU	9. Attrition	10. Measure-ment	11. Outcome	12. Selective	Percentage criteria met (no. of criteria met/no. of relevant criteria)
Brown et al. 2016													83.3% (10/12)
Moskowitz et al. 2017													83.3% (10/12)
Saberi et al. 2021													86.4% (9.5/11)
Himelhoch et al. 2013													86.4% (9.5/11)
Heckman et al. 2013													86.4% (9.5/11)
Heckman et al. 2018													87.5% (10.5/12)
Magidson et al. 2022													87.5% (10.5/12)
Yigit et al. 2020													87.5% (10.5/12)
Carrico et al. 2018													87.5% (10.5/12)
Guy et al. 2022													87.5% (10.5/12)
Safren et al. 2016													87.5% (10.5/12)
van Luenen et al. 2018													87.5% (10.5/12)
Barroso et al. 2014				/	/	/							88.9% (8/9)
Klein et al. 2013				/	/	/							88.9% (8/9)
Scott et al. 2021				/	/	/							88.9% (8/9)
Cote et al. 2020				/	/	/							88.9% (8/9)
Berko et al. 2023				/	/	/							88.9% (8/9)
Blashill et al. 2017													91.7% (11/12)
Bogart et al. 2023													91.7% (11/12)
Carey et al. 2020													100% (12/12)
Stanton et al. 2020													100% (12/12)
Cunningham et al. 2018													100% (12/12)
Stradling et al. 2021													100% (12/12)
Uebelacker et al. 2023													100% (12/12)

Twelve risk of bias criteria include: 1. Random allocation to arms, 2. Concealment of allocation, 3. Power calculation, 4. Treatment manual, 5. Provider training, 6. Provider protocol adherence checked, 7. ITT/participants kept in randomized groups, 8. 30% or less LTFU in both arms at initial time point, 9. Attrition bias considered, 10. Appropriate measurement of outcome, 11. Outcome measurement same in both arms, 12. No evidence of selective reporting. If a criterion was considered to have been met ("yes"), it is coded in blue; if a criterion was not considered to have been met or was not mentioned ("no/not mentioned"), it is coded as red; if a criterion was considered to have been somewhat met or mentioned but not achieved ("somewhat" or "mentioned not achieved"), it is coded as green.

Five studies that did not contribute data to the meta-analyses were excluded from the risk of bias assessment presented in this table [19, 20, 24–26].

depression may be up to -0.29 [-0.38 , -0.20], suggesting a small to moderate overall effect of psychosocial intervention on depression.

Furthermore, there may be limitations to combining effect estimates across different measures within a particular outcome category. The constructs of depression and anxiety are relatively well defined, and arguably consistently captured across the numerous questionnaires used to measure these conditions, at least in terms of relative score, if not absolute level. However, other constructs investigated in this review, such as stress, stigma and quality of life, may be interpreted differently across questionnaires, affecting the overall findings in the meta-analysis. For instance, the questionnaires used to measure stigma captured aspects of internalized, enacted and/or anticipated stigma. The questionnaires used to measure stress included stress related to life events, every day emotional states or parenting. The questionnaires used to measure general quality of life were particularly heterogeneous, capturing the quality of one's general health or quality of life in general. Questionnaire scales are presented in full in Table 2.

There may be a lack of generalizability of findings in this meta-analysis given that all included studies utilized convenience sampling for participant recruitment. Further, 84% of studies were conducted in the United States, and findings may be less applicable to other high-income country settings including the UK. We did not consider interventions conducted in low/middle-income countries; however, some interventions that have been evaluated in low-income settings may also be relevant and applicable to high-income settings. Future systematic reviews of psychosocial interventions in people living with HIV may wish to include studies considered outside the scope of this review such as, observational studies or studies including adolescent participants.

A sensitivity analysis in this review suggested that interventions were less effective overall in reducing depressive symptoms over the longer-term. A key theme discussed across studies was the need for booster sessions to retain positive effects within one to 6 months after intervention completion. It was suggested in one study that to sustain any beneficial intervention effect regarding stigma, ongoing social support via regular peer support groups, even in a clinical setting, would be needed, as stigma may still be experienced in families, communities and places of work [38]. Findings from the meta-regression in this review also suggest that longer interventions (≥ 61 days), with a greater number of sessions (≥ 9), tended to be more beneficial.

Across studies in this review, there were conflicting strategies used in terms of exclusion of participants based on psychiatric conditions. Some studies stated that individuals were not excluded on the basis of psychiatric history in order to assemble a more externally valid sample [39], whereas others argued it was potentially dangerous and unethical to include people with severe psychiatric conditions in RCTs [40].

In the UK, health coaching (to build patient knowledge, skills and confidence) is being rolled out on the National Health Service (NHS) for chronic conditions and there has been a big investment in social prescribing in primary care. In the current review, very few interventions included "coaching," and none included "social prescribing." Four interventions

included a component described as coaching [25, 41–43]. In one study, the control condition consisted of health coaching [44]. However, some studies may have included equivalent interventions that were labelled differently. Further research is needed to investigate the effectiveness of health coaching and social prescribing for people living with HIV.

5 | CONCLUSIONS

Current evidence from RCTs in high-income settings suggests that people living with HIV may benefit from psychosocial interventions, with evidence that these interventions had a beneficial impact on symptoms of depression, anxiety, stress, self-efficacy/coping and other measures of wellbeing. Interventions were most effective in reducing depression when targeted only at those who met a threshold mental health score at baseline. Pooled effect estimates were small, or small to moderate in this review, with an indication that the widespread use of active control groups results in an underestimation of true effect size. Psychosocial interventions may also improve other measures of wellbeing and quality of life, although the overall findings in this review were not statistically significant, and very few studies investigated stigma and loneliness outcomes. The specific type of psychosocial intervention does not appear to determine effectiveness on depression, in line with previous research. Future RCTs could consider the use of mental health/wellbeing screening as an eligibility criterion, the type of control group comparator, and the length and intensity of the intervention, as these factors may influence the effect size.

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COMPETING INTERESTS

No potential conflict of interest was reported by the authors.

AUTHORS' CONTRIBUTIONS

FCL and AR conceived the review, and FCL, AR, ARM, JS, ANP, LS, SVL, NG and VK developed the search strategy. ARM and JS carried out the systematic searches. FCL, VC, ARM, JS and FN developed the data extraction protocol and designed the meta-analysis. ARM, JS and SMR extracted the data. ARM drafted the manuscript and conducted all analyses. All authors contributed to data interpretation, writing, revision and approval of the final manuscript.

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DATA AVAILABILITY STATEMENT

All data are presented in the figures.

DISCLAIMER

The views expressed are those of the authors and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health and Social Care.

REFERENCES

- Colloty J, Teixeira M, Hunt R. Advances in the treatment and prevention of HIV: what you need to know. *Br J Hosp Med (Lond)*. **2023**;84(7):1–9.
- Rodger AJ, Cambiano V, Bruun T, Vernazza P, Collins S, Degen O, et al. Risk of HIV transmission through condomless sex in serodifferent gay couples with the HIV-positive partner taking suppressive antiretroviral therapy (PARTNER): final results of a multicentre, prospective, observational study. *Lancet*. **2019**;393(10189):2428–38.
- Nkulu-Kalengayi FK, Hurtig AK, Linander I. "Discrimination is harder to live with than the disease": an interview study of the perceptions and experiences of sexual and reproductive health and rights among women living with HIV in Sweden. *Sex Reprod Health Matters*. **2023**;31(1):2245197.
- Hedge B, Devan K, Catalan J, Cheshire A, Ridge D. HIV-related stigma in the UK then and now: to what extent are we on track to eliminate stigma? A qualitative investigation. *BMC Public Health*. **2021**;21(1):1022.
- Rubin LH, Maki PM. HIV, depression, and cognitive impairment in the era of effective antiretroviral therapy. *Curr HIV/AIDS Rep*. **2019**;16(1):82–95.
- Zelege TA, Alemu K, Ayele TA, Denu ZA, Mwanri L, Azale T. Systematic review and meta-analysis on the effect of depression on ART adherence among women living with HIV. *PLoS One*. **2024**;19(6):e0300106.
- Miltz A, Lampe F, McCormack S, Dunn D, White E, Rodger A, et al. Prevalence and correlates of depressive symptoms among gay, bisexual and other men who have sex with men in the PROUD randomised clinical trial of HIV pre-exposure prophylaxis. *BMJ Open*. **2019**;9(12):e031085.
- Miltz AR, Rodger AJ, Phillips AN, Sewell J, Edwards S, Allan S, et al. Opposing associations of depression with sexual behaviour: implications for epidemiological investigation among gay, bisexual and other men who have sex with men. *Sex Transm Infect*. **2021**;97(8):613–18.
- Miltz AR, Rodger AJ, Sewell J, Gilson R, Allan S, Scott C, et al. Recreational drug use and use of drugs associated with chemsex among HIV-negative and HIV-positive heterosexual men and women attending sexual health and HIV clinics in England. *Int J Drug Policy*. **2021**;91:103101.
- Rein SM, Smith CJ, Chaloner C, Stafford A, Rodger AJ, Johnson MA, et al. Prospective association of social circumstance, socioeconomic, lifestyle and mental health factors with subsequent hospitalisation over 6–7 year follow up in people living with HIV. *EclinicalMedicine*. **2021**;31:100665.
- van Luenen S, Garnefski N, Spinhoven P, Spaan P, Dusseldorp E, Kraaij V. The benefits of psychosocial interventions for mental health in people living with HIV: a systematic review and meta-analysis. *AIDS Behav*. **2018**;22(1):9–42.
- Cochrane. A revised Cochrane risk-of-bias tool for randomized trials. **2024**. Accessed November 2020. Available from: <https://methods.cochrane.org/bias/resources/rob-2-revised-cochrane-risk-bias-tool-randomized-trials>
- Chambless DL, Hollon SD. Defining empirically supported therapies. *J Consult Clin Psychol*. **1998**;66(1):7–18.
- Higgins JP, Altman DG, Gøtzsche PC, Jüni P, Moher D, Oxman AD, et al. The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ*. **2011**;343:d5928.
- Lin L, Aloe AM. Evaluation of various estimators for standardized mean difference in meta-analysis. *Stat Med*. **2021**;40(2):403–26.
- Stata Statistical Software: Release 18 [Internet]. StataCorp LLC. **2023**.
- PRISMA. PRISMA 2020 statement. **2024**. Accessed October 2020. Available from: <https://www.prisma-statement.org/prisma-2020>
- Brown LK, Kennard BD, Emslie GJ, Mayes TL, Whiteley LB, Bethel J, et al. Effective treatment of depressive disorders in medical clinics for adolescents and young adults living with HIV: a controlled trial. *J Acquir Immune Defic Syndr*. **2016**;71(1):38–46.
- O'Cleirigh C, Zvolensky MJ, Smits JAJ, Labbe AK, Coleman JN, Wilner JG, et al. Integrated treatment for smoking cessation, anxiety, and depressed mood in people living with HIV: a randomized controlled trial. *J Acquir Immune Defic Syndr*. **2018**;79(2):261–68.
- Schnall R, Cho H, Mangone A, Pichon A, Jia H. Mobile health technology for improving symptom management in low income persons living with HIV. *AIDS Behav*. **2018**;22(10):3373–83.
- Saberi P, McCuistian C, Agnew E, Wootton AR, Legnitto Packard DA, Dawson-Rose C, et al. Video-counseling intervention to address HIV care engagement, mental health, and substance use challenges: a pilot randomized clinical trial for youth and young adults living with HIV. *Telemed Rep*. **2021**;2(1):14–25.
- Yigit I, Modi RA, Weiser SD, Johnson MO, Mugavero MJ, Turan JM, et al. Effects of an intervention on internalized HIV-related stigma for individuals newly entering HIV care. *AIDS*. **2020**;34(Suppl 1):S73–S82.
- Giordano TP, Cully J, Amico KR, Davila JA, Kallen MA, Hartman C, et al. A randomized trial to test a peer mentor intervention to improve outcomes in persons hospitalized with HIV infection. *Clin Infect Dis*. **2016**;63(5):678–86.
- Bonato M, Turrini F, DE Zan V, Meloni A, Plebani M, Brambilla E, et al. A mobile application for exercise intervention in people living with HIV. *Med Sci Sports Exerc*. **2020**;52(2):425–33.
- Roth AM, Holmes AM, Stump TE, Aalsma MC, Ackermann RT, Carney TS, et al. Can lay health workers promote better medical self-management by persons living with HIV? An evaluation of the Positive Choices program. *Patient Educ Couns*. **2012**;89(1):184–90.
- Hersch RK, Cook RF, Billings DW, Kaplan S, Murray D, Safren S, et al. Test of a web-based program to improve adherence to HIV medications. *AIDS Behav*. **2013**;17(9):2963–76.
- Blashill AJ, Safren SA, Wilhelm S, Jampel J, Taylor SW, O'Cleirigh C, et al. Cognitive behavioral therapy for body image and self-care (CBT-BISC) in sexual minority men living with HIV: a randomized controlled trial. *Health Psychol*. **2017**;36(10):937–46.
- Plessen CY, Karyotaki E, Miguel C, Ciharova M, Cuijpers P. Exploring the efficacy of psychotherapies for depression: a multiverse meta-analysis. *BMJ Ment Health*. **2023**;26(1):e300626.
- Ardito RB, Rabellino D. Therapeutic alliance and outcome of psychotherapy: historical excursus, measurements, and prospects for research. *Front Psychol*. **2011**;2:270.
- Barroso J, Relf MV, Williams MS, Arscott J, Moore ED, Caiola C, et al. A randomized controlled trial of the efficacy of a stigma reduction intervention for HIV-infected women in the deep south. *AIDS Patient Care STDs*. **2014**;28(9):489–98.
- Rao D, Kemp CG, Huh D, Nevin PE, Turan J, Cohn SE, et al. Stigma reduction among African American women with HIV: UNITY Health study. *J Acquir Immune Defic Syndr*. **2018**;78(3):269–75.
- Parker R, Aggleton P. HIV and AIDS-related stigma and discrimination: a conceptual framework and implications for action. *Soc Sci Med*. **2003**;57(1):13–24.
- Bogart LM, Barreras JL, Gonzalez A, Klein DJ, Marsh T, Agniel D, et al. Pilot randomized controlled trial of an intervention to improve coping with intersectional stigma and medication adherence among HIV-positive Latinx sexual minority men. *AIDS Behav*. **2021**;25(6):1647–60.
- Barroso J, Madisetti M, Mueller M. A feasibility study to develop and test a cognitive behavioral stress management mobile health application for HIV-related fatigue. *J Pain Symptom Manage*. **2020**;59(2):242–53.
- Harris M, Brouillette MJ, Scott SC, Smail F, Smith G, Thomas R, et al. Impact of loneliness on brain health and quality of life among adults living with HIV in Canada. *J Acquir Immune Defic Syndr*. **2020**;84(4):336–44.
- Blanco JR, Baeza AG, de Miguel Buckley R, De La Torre-Lima J, Cano Smith J, Olalla J. Loneliness and social isolation in people with HIV. *Curr Opin HIV AIDS*. **2025**;20(2):172–82.
- Brown JL, Vanable PA, Bostwick RA, Carey MP. A pilot intervention trial to promote sexual health and stress management among HIV-infected men who have sex with men. *AIDS Behav*. **2019**;23(1):48–59.
- Simoni JM, Wiebe JS, Saucedo JA, Huh D, Sanchez G, Longoria V, et al. A preliminary RCT of CBT-AD for adherence and depression among HIV-positive Latinos on the U.S.-Mexico border: the Nuevo Dia study. *AIDS Behav*. **2013**;17(8):2816–29.
- Heckman TG, Heckman BD, Anderson T, Lovejoy TI, Mohr D, Sutton M, et al. Supportive-expressive and coping group teletherapies for HIV-infected older adults: a randomized clinical trial. *AIDS Behav*. **2013**;17(9):3034–44.
- Himelhoch S, Medoff D, Maxfield J, Dihmes S, Dixon L, Robinson C, et al. Telephone based cognitive behavioral therapy targeting major depression among urban dwelling, low income people living with HIV/AIDS: results of a randomized controlled trial. *AIDS Behav*. **2013**;17(8):2756–64.
- Carroll JK, Tobin JN, Luque A, Farah S, Sanders M, Cassells A, et al. "Get Ready and Empowered About Treatment" (GREAT) study: a pragmatic randomized controlled trial of activation in persons living with HIV. *J Gen Intern Med*. **2019**;34(9):1782–89.

42. Klein CH, Kuhn T, Altamirano M, Lomonaco C. C-SAFE: a computer-delivered sexual health promotion program for Latinas. *Health Promot Pract*. 2017;18(4):516–25.
43. van Luenen S, Garnefski N, Spinhoven P, Kraaij V. Guided internet-based intervention for people with HIV and depressive symptoms: a randomised controlled trial in the Netherlands. *Lancet HIV*. 2018;5(9):e488–97.
44. Carey MP, Dunne EM, Norris A, Dunsiger S, Rich C, Rosen RK, et al. Telephone-delivered mindfulness training to promote medication adherence and reduce sexual risk behavior among persons living with HIV: an exploratory clinical trial. *AIDS Behav*. 2020;24(6):1912–28.
45. SIGN. Search filters: The Scottish Intercollegiate Guidelines Network (SIGN). 2020. Accessed October 2020. Available from: <https://www.sign.ac.uk/what-we-do/methodology/search-filters/>
46. Cochrane. LMIC filters: The Cochrane Collaboration. 2021. Accessed September 2020. Available from: <https://epoc.cochrane.org/lmic-filters>
47. WBG. Data. World Bank Country and Lending Groups: The World Bank Group (WBG). 2021. Accessed October 2020. Available from: <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
48. Abraham C, Johnson BT, de Bruin M, Luszczynska A. Enhancing reporting of behavior change intervention evaluations. *J Acquir Immune Defic Syndr*. 2014;66(Suppl 3):S293–99.
49. Berko J, Mazonson P, Short D, Karris M, Ehui L, Gutner CA, et al. Waitlist-controlled trial of an online intervention to address mental health among older people living with HIV. *Antivir Ther*. 2023;28(6):13596535231216311. <https://doi.org/10.1177/13596535231216311>
50. Bogart LM, Mutchler MG, Goggin K, Ghosh-Dastidar M, Klein DJ, Saya U, et al. Randomized controlled trial of RISE, a community-based culturally congruent counseling intervention to support antiretroviral therapy adherence among Black/African American adults living with HIV. *AIDS Behav*. 2023;27(5):1573–86.
51. Brown JL, Vanable PA, Carey MP, Elinc L. Computerized stress management training for HIV+ women: a pilot intervention study. *AIDS Care*. 2011;23(12):1525–32.
52. Carey MP, Rich C, Norris AL, Krieger N, Gavarkovs AG, Kaplan C, et al. A brief clinic-based intervention to reduce alcohol misuse and sexual risk behavior in young women: results from an exploratory clinical trial. *Arch Sex Behav*. 2020;49(4):1231–50.
53. Carrico AW, Gmez W, Jain J, Shoptaw S, Discepolo MV, Olem D, et al. Randomized controlled trial of a positive affect intervention for methamphetamine users. *Drug Alcohol Depend*. 2018;192:8–15.
54. Cote J, Rouleau G, Ramirez-Garcia MP, Auger P, Thomas R, Leblanc J. Effectiveness of a web-based intervention to support medication adherence among people living with HIV: web-based randomized controlled trial. *JMIR Public Health Surveill*. 2020;6(2):69–81.
55. Cunningham WE, Weiss RE, Nakazono T, Malek MA, Shoptaw SJ, Ettner SL, et al. Effectiveness of a peer navigation intervention to sustain viral suppression among HIV-positive men and transgender women released from jail: the LINK LA randomized clinical trial. *JAMA Intern Med*. 2018;178(4):542–53.
56. DeMarco RF, Chan K. The Sistah Powah structured writing intervention: a feasibility study for aging, low-income, HIV-positive Black women. *Am J Health Promot*. 2013;28(2):108–18.
57. Drozd F, Skeie LG, Kraft P, Kvale D. A web-based intervention trial for depressive symptoms and subjective well-being in patients with chronic HIV infection. *AIDS Care*. 2014;26(9):1080–89.
58. Flentje A, Sunder G, Dilley JW, Neilands TB, Lisha NE, Katuzny KE, et al. AWARENESS: a cognitive behavioral intervention to reduce intersectional minority stress among sexual minority men living with HIV who use substances. *Drug Alcohol Depend Rep*. 2022;3:100059.
59. Garcia MPR, Leclerc-Loiselle J, Côté J, Brouillette MJ, Thomas R. Effect of internet cognitive-behavioral training on quality of life and symptoms in people living with HIV: a mixed method randomized controlled trial. *Complement Ther Clin Pract*. 2023;50:101716.
60. Gonzalez-Garcia M, Ferrer MJ, Borrás X, Munoz-Moreno JA, Miranda C, Puig J, et al. Effectiveness of mindfulness-based cognitive therapy on the quality of life, emotional status, and CD4 cell count of patients aging with HIV infection. *AIDS Behav*. 2014;18(4):676–85.
61. Gupta SK, Slaven JE, Liu Z, Polanka BM, Freiberg MS, Stewart JC. Effects of internet cognitive-behavioral therapy on depressive symptoms and surrogates of cardiovascular risk in human immunodeficiency virus: a pilot, randomized, controlled trial. *Open Forum Infect Dis*. 2020;7(7):ofaa280.
62. Guy AA, Zelaya DG, Surace A, Mastroleone NR, Pantalone DW, Monti PM, et al. Discrimination and alcohol problems among heavy drinking HIV-positive men who have sex with men: the buffering effect of a brief Motivational Intervention to reduce alcohol use. *Drug Alcohol Depend*. 2022;233:109384.
63. Han HR, Mendez KJW, Perrin N, Cudjoe J, Taylor G, Baker D, et al. Community-based health literacy focused intervention for cervical cancer control among Black women living with human immunodeficiency virus: a randomized pilot trial. *Health Expect*. 2023;26(1):172–82.
64. Hart TA, Noor SW, Skakoon-Sparling S, Lazkani SN, Gardner S, Leahy B, et al. GPS: a randomized controlled trial of sexual health counseling for gay and bisexual men living with HIV. *Behav Ther*. 2021;52(1):1–14.
65. Hecht FM, Moskowitz JT, Moran P, Epel ES, Bacchetti P, Acree M, et al. A randomized, controlled trial of mindfulness-based stress reduction in HIV infection. *Brain Behav Immun*. 2018;73:331–39.
66. Heckman TG, Markowitz JC, Heckman BD, Woldu H, Anderson T, Lovejoy TI, et al. A randomized clinical trial showing persisting reductions in depressive symptoms in HIV-infected rural adults following brief telephone-administered interpersonal psychotherapy. *Ann Behav Med*. 2018;52(4):299–308.
67. Jagers JR, Hand GA, Dudgeon WD, Burgess S, Phillips KD, Durstine JL, et al. Aerobic and resistance training improves mood state among adults living with HIV. *Int J Sports Med*. 2015;36(2):175–81.
68. Johnson ER, Davies SL, Aban I, Mugavero MJ, Shrestha S, Kempf MC. Improving parental stress levels among mothers living with HIV: a randomized control group intervention study. *AIDS Patient Care STDs*. 2015;29(4):220–28.
69. Klein CH, Lomonaco CG, Pavlescak R, Card JJ, Willow: reaching HIV-positive African-American women through a computer-delivered intervention. *AIDS Behav*. 2013;17(9):3013–23.
70. Lee KA, Jong S, Gay CL. Fatigue management for adults living with HIV: a randomized controlled pilot study. *Res Nurs Health*. 2020;43(1):56–67.
71. Lee JY, Lee JE, Moskowitz JT, Feaster DJ, Neilands TB, Dilworth SE, et al. An autoregressive cross-lagged model unraveling co-occurring stimulant use and HIV: results from a randomized controlled trial. *Drug Alcohol Depend*. 2021;225:108752.
72. Lovejoy TI. Telephone-delivered motivational interviewing targeting sexual risk behavior reduces depression, anxiety, and stress in HIV-positive older adults. *Ann Behav Med*. 2012;44(3):416–21.
73. Magidson JF, Belus JM, Seitz-Brown CJ, Tralka H, Safren SA, Daughters SB. Act Healthy: a randomized clinical trial evaluating a behavioral activation intervention to address substance use and medication adherence among low-income, Black/African American individuals living with HIV/AIDS. *AIDS Behav*. 2022;26(1):102–15.
74. Millard T, Agius PA, McDonald K, Slavin S, Girdler S, Elliott JH. The Positive Outlook Study: a randomised controlled trial evaluating online self-management for HIV positive gay men. *AIDS Behav*. 2016;20(9):1907–18.
75. Moitra E, LaPlante A, Armstrong ML, Chan PA, Stein MD. Pilot randomized controlled trial of acceptance-based behavior therapy to promote HIV acceptance, HIV disclosure, and retention in medical care. *AIDS Behav*. 2017;21(9):2641–49.
76. Moskowitz JT, Carrico AW, Duncan LG, Cohn MA, Cheung EO, Batchelder A, et al. Randomized controlled trial of a positive affect intervention for people newly diagnosed with HIV. *J Consult Clin Psychol*. 2017;85(5):409–23.
77. Murphy DA, Armistead L, Marelich WD, Payne DL, Herbeck DM. Pilot trial of a disclosure intervention for HIV+ mothers: the TRACK program. *J Consult Clin Psychol*. 2011;79(2):203–14.
78. Murphy DA, Armistead L, Payne DL, Marelich WD, Herbeck DM. Pilot trial of a parenting and self-care intervention for HIV-positive mothers: the IMAGE program. *AIDS Care*. 2017;29(1):40–48.
79. Oliveira VHF, Rosa FT, Santos JC, Wiechmann SL, Narciso AMS, Franzi de Moraes SM, et al. Effects of a combined exercise training program on health indicators and quality of life of people living with HIV: a randomized clinical trial. *AIDS Behav*. 2020;24(5):1531–41.
80. Ownby RL, Kim J. Computer-delivered cognitive training and transcranial direct current stimulation in patients with HIV-associated neurocognitive disorder: a randomized trial. *Front Aging Neurosci*. 2021;13:766311.
81. Pyne JM, Fortney JC, Curran GM, Tripathi S, Atkinson JH, Kilbourne AM, et al. Effectiveness of collaborative care for depression in human immunodeficiency virus clinics. *Arch Intern Med*. 2011;171(1):23–31.
82. Safren SA, Bedoya CA, O'Leirigh C, Biello KB, Pinkston MM, Stein MD, et al. Cognitive behavioural therapy for adherence and depression in patients with HIV: a three-arm randomised controlled trial. *Lancet HIV*. 2016;3(11):e529–38.
83. Scharer J, Arnold R, Wald R, Nichols J, Medoff D, Himelhoch S, et al. Personal Approach to Treatment Choices for HIV (PATCH): randomized controlled trial of a brief motivational enhancement intervention to improve medication adherence in persons with HIV. *AIDS Behav*. 2020;24(6):1893–902.

84. Schulte MT, Armistead L, Murphy DA, Marelich W. Multisite longitudinal efficacy trial of a disclosure intervention (TRACK) for HIV+ mothers. *J Consult Clin Psychol.* **2021**;89(2):81–95.
85. Scott W, Guildford BJ, Badenoch J, Driscoll E, Chilcot J, Norton S, et al. Feasibility randomized-controlled trial of online acceptance and commitment therapy for painful peripheral neuropathy in people living with HIV: the OPEN study. *Eur J Pain.* **2021**;25(7):1493–507.
86. Shah KN, Majeed Z, Yoruk YB, Yang H, Hilton TN, McMahon JM, et al. Enhancing physical function in HIV-infected older adults: a randomized controlled clinical trial. *Health Psychol.* **2016**;35(6):563–73.
87. Shuter J, Kim RS, An LC, Abroms LC. Feasibility of a smartphone-based tobacco treatment for HIV-infected smokers. *Nicotine Tob Res.* **2020**;22(3):398–407.
88. Sibinga EMS, Webb L, Perin J, Tepper V, Kerrigan D, Grieb S, et al. Mindfulness instruction for medication adherence among adolescents and young adults living with HIV: a randomized controlled trial. *AIDS Care.* **2022**;34(12):1619–27.
89. Stanton CA, Kumar PN, Moadel AB, Cunningham CO, Schechter CB, Kim RS, et al. A multicenter randomized controlled trial of intensive group therapy for tobacco treatment in HIV-infected cigarette smokers. *J Acquir Immune Defic Syndr.* **2020**;83(4):405–14.
90. Stradling C, Thomas GN, Hemming K, Taylor S, Taheri S. Randomized parallel-group pilot trial (Best foods for your heart) comparing the effects of a Mediterranean Portfolio diet with a low saturated fat diet on HIV dyslipidemia. *Clin Nutr.* **2021**;40(3):860–69.
91. Uebelacker LA, Pinkston MM, Busch AM, Baker JV, Anderson B, Caviness CM, et al. HIV-PASS (Pain and Sadness Support): randomized controlled trial of a behavioral health intervention for interference due to pain in people living with HIV, chronic pain, and depression. *Psychosom Med.* **2023**;85(3):250–59.
92. Vance DE, Pope CN, Fazeli PL, Azuero A, Frank JS, Wadley VG, et al. A randomized clinical trial on the impact of individually targeted computerized cognitive training on quality of life indicators in adults with HIV-associated neurocognitive disorder in the southeastern United States. *J Assoc Nurses AIDS Care.* **2022**;33(3):295–310.
93. Webel AR. Testing a peer-based symptom management intervention for women living with HIV/AIDS. *AIDS Care.* **2010**;22(9):1029–40.
94. Williams JK, Glover DA, Wyatt GE, Kisler K, Liu H, Zhang M. A sexual risk and stress reduction intervention designed for HIV-positive bisexual African American men with childhood sexual abuse histories. *Am J Public Health.* **2013**;103(8):1476–84.
95. Wimberly AS, Engstrom M, Layde M, McKay JR. A randomized trial of yoga for stress and substance use among people living with HIV in reentry. *J Subst Abuse Treat.* **2018**;94:97–104.