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Review Article

Collaborative care for common mental disorders in low- and middle-income countries: A systematic review and meta-analysis

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ABSTRACT

Background: Low- and middle-income countries (LMICs) face high burden of common mental disorders (CMDs). Most of the evidence for the Collaborative Care (CC) model effectiveness comes from high-income countries (HICs) and may not generalise to LMICs. A systematic review was conducted to assess effectiveness of CC for CMDs in LMICs.

Methods: We searched eight-databases, two trial registries (2011-November 2023). Randomised controlled trials (RCTs) of adults (≥18 years) with depression/anxiety diagnosis, reporting remission/change in symptom severity were eligible. Random effects meta-analyses were conducted for: short-(0–6 months), medium-(7–12 months), long-(13–24 months), and very long-term (≥25 months) follow-up. Quality was assessed with Cochrane RoB2 tool. PROSPERO registration: CRD42022380407.

Results: Searches identified 7494 studies, 12 trials involving 13,531 participants were included; nine had low-risk of bias. CC was more effective than usual care for depression: dichotomous outcomes (short-term, 7 studies, relative risk (RR) 1.39, 95%CI 1.31, 1.48; medium-term, 6 studies, RR 1.35, 95%CI 1.28, 1.43); and continuous outcomes (short-term, 8 studies, standardised mean difference (SMD) −0.51, 95%CI −0.80, −0.23; medium-term, 8 studies, SMD −0.59, 95%CI −1.00, −0.17). CC was found to be effective at long-term (one study), but not at very long-term. Improvement in anxiety outcomes with CC (2 studies, 340 participants) reported up to 12-months; improvements in quality-of-life were not statistically significant (3 studies, 796 participants, SMD 0.62, 95%CI −0.10, 1.34).

Limitations: Pooled estimates showed high heterogeneity.

Conclusions: In LMICs, CC was more effective than usual care for improving depression outcomes at short and medium-term follow-up. A similar improvement was found for anxiety outcomes, but evidence is limited.

1. Introduction

Common mental disorders (CMDs) including depressive and anxiety disorders affect >250 million people globally (World Health Organization, 2017). They have far reaching negative impacts, including poorer social, economic and physical health outcomes for people living with these conditions (Fryers et al., 2003; Lund et al., 2010). In terms of the global disability burden, depression and anxiety rank 1st and 6th in the world, respectively (WHO, 2017). The burden is high for both men and women, and throughout the lifespan (Santomauro et al., 2021). There is a staggering economic burden of US$ 1 trillion for the global economy each year due to lost productivity linked to these disorders (The Lancet Global Health, 2020). Furthermore, people with chronic physical illnesses are at higher risk of depression, and the presence of depression

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worsens the outcomes of chronic disorders such as cardiovascular disease and diabetes (Zavala et al., 2023; Edwards et al., 2023). This additional burden is often not accounted for in estimates of disability or economic burden (Bobo et al., 2022).

More than 80 % of people with CMDs live in low and middle-income countries (LMICs) accounting for 8.8 % of the total disease burden (Rathod et al., 2017). By 2030, depression is projected to be the third leading cause of disease burden in low-income countries, following HIV/AIDS and ischaemic heart diseases (problems caused by poor blood supply to the heart), and the second leading cause in middle-income countries after HIV/AIDS (Mathers and Loncar, 2006). Social factors, such as poverty, urbanisation, internal migration, and lifestyle changes, are moderators of this high burden in many LMICs (Lund et al., 2010).

Despite this, LMICs have struggled to give it due importance, with a lack of recognition by society and policymakers, and a failure to allocate appropriate resources. There is wide variability in the provision of care, with typically <1 % of the health budget spent on mental health (Rathod et al., 2017; Araya et al., 2018; Rojas et al., 2019). In LMICs, the mental health workforce is extremely limited compared with the global average, with the majority based in urban centres, and not accessible to most of the population (Freeman, 2022). Consequently, most LMICs share the mismatch between high need and persistent scarcity of financial resources, workforce, and infrastructure for mental health services (Alvi et al., 2023; Singla et al., n.d.). About 90 % of people needing mental health treatment do not receive it - the well documented 'mental health treatment gap' (Mackenzie and Kesner, 2016).

Collaborative Care (CC) is an integrated care model in which non-mental health specialists (e.g. in primary care or chronic disease services) receive training and supervision from mental health specialists to provide evidence-based mental health care, using a team-based approach (Gilbody et al., 2003). This 'task sharing' approach, whereby non-specialists carry out care usually delivered by specialists, helps to increase capacity and reduce reliance on mental health specialists making CC particularly appropriate for low-resource settings. It includes various components such as screening, assessment and treatment of CMD, with regular monitoring of outcomes and supervision by mental health specialists through patient case reviews, and data driven care to help deliver efficient, high quality care.

There is robust evidence that CC is effective for improving mental (and physical health) outcomes by addressing the shortage of mental health professionals. It has been recommended by the World Health Organization (WHO) for implementation in primary care and long-term physical care services (Ee et al., 2020). Although the effectiveness of CC for improving depression and anxiety outcomes is well established (Archer et al., 2012), most reviews include studies predominantly conducted in high-income countries (HICs) and may not be generalisable to LMICs.

Furthermore, a recent rapid review by Whitfield 2023 which looked at successful ingredients of different types of shared care models in LMICs, including the CC model, presented only a narrative synthesis of various structural elements highlighting the challenge associated with identifying the specific components that are required for effectiveness (Archer et al., 2012; Whitfield et al., 2023). Nevertheless, the authors report effective models sharing several structural (multi-disciplinary care team and standardised protocols for evidence based care (pharmacologic/psychological) delivery), and process-of-care elements (systematic identification of mental disorders, team-based care delivery with structured communication, and monitoring patient treatment response and a stepped-care approach to intensify treatment as required). The focus of our review is to assess the effectiveness of the CC model as a complex intervention, which would have included the structural and process-of-care elements reported to be the 'active ingredients'. Given the rise of CMD burden in LMICs, we therefore aimed to synthesise and update the evidence for the effectiveness of CC for CMDs in LMICs in order to help inform policy and practice for addressing the CMD burden in these countries.

2. Methods

We conducted the systematic review and meta-analyses following the Centre for Reviews and Dissemination (CRD) guidance (Systematic Reviews, 2009), and report the study according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

2.1. Selection criteria

Randomised controlled trials (RCTs) based in LMICs (Hamadeh et al., 2022) were included. As the aim of this review is to assess effectiveness, it is not possible to compare trials with quasi-experimental designs. Studies including adult participants with a valid diagnosis of depression and/or anxiety were eligible. Interventions which fulfilled four key CC criteria (Archer et al., 2012) were included: (1) multi-professional approach, (2) structured management plan, (3) scheduled patient follow-ups, and (4) enhanced inter-professional communication. Comparators could be usual care (UC) or enhanced usual care (EUC). Primary outcomes were change in depression and/or anxiety (remission, time to recovery or severity in symptoms). Additional outcomes included: medication use, health related quality of life (HRQoL) or patient satisfaction outcomes, and comorbid disease outcomes (Vidyasagaran et al., 2024) (details in Table 1).

2.2. Search methods

A search strategy was designed for Ovid MEDLINE and adapted for other databases by an information specialist (HF). Search terms included the following concepts: CMDs, CC, LMICs, and RCTs. No language limits were applied (full search strategy in Appendix).

The following databases were searched for studies between 2011 and 10th November 2023 (to cover the time-period after the Cochrane review searches): MEDLINE(R) ALL, Embase, PsycINFO, Cumulative Index to Nursing & Allied Health (CINAHL Plus), Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews (CDSR), Global Index Medicus, and Epistemonikos. ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform portal were also searched for relevant ongoing work.

We checked reference lists of all included studies and other similar reviews to identify additional studies.

2.3. Data analysis

2.3.1. Data extraction

Records identified by searches were deduplicated in Endnote (EndNote 20, 2013) and imported into Covidence (www.covidence.org) for title/abstract screening followed by full-text screening; both done independently by at least two reviewers. Disagreements were resolved through discussion or consulting a senior author.

Data extraction was carried out independently by at least two reviewers using an excel-based, pilot-tested, data extraction form. Dichotomous and continuous outcomes were analysed and reported separately. Outcomes were categorised as short-term (0–6 months), medium-term (7–12 months), long-term (13–24 months), and very long-term (≥25 months). These time points have been selected based on the follow-up time points commonly used in trials of interventions for management of anxiety and/or depression. For ease in interpretation, data on dichotomous depression outcomes presented in different ways, such as proportion of participants with improvement in symptoms, or remission and/or recovery from depression, were reported as 'improvement in depression symptoms'. Where studies reported more than one dichotomous outcome (improvement and remission or recovery), we included the improvement outcome for that study. We contacted authors of identified studies to request additional data, as required.

Table 1
Study selection criteria.

Criteria	Description
Types of studies	All randomised controlled trials (RCTs) including cluster RCTs (cRCT) were eligible.
Setting	Studies conducted in LMICs as defined by the World Bank (2023) (Hamadeh et al., 2022) were included. Studies could be based in any clinical setting including primary or secondary/tertiary care, including specialist clinics e.g., diabetes clinics, maternity centres.
Participants	Adults ≥18 years with a valid diagnosis of CMD, including depression (acute, chronic, persistent, remitted, subthreshold and postnatal) or anxiety (generalised anxiety, panic, post-traumatic stress disorder (PTSD), phobias, social anxiety, health anxiety and obsessive-compulsive disorder (OCD)). Diagnosis could be made by (1) physicians through routine clinical assessments (2) using Research Diagnostic Criteria (RDC), Diagnostic and Statistical Manual (DSM) or International Classification of Diseases (ICD) criteria, (3) with clinician/patient self-rated valid instruments (e.g. Patient Health Questionnaire-9 (PHQ-9), Beck Anxiety Inventory (BAI)). Studies including participants with comorbid conditions (e.g. cardiovascular disease, diabetes) were eligible.
Intervention	Interventions which fulfilled the four key CC criteria (Archer et al., 2012) were included: 1. Use of a multi-professional approach for patient care: Involving a primary care provider (e.g. general practitioner, family physician, primary care physician or a specialist providing undifferentiated medical care), and at least one other health professional (e.g. nurse, psychologist, psychiatrist, or pharmacist), or a paraprofessional. 2. A structured management plan: Organised approach to patient care provision (evidence-based guidelines/protocols, management including either or both non-pharmacological interventions (e.g. counselling, cognitive behaviour therapy (CBT)), and pharmacological interventions (e.g. antidepressant medication). 3. Scheduled patient follow-up: Telephone, or in-person appointments for review/monitoring purposes. 4. Enhanced inter-professional communication: Sharing medical records, case conferences, meetings etc.) to facilitate communication between various professionals involved in provision of care.
Comparator	Comparators could be usual care (UC) or enhanced usual care (EUC). UC was defined as care routinely provided in the service to patients with CMD (e.g. referral to mental health teams). EUC was defined as patients having access to enhanced care systems (other than the CC components), such as consultation-liaison psychiatry referrals, case reviews, care provider receiving didactic training, manualised treatment algorithms, guidelines or other educational materials for CMD care. Although such care may have included elements associated with CC, unless it included all the four key CC criteria, it was considered as EUC.
Outcomes	The primary outcomes were change in depression and/or anxiety (remission, time to recovery or severity in symptoms). Additional outcomes included: • Medication use for depression and/or anxiety, reported as either proportion of patients using medication, proportions meeting predefined levels of use, or proportions with 'appropriate' use according to guidelines. • Health-related quality of life (QoL) outcomes, social functioning, and patient satisfaction assessed using validated measures. • Comorbid disease outcomes e.g. medication adherence, adverse events, and cost of treatment (out-of-pocket expenditure for direct non-medical costs such as participant time spent travelling to and attending appointments, and indirect costs such as lost productivity associated with illness or premature mortality).

2.3.2. Quality assessment

Quality was appraised using Cochrane risk-of-bias 2 (RoB2) tool (Higgins et al., 2023) for individually randomised or cluster RCTs, as appropriate for each study's primary outcome by at least two reviewers, with consensus reached through discussion, where needed. Reporting bias was assessed through funnel plots to test for asymmetry indicating either publication bias, poor methodological quality, or heterogeneity; and Egger's test for small study effects (Egger et al., 1997).

2.3.3. Data synthesis

For included studies, study characteristics and risk of bias for the primary outcome were summarised in a table. Meta-analyses were conducted in Stata (version 17) (StataCorp, 2021) using random effects models, for studies reporting changes in depression and/or anxiety outcomes either as dichotomous or continuous outcomes. A standardised effect size, based on risk ratios (RR) was presented with 95 % confidence interval (CI) for dichotomous outcomes; and standardised mean difference (SMD) was calculated for continuous measures along with 95 % CI. We also performed pre-defined meta-analyses for secondary outcomes (medication use, QoL, comorbid disease outcomes) where sufficient data to allow pooling were available.

To explore heterogeneity, assessed using the I^2 statistic (Deeks et al., 2022), we conducted subgroup analyses based on: (1) presence of comorbid diseases; (2) use of lay/community health workers as part of the intervention delivery team; (3) use of pharmacological and/or psychological interventions; and (4) region (Asia, Africa, South America). Sensitivity analyses were also performed by removing low quality studies to examine effect on pooled estimates.

The review was registered with PROSPERO CRD42022380407.

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3. Results

3.1. Characteristics of included studies

The electronic searches identified 17,002 references. After removing duplicates, 7301 titles and abstracts were screened. Full texts of 102 studies, and one record identified through citation searching were assessed for eligibility, leading to 12 individual trials (16 reports) (Patel et al., 2010; Pillai et al., 2021; Chen et al., 2015; Oladeji et al., 2015; Adewuya et al., 2019; Ali et al., 2020; Kemp et al., 2022; Emmert-Fees et al., 2023; Suvada et al., 2023; Gureje et al., 2019a,b; Petersen et al., 2021; Chen et al., 2022; Scazufca et al., 2022; Srinivasan et al., 2022; Wagner et al., 2023) being included (Fig. 1).

The 12 RCTs involved 13,531 participants (Table 2). Six trials were conducted in Africa (Nigeria (n = 4) (Oladeji et al., 2015; Adewuya et al., 2019; Gureje et al., 2019a,b), South Africa (n = 1) (Petersen et al., 2021), Uganda (n = 1)) (Wagner et al., 2023); five in Asia (China (n = 2) (Chen et al., 2015, 2022) and India (n = 3)) (Patel et al., 2010; Ali et al., 2020; Srinivasan et al., 2022); and one in South America (Brazil (n = 1) (Scazufca et al., 2022) (Fig. 2)). Eleven (Chen et al., 2015; Oladeji et al., 2015; Adewuya et al., 2019; Ali et al., 2020; Gureje et al., 2019a,b; Petersen et al., 2021; Chen et al., 2022; Scazufca et al., 2022; Srinivasan et al., 2022; Wagner et al., 2023) comparisons used cluster randomisation with ten reporting primary care centres as the unit of randomisation, and one using whole township (Chen et al., 2022).

All studies were conducted in adult populations (18+ years). One study included participants <60 years of age (Adewuya et al., 2019), one study used eligibility criteria of at least 35 years age (Ali et al., 2020), and three others included participants over 60 years age only (Chen et al., 2015, 2022; Scazufca et al., 2022). All studies included men and women, except two studies (Gureje et al., 2019a; Wagner et al., 2023) which recruited only women participants to assess postnatal depression.

All studies included participants that met diagnostic criteria for major depressive disorder, and two (Gureje et al., 2019a; Wagner et al., 2023) included postnatal depression exclusively. Two studies (Kemp et al., 2022; Scazufca et al., 2022) additionally reported anxiety disorder, and one included a composite measure the Clinical Interview Schedule-Revised (CIS-R) for CMD (Patel et al., 2010). Seven studies reported a comorbidity such as diabetes (n = 1) (Ali et al., 2020), cardiovascular conditions (n = 2) (Petersen et al., 2021; Chen et al., 2022) or both (n = 2) (Scazufca et al., 2022; Srinivasan et al., 2022), HIV (n = 1) (Wagner et al., 2023), and other chronic illnesses (n = 1) (Srinivasan et al., 2022).

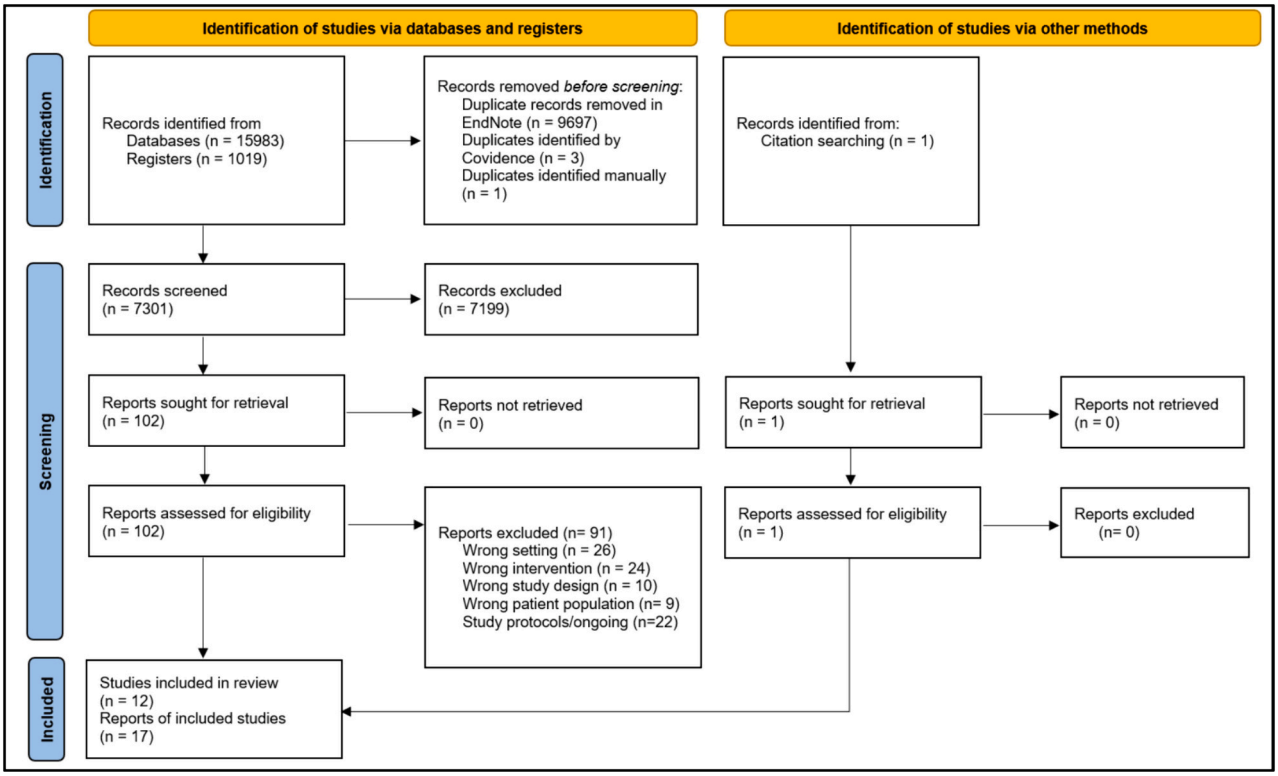

Fig. 1. PRISMA Flowchart of study selection.

Details of the collaborative care components in each study are presented in Table 1 in the Appendix.

All interventions included the following:

- A multi-professional approach: Teams included a health care provider (physician/doctor), and at least one other health professional such as a nurse (n = 9) (Chen et al., 2015; Oladeji et al., 2015; Adewuya et al., 2019; Gureje et al., 2019b; Petersen et al., 2021; Chen et al., 2022; Scazufca et al., 2022; Srinivasan et al., 2022; Wagner et al., 2023), primary maternal care provider (n = 1) (Gureje et al., 2019a), psychiatrist (n = 9) (Patel et al., 2010; Chen et al., 2015; Oladeji et al., 2015; Chen et al., 2022; Ali et al., 2020; Gureje et al., 2019a,b; Srinivasan et al., 2022; Wagner et al., 2023), psychologist (n = 1) (Petersen et al., 2021), diabetologist (n = 1) (Ali et al., 2020), and contributions from other health workers such as community/lay health worker/extension community health worker/aging worker/peer mothers (n = 8) (Patel et al., 2010; Oladeji et al., 2015; Gureje et al., 2019b; Petersen et al., 2021; Chen et al., 2022; Scazufca et al., 2022; Srinivasan et al., 2022; Wagner et al., 2023); and other allied health professionals such as dieticians/social workers (n = 1) (Ali et al., 2020) and pharmacist (n = 1) (Srinivasan et al., 2022).
- A structured management plan: A structured approach to patient care was used through evidence-based medication algorithms and protocol driven psychological interventions (e.g. behavioural activation, problem-solving therapy, psychosocial counselling). Nine studies (Patel et al., 2010; Oladeji et al., 2015; Adewuya et al., 2019; Ali et al., 2020; Gureje et al., 2019a,b; Petersen et al., 2021; Srinivasan et al., 2022; Wagner et al., 2023) included both pharmacological interventions and psychotherapy whereas two (Chen et al., 2015, 2022) used only pharmacotherapy and one (Scazufca et al., 2022) psychotherapy only.
- Scheduled patient follow-up: These could be by telephone or in-person. In three studies (Patel et al., 2010; Chen et al., 2015; Adewuya et al., 2019), the intervention lasted 4 months or less, nine studies (Oladeji et al., 2015; Adewuya et al., 2019; Ali et al., 2020; Gureje et al., 2019a,b; Petersen et al., 2021; Scazufca et al., 2022; Srinivasan et al., 2022; Wagner et al., 2023) reported intervention duration to be >4 months.
- Enhanced inter-professional communication: Mechanisms to enhance communication between the professionals involved in patient care included regular team meetings and patient-specific case reviews.

Nine studies (Patel et al., 2010; Chen et al., 2015; Oladeji et al., 2015; Adewuya et al., 2019; Gureje et al., 2019a,b; Chen et al., 2022; Scazufca et al., 2022; Srinivasan et al., 2022) compared CC with enhanced usual care (EUC), which included interventions (also provided in the CC arm), such as education on the recognition and management of depression and anxiety symptoms, or notification of the patient's depression status to the health care providers. In three studies (Ali et al., 2020; Petersen et al., 2021; Wagner et al., 2023) the comparison was with usual care (UC). The term UC is used here on to describe the comparison group, whether it included EUC or UC. Details of CC intervention in each study are presented in Table 1 in Appendix.

Six studies (Patel et al., 2010; Oladeji et al., 2015; Gureje et al., 2019a,b; Petersen et al., 2021; Wagner et al., 2023) reported conducting fidelity assessment of the intervention delivery using various approaches such as direct observations (Patel et al., 2010; Gureje et al., 2019b), questionnaires (Oladeji et al., 2015), checklists (Gureje et al., 2019b; Wagner et al., 2023), session transcripts (Patel et al., 2010), review of activity logs (Gureje et al., 2019a) and clinical records (Patel et al., 2010; Gureje et al., 2019a; Wagner et al., 2023), and interviews with the staff members (Patel et al., 2010; Petersen et al., 2021). Only four studies presented their findings for the fidelity assessment, with two studies reported high fidelity (Patel et al., 2010; Gureje et al., 2019a) and the other two (Chen et al., 2015; Petersen et al., 2021) reported moderate to good adherence to protocol.

Table 2
Characteristics of included studies.

Study details	Type of study, country	Setting	Participants	Outcomes	Risk of bias for primary outcome
Patel et al. (2010) Pillai et al. (2021) (Follow-up of Patel 2010 for secondary outcomes)	Cluster RCT India	Primary care, public and private	Clusters: Total 24 with 12 assigned to intervention and 12 to control group N: Total participants 2796; intervention 1.360, control 1436 Gender: 82 % female Age (mean (SD)): 46.3 y (13.3) Condition: CMD	Primary outcome: 1) Proportion of depression cases who recover at 6 months measured with revised CIS-R CC: $n = 142$ (53.6 %) UC: $n = 216$ (50.4 %) RR: 1·05 (95 % CI 0·81, 1·36) Secondary outcome: Proportions for: 1) Antidepressant prescription CC: 44.3 % UC: 49.9 % OR: 0.87 (95 % CI 0.40, 1.87) 2) Antidepressant compliance (at least 1-month adherence) CC: 66.8 % UC: 31.1 % OR: 6.10 (95 % CI 3.67, 10.14)	Low
Chen et al. (2015)	Cluster RCT China	Primary care	Clusters: Total 16 with 8 assigned to intervention and 8 to control group N: Total participants 326; intervention 164, control 162 Gender: 63 % female in intervention and 64 % in control group Age (median (IQR)): 70y (60–90) in intervention and 70y (60–89) in control group Condition: Depression	Primary outcome: 1) Proportion of patients who achieved: i) Response to depression (≥50 % reduction in HAMD score) at 3 months (RR 0.62, 95 % CI 0.54, 0.72); 6 months (RR: 0.47, 95 % CI 0.38, 0.59), and 12 months (RR: 0.46, 95 % CI 0.34, 0.62). ii) Remission (HAMD total score < 7) at 3 months (RR: 0.81, 95 % CI 0.75, 0.88), 6 months (RR: 0.71, 95 % CI 0.63, 0.81) and 12 months (RR: 0.47, 95 % CI 0.37, 0.58). 2) Change in HAMD mean (SD) score at 3 months (CC: 9.3 (3.5), UC: 16.1 (4.3), SMD: −1.73 (95 % CI −1.45, −2.00), 6 months (CC: 8.0 (3.0), UC: 14.1 (4.9), SMD: −1.51, 95 % CI −1.80, −1.22), and 12 months (CC: 6.1 (2.6), UC: 12.6 (5.2), SMD: −1.59, 95 % CI −1.90, −1.29) Secondary outcomes: 1) QoL using SF-12 at 12 months (SMD: 1.25, 95 % CI 0.96, 1.54). 2) Patient satisfaction using CSQ-8 at 12 months (SMD: 0.6, 95 % CI 0.5, 0.7).	High
Oladeji et al. (2015)	Cluster RCT Nigeria	Primary care	Clusters: Total 6 with 3 assigned to intervention and 3 to control group N: Total participants 234; intervention 165, control 69 Gender: 80.6 % female in intervention and 79.7 % female in control group Age (mean (SD)): 43.2 y (15.3) in intervention and 43.1 y (18.9) in control group Condition: Depression	Primary outcome: 1) Improvement in depression (50 % reduction or ≤ 5 on 9-item (PHQ-9) presented as mean scores (SD) CC: 4.1 (4.4) UC: 5.5 (5.2) SMD: −0.30, 95 % CI −0.60, −0.00 Secondary outcome: 1) Changes in WHOQOL score presented as mean (SD) CC: 85.5 (12.9) UC: 78.2 (11.5) SMD: 0.59, 95 % CI 0.28, 0.89	Low
Adewuya et al. (2019)	Cluster RCT Nigeria	Primary care	Clusters: Total 10 with 5 assigned to intervention and 5 to control group N: Total participants 907; intervention 456, control 451 Gender: 52.9 % females Age (mean (SD)): 34.3 y (11.9) Condition: Depression	Primary outcome: 1) Recovery (PHQ-9 score < 6) at 12 months follow up CC: $n = 275$ (60.9 %) UC: $n = 82$ (18.2 %) RR: 3.32 (95 % CI 2.69, 4.09) 2) Recovery (PHQ-9 score < 6) at 4 months (CC: $n = 197$ (43.2 %), UC: $n = 108$ (23.9 %), RR 1.80, 95 % CI 1.48, 2.19), and 6 months (CC; $n = 249$ (54.6 %), UC: $n = 118$ (26.2 %), RR 2.08, 95 % CI 1.75, 2.49) follow up Secondary outcome:	Low

(*continued on next page*)

Table 2 (*continued*)

Study details	Type of study, country	Setting	Participants	Outcomes	Risk of bias for primary outcome
				1) Good QoL at 12 months (WHOQOL overall score > 3) (CC: *n* = 225 (49.3 %), UC: n = 36 (8.0 %), RR 6.18, 95 % CI 4.46, 8.57) 2) Good adherence in the intervention group at 12 months: psychotherapy (PST-PC) *n* = 82 (52.2 %) vs antidepressant use *n* = 188 (62.9 %), RR: 0.83, 95 % CI 0.70, 0.99).	
Ali et al. (2020) (INDEPENDENT trial)	Individual RCT India	Primary care (urban diabetes clinics)	N: Total 404 participants randomised with 196 in intervention and 208 in control group. Gender: 59.1 % female Age (mean (SD)): 52.7 (8.6) years Condition: Depression, diabetes	Primary outcome: 1) 50 % improvement in SCL-20 scores at 12 months (CC: *n* = 137 (71.5 %), UC: *n* = 92 (45.8 %), RR 1.57, 95 % CI 1.31, 1.87), and 24 months (CC: *n* = 144 (77.7 %), UC: *n* = 123 (63.6 %), RR 1.22, 95 % CI 1.07, 1.39), 2) Mean changes in SCL-20 at 12 months (CC: 0.52 (SD 0.38), UC: 0.82 (SD 0.54), SMD: −0.64, 95 % CI −0.84, −0.44), and 24 months (CC: 0.39 (SD 0.27), UC: 0.53 (SD 0.37), SMD: −0.43, 95 % CI −0.63, −0.23). Secondary outcome: 1) Proportion of patients receiving antidepressant medication at 12 months (CC: *n* = 33 (17.3 %), UC: n = 11 (5.6 %), RR: 3.16, 95 % CI 1.64, 6.07). 2) Adverse events for CC vs UC at 24 months followup (CVD events or hospitalisations: *n* = 4 (2.0 %) vs 7 3.4 %), stroke *n* = 0 vs 3 (1.4 %), Deaths n = 2 (1.0 %) vs 7 (3.4 %), and severe hypoglycemia n = 8 (4.1 % vs 0)	Low
Kemp et al. (2022) (INDEPENDENT trial)			N = Total 192 participants with at least moderate anxiety symptoms, with 82 in intervention and 90 in control group. Age (mean (SD)): 52.3 y (8.4) Gender: 69.2 % female Condition: General Anxiety Disorder (GAD) in people with comorbid depression and diabetes	Primary outcome: 1) Proportions with reduction in anxiety symptoms (changing by 6 or more points from baseline) at: 6 months (CC: 48.4 % (SE 5.3 %), UC: 30.0 % (SE 4.6 %), RD: 0.17 (SE 0.07) 12 months (CC: 65.7 % (SE 5.1 %), UC 41.4 % (SE 5.0 %), RD: 0.23 (SE 0.07) 18 months (CC: 79.6 % (SE 4.5 %), UC: 65.7 % (SE 4.8 %), RD: 0.13 (SE 0.07) 24 months (CC: 85.6 % (SE 4.1 %), UC: 86.7 % (SE 3.6 %), RD: −0.02 (SE 0.05)	
Emmert-Fees et al. (2023) (INDEPENDENT trial)			Number of participants, gender, age and condition same as that reported for Ali 2020	Secondary outcome: 1) Health related quality of data was collected at 24 months follow-up and presented as s QALY metric (mean, 95 % CI): INR 0.084 (0.015 to 0.152) 2) Costs (mean, 95 % CI) at 24 months related to: i) Formal health sector costs- health care utilisation (outpatient visits and care, in patient visits and care and medication costs): INR 3926 (1881 to 5971) or $: 194.6 (93.3 to 296.0) ii) Informal health sector costs: food and transportation INR: 147.0 (−77.6 to 371.6) or $7.29 (−3.85 to 18.4) iii) Time costs: escort time costs for inpatient and/or outpatient visits, patient time costs for diabetes care INR 808.6(−367.6 to 1985) or $ 40.1 (−18.2 to 98.4) iv) Lost productivity due to outpatient care INR 468.0 (−537.4 to 1474) or $ 23.2 (−26.6 to 73.0)	
Suvada et al. (2023) (INDEPENDENT trial)			N: At 36 months, 331 total participants with 164 in intervention and 167 in control group Age (mean): 52.9 y	Primary outcome: 1) 50 % improvement in SCL-20 scores at 36 months CC: *n* = 164 (75.9 %), UC: *n* = 167 (74.2 %)	

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Table 2 (*continued*)

Study details	Type of study, country	Setting	Participants	Outcomes	Risk of bias for primary outcome
			Condition: Depression, diabetes	RR: 1.02, 95 % CI 0.90, 1.15) 2) Mean changes in SCL-20 at 36 months CC: 0.41 (SD 0.32) UC: 0.43 (SD 0.33) SMD: −0.06, 95 % CI −0.28, 0.16).	
Gureje et al. (2019a) (EXPONATE)	Cluster RCT Nigeria	Primary care, maternal	Clusters: Total 29 maternal care clinic clusters, with 14 assigned to intervention and 15 to control group. N: Total 686 participants, with 452 in intervention and 234 in control group. Gender: 100 % female Age (mean (SD)): 24.7 y (5.7) Condition: Depression (post-partum)	Primary outcomes: 1) Remission from depression EPDS score < 6) at 6 months postpartum CC: *n* = 267 (70.5 %) UC: *n* = 131 (66.5 %) RR: 1.06, 95 % CI 0.94, 1.19 2) Depressive symptoms (as shown by EPDS score over the follow-up period) at 6 months (CC: 3.70 (SD 4.10), UC: 4.50 (4.40), SMD: −0.19, 95 % CI: −0.36, −0.02), and 12 months (CC: 3.50 (SD 3.90), UC: 4.60 (4.60), SMD: −0.27, 95 % CI −0.45, −0.09).	Low
Gureje et al. (2019b) (STEPCARE)	Cluster RCT Nigeria	Primary care	Clusters: Total 35 primary care clinics, with 18 assigned to intervention and 17 to control group. N: Total 1178 participants, with 631 in the intervention and 547 in control group. Gender: 83 % female Age (mean (SD): 50.2 y (15) in intervention and 44 y (14.5) in control group Condition: Depression	Primary outcome: 1) Proportion of patients who had remission of depression (PHQ-9 score < 6) at 12 months 2) Depression symptoms as mean PHQ-9 scores at 6 months (CC: 3.80 (SD 4.10), UC: 4.30 (SD 4.50), SMD: −0.12, 95 % CI −0.24, 0.01), and 12 months (CC: 3.60 (SD 4.90), UC 3.50 (SD 3.90), SMD: 0.02, 95 % CI −0.10, 0.14) Secondary outcome: 1) Proportion of participants prescribed antidepressant medication CC: *n* = 76 (11.9 %) UC: n = 144 (32.1 %) RR: 0.37, 95 % CI 0.29, 0.48	Low
Petersen et al. (2021)	Cluster RCT South Africa	Primary care	Clusters: Total 20 primary care clinics with 10 assigned to intervention and 10 to control group. N: Total participants 1043, with 504 in intervention and 539 in control group. Gender: 85 % female in intervention and 79 % in control group Age (mean (SD)): 54 y (11) in intervention and 55 y (11) in control group Condition: Depression, hypertension	Primary outcome: 1) 50 % improvement in PHQ-9 score at 6 months CC: *n* = 275 (60 %) UC: *n* = 232 (42 %) RR: 1.28, 95 % CI 1.13, 1.44). 2) 50 % improvement in PHQ-9 score at 12 months CC: *n* = 249 (56 %) UC: *n* = 271 (56 %) RR: 1.01, 95 % CI 0.90, 1.13) 3) Difference in mean PHQ-9 scores at 6 months (CC: 7 (SD 5), UC: 7 (SD 5), SMD: 0.0, 95 % CI −0.13, 0.13), and 12 months (CC: 6 (SD 5), UC: 7 (SD 5), SMD: −0.20, 95 % CI −0.33, −0.07) 4) Remission of depression symptoms (PHQ-9 score of ≤5) at 12 months CC: *n* = 196 (44 %) UC: *n* = 197 (41 %) RR: 1.05, 95 % CI 0.65, 1.69). 5) PHQ-9 recovery (score of ≤5) at both 6 months and 12 months CC: *n* = 103/448 (23 %) UC: 118/495 (24 %) RR: 0.92, 95 % CI: 0.41, 2.07). Secondary outcome: 1) Adverse events: i) Mortality CC: n = 13 (2.6 %) UC: n = 10 (1.9 %) RD: 0.01, 95 % CI −0.01, 0.03) ii) Number with a hospitalisation CC: *n* = 20 (4	Low

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Table 2 (*continued*)

Study details	Type of study, country	Setting	Participants	Outcomes	Risk of bias for primary outcome
				%) UC: 34 (6.3 %) RD: −0.02, 95 % CI −0.05, 0.01) 2) Antidepressant medication use at any time point CC: 4/504 (0.8 %) UC: 14/539 (2.6 %) RR: 0.31, 95 % CI 0.10, 0.92)	
Chen et al. (2022)	Cluster RCT China	Primary care	Clusters: Total 10 townships (including all villages and associated rural primary care clinics), with 5 townships assigned to intervention, and 5 townships assigned to control group. N: Total 2365, with 1232 in the intervention and 1133 in control group. Gender: 67 % female Age (mean (SD): 74.46 y (8.23). Condition: Depression	Primary outcome: 1) Change in depression symptom severity (HAMD mean scores) At 6 months: CC: 15.63 (SD 5.02), UC: 19.58 (4.64), SMD: −0.82 (95 % CI −0.90, −0.73) At 12 months: CC: 12.69 (SD 4.22), UC: 18.77 (SD 4.67), SMD: −1.37 (95 % CI −1.46, −1.28). Secondary outcome: 1) Proportion of patients who agreed to take antidepressant medication (intervention group) 714/1232 (58 %)	Some concerns
Scazufca et al. (2022)	Cluster RCT Brazil	Primary care	Clusters: Total 10 primary care clinics randomised with 5 in intervention and 5 in control group. N: Total 715, with 360 in intervention and 355 in control group. Gender: 73.6 % females Age: for the whole sample not reported. Condition: Depression, Anxiety Diabetes, Hypertension	Primary outcome: 1) Proportion of participants recovered from depression (PHQ-9 score of <10) at 12 months: CC: 115/193 (59.6 %) UC: 77/188 (41 %) 2. Changes in anxiety (GAD-7) scores at 12 months: CC: 7.62 (SD 6.04), UC: 9.09 (SD 6.45), SMD: −0.24 (95 % CI −0.44, −0.03). 2). Changes in depression symptomatology as mean PHQ-9 scores at 12 months: CC: 9.32 (SD 7.28), UC: 11.56 (SD 6.92), SMD: −0.32 (95 % CI −0.52, −0.11) Secondary outcome: 1) Changes in mean QoL scores (EQ-5D-5L) at 12 months: CC: 0.82 (SD 0.20), UC: 0.81 (SD 0.16), SMD: 0.05 (−0.15, 0.25) 2) Adverse events at 12 months: Hospitalisations (n %): CC: 33 (9.2 %), UC: 36 (10.1 %) Death (n %): CC: 16 (4.4 %), UC: 9 (2.5 %)	Low
Srinivasan et al. (2022)	Cluster RCT India	Primary care	Clusters: Total 49 PHCs were randomised with 24 PHCs allocated to intervention and 25 PHCs in the control group. N: Total 2486 with 1222 in intervention and 1264 in the control group. Gender: 75 % females Age (mean (SD): 59.2y (Rathod et al., 2017). Condition: Depression, Diabetes, Hypertension, Hyperlipidemia, Angina	Primary outcome: 1) Severity of depression (assessed with PHQ-9 mean scores) At 6 months: CC: 4.81 (SD 2.98) UC: 6.13 (SD 3.42) SMD: −0.41 (95 % CI −0.51, −0.32) At 12 months: CC: 4.22 (2.65) UC: 5.23 (2.71) SMD: −0.38 (95 % CI −0.47, −0.28) Secondary outcome: 1). Medication use (n %): At 6 months: CC: 223/857 (26 %), UC: 10/800 (1.3 %) RR: 22.19 (95 % CI 11.86, 41.52) At 12 months: CC: 252/916 (27.5 %), UC: 10/853 (1.2 %) RR: 23.47 (95 % CI 12.56, 43.84)	Low

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Table 2 (*continued*)

Study details	Type of study, country	Setting	Participants	Outcomes	Risk of bias for primary outcome
Wagner et al. (2023)	Cluster RCT Uganda	Primary care, maternal	Clusters: Total 8 ANC clinics randomised with 4 allocated to intervention and 4 to control group. N: Total 391 with $n = 191$ in intervention and $n = 200$ in control group. Gender: All females Age (mean SD): 27.5y (5.9) Condition: Postpartum depression, HIV	Primary outcome: 1) Improvement in clinical depression at 2 months postpartum CC: 152/187 (81.3 %) UC: 93/185 (51.3 %) RR: 1.62 (95 % CI 1.38, 1.90) Secondary outcome: 1) Changes in mean PHQ-9 scores at 2 months postpartum: CC: 5.6 (SD 4.1), UC: 10 (SD 6.1), SMD: −0.85 (95 % CI −1.06, −0.64) 2) Medication adherence (n %): CC: 182/191 (95.2 %) UC: 182/200 (90.8 %) RR: 0.52 (95 % CI 0.24, 1.13)	High

CC: Collaborative care arm; CIS-R: Clinical Interview Schedule-Revised; CMD: Common Mental Disorder; CSQ-8: Client Satisfaction Questionnaire- 8 item; EPDS: Edinburgh Postnatal Depression Scale; GAD-7: Generalized Anxiety Disorder- 7 item; HAMD: Hamilton Rating Scale for Depression; INR: Indian Rupee; OR: Odds Ratio; PHQ-9: Patient Health Questionnaire-9 item; QALY: Quality Adjusted Life Years; RD: Risk Difference; RR: Risk Ratios; SD: SFH- Short-Form Health survey; Standard Deviation; SMD: Standardised Mean Difference; SCL-20: Symptoms Checklist Depression Scale- 20 item; UC: Usual Care arm; WHOQoL: WHO Quality of Life.

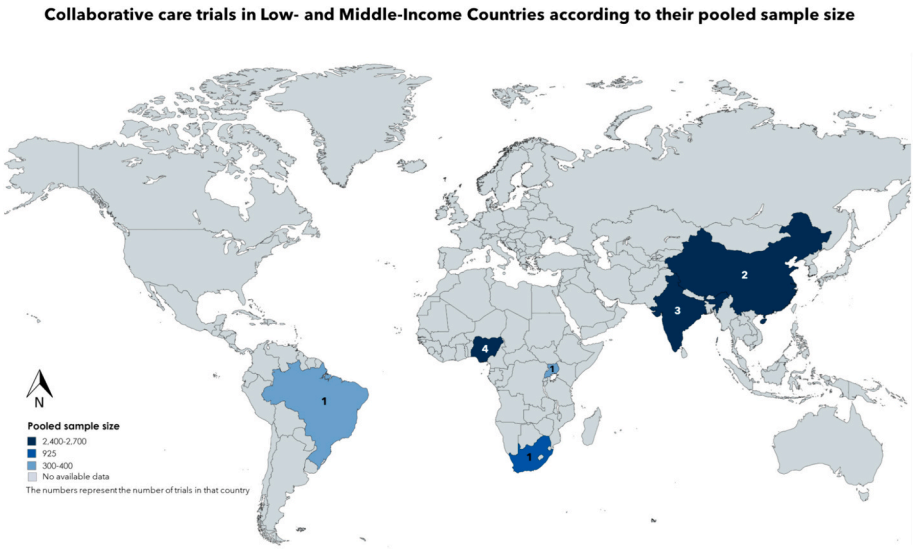

Fig. 2. Distribution of trials conducted in low- and middle-income countries.

3.2. Effects of interventions

3.2.1. Primary outcomes

3.2.1.1. Depression outcomes

3.2.1.1.1. Short term (0–6 months). Short-term dichotomous outcomes (including remission and improvement in symptoms) were reported in seven studies ($N = 3916$). CC was significantly more effective than UC (RR 1.39, 95 % CI 1.31 to 1.48, I^2 91.8 %) (Fig. 3).

Eight studies reported short-term continuous outcomes ($N = 7359$); again, CC was found to be significantly more effective than UC (SMD −0.51, 95 % CI −0.80 to −0.23, I^2 96.9 %) (Fig. 4).

3.2.1.1.2. Medium term (7 to 12 months). CC was also found to be more effective than usual care for depression outcomes in the medium -term (6 studies reporting dichotomous outcomes, $N = 3874$; RR 1.35, 95 % CI 1.28 to 1.43, I^2 97.6 % (Fig. 3) and 8 studies reporting continuous outcomes, $N = 7622$; SMD −0.59, 95 % CI −1.00 to −0.17, I^2 98.6 %) (Fig. 4).

3.2.1.1.3. Long term (13 to 24 months). Long term outcomes for CC compared with UC were reported in one study (Ali et al., 2020) ($N = 378$). CC was significantly more effective than UC for both dichotomous (RR 1.22 95 % CI 1.07 to 1.39) (Fig. 3) and continuous outcomes (SMD −0.43, 95 % CI −0.63 to −0.23) (Fig. 4).

3.2.1.1.4. Very long term (>25 months). Very long term dichotomous and continuous outcomes for CC versus UC were reported for one trial (Suvada et al., 2023) ($N = 331$), as a post-hoc analysis, and at this follow up point, CC was not found to be more effective than UC (RR 1.02, 95 % CI 0.90 to 1.15; SMD −0.06, 95 % CI −0.28 to 0.16) (Figs. 3 & 4).

3.2.1.2. Anxiety outcomes.

Only two studies reported anxiety outcomes and due to differences in outcome reporting, they could not be pooled. CC was reported to be effective for improving anxiety symptoms by Scazufca et al. (2022) at 12 months follow-up (SMD −0.24, 95 % CI −0.44 to −0.03). Kemp et al. (2022) in a follow-up of the INDEPENDENT trial, reported a reduction in anxiety symptoms for CC compared with usual care at 6 months (Risk Difference (RD) 17 % (SE 7 %), $p =$

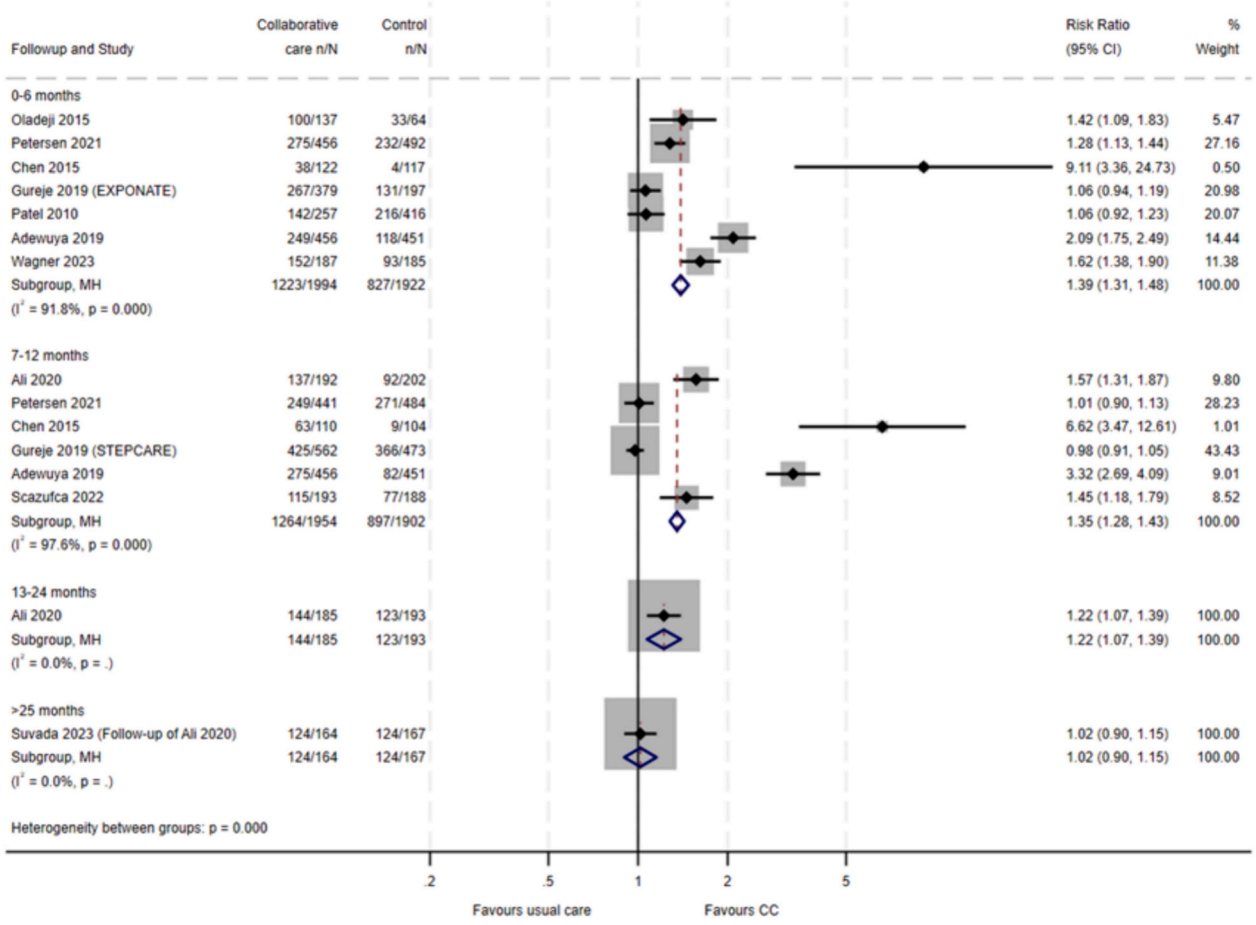

Fig. 3. Forest plot of comparison between collaborative care and control group (usual/enhanced usual care) for improvement in depression symptoms reported as dichotomous outcome.

0.019) and 12 months follow-up (RD 23 % (SE 7 %), $p = 0.002$); however the difference was not significant at longer follow-up of 24 months (RD -2 % (SE 5 %), $p = 0.68$).

3.2.2. Additional outcomes

3.2.2.1. Medication use. Eight studies reported antidepressant medication use at any time point for both CC and control group. There was no significant difference evident (RR 1.07, 95 % CI 1.00 to 1.13; six studies, $N = 7472$) (Fig. 1 in Appendix). One study (Chen et al., 2022) did not include antidepressant medication as part of usual care and another did not report antidepressant use for the usual care arm (Adewuya et al., 2019).

No studies reported medication use for anxiety symptoms.

3.2.2.2. Quality of life (QoL) and patient satisfaction. Five studies reported on QoL, findings of only three studies could be pooled using their longest follow-up. CC appeared to improve QoL but was not statistically significant (SMD 0.62, 95 % CI −0.10, 1.34, I^2 95.5 %; 3 studies, $N = 796$) (Fig. 2 in Appendix). The two remaining studies also reported improvement in QoL for the CC group, as proportions of participants with good QoL (RR 6.18, 95 % CI 4.46, 8.57) (Adewuya et al., 2019), and Quality Adjusted Life Years (QALYs) gained (0.084, 95 % CI 0.015, 0.152) (Emmert-Fees et al., 2023).

Only one study reported patient satisfaction assessed using the client satisfaction questionnaire (CSQ-8), with significant difference in favour of the CC group (SMD 0.6, 95 % CI 0.5, 0.7) (Chen et al., 2015).

3.2.2.3. Comorbid disease outcomes. For studies reporting comorbid conditions, costs were reported by only one trial for comorbid diabetes (Emmert-Fees et al., 2023). The between-group differences for costs related to healthcare utilisation (formal health sector costs) were higher for patients in the CC group (Int'l-$194.6, 95 % CI 93.3–296.0), particularly because of outpatient care. Informal health sector costs such as time costs (Int'l-$40.1, 18.2 to 98.4), and lost productivity (Int'l-$23.2, 95 % CI 26.7 to 73.0) in the CC group were also slightly higher, driven by outpatient care. The study reported a 56.4 % probability of cost-effectiveness per quality-adjusted life-years (QALYs).

Data on adverse events collected in studies of populations with a comorbid condition were reported in two studies. Although there were fewer adverse events such as mortality and hospitalisation reported for CC compared with UC in a study of participants with comorbid hypertension, the difference was not significant (RR 1.39, 95 % CI 0.61 to 3.14, and RR 0.63, 95 % CI 0.37 to 1.08 respectively; $N = 1043$) (Petersen et al., 2021). Similarly, no difference was found in a study including participants with comorbid diabetes, in the number of deaths (RR 0.30, 95 % CI 0.06 to 1.42; $N = 404$), and hospitalisations (RR 7.30, 95 % CI 0.38 to 140.39; N = 404) (Ali et al., 2020).

3.2.2.4. Subgroup and sensitivity analysis. Based on subgroup analysis, CC was effective for management of depression even in the presence of chronic communicable (RR 1.62, 95 % CI 1.38, 1.90) or non-communicable illnesses (RR 1.14, 95 % CI 1.05, 1.24); when lay health workers were a part of the team (RR 1.11; 95 % CI 1.06, 1.17), whether CC included pharmacological (RR 6.62, 95 % CI 3.47, 12.61) or psychological interventions (RR 1.45, 95 % CI 1.18, 1.79), or a

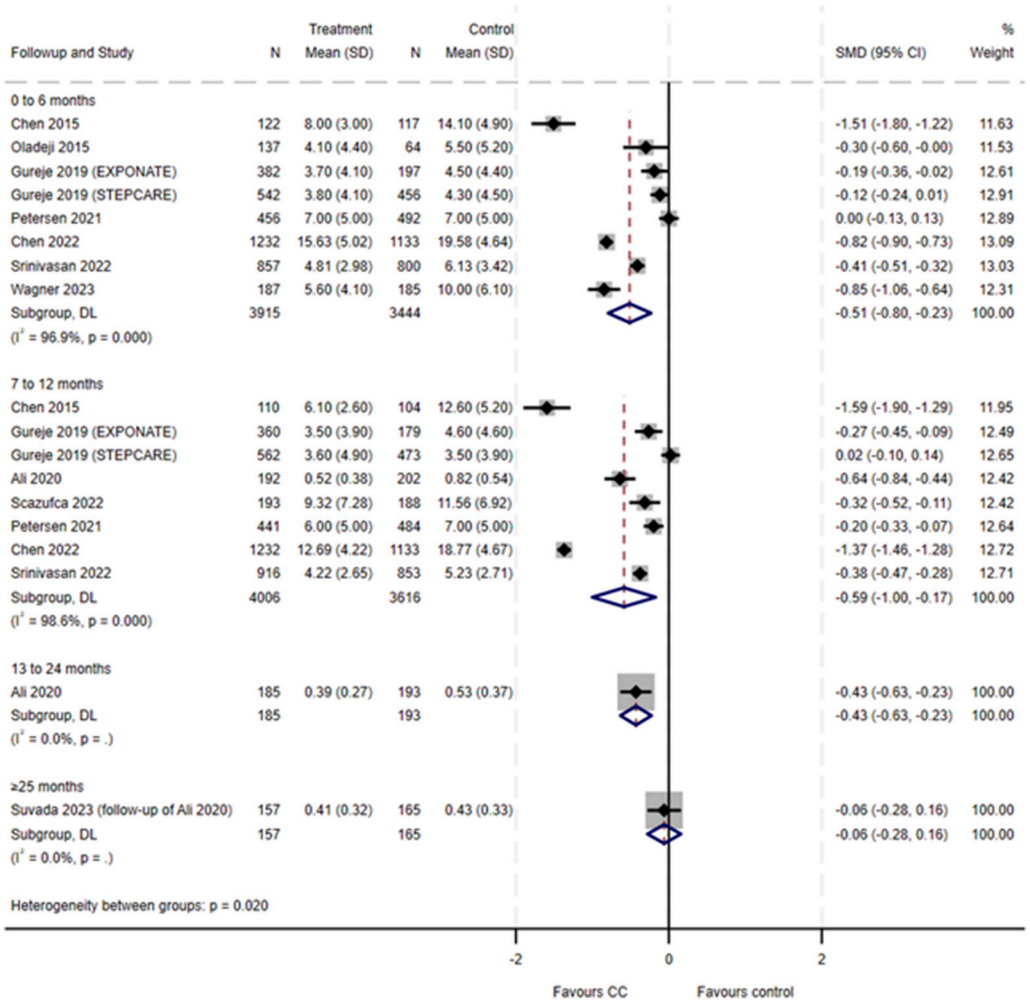

Fig. 4. Forest plot for comparison between collaborative care and control group (usual/enhanced usual) care for changes in mean scores of depression symptoms.

combination of both (RR 1.23, 95 % CI 1.18, 1.29) and for trials conducted in various primary care settings of LMICs globally (Africa: RR 1.26, 95 % CI 1.20, 1.32; Asia: RR 1.30, 95 % CI 1.18, 1.44; South America: RR 1.45, 95 % CI 1.18, 1.79). However, there was considerable heterogeneity seen in the results (Figs. 3–6 in Appendix for dichotomous outcomes; Figs. 11–14 for continuous outcomes).

Results for the primary analysis of the effects of CC compared with UC on dichotomous depression outcomes were not markedly changed when a low quality study was removed from the analysis in a sensitivity analysis (RR 1.32, 95 % CI 1.23 to 1.41; 5 studies; $N = 3305$ at 6 months, and (RR 1.30, 95 % CI 1.23 to 1.37; 5 studies; $N = 3642$ at 7–12 months follow up; Fig. 7 in Appendix).

In contrast, for continuous depression outcomes, the effect was reduced and no longer statistically significant at 6 months (SMD −0.18, 95 % CI −0.38, 0.02, 4 studies, $N = 4182$). The pooled estimate for the difference at 7–12 months follow-up was also reduced (SMD −0.29, 95 % CI −0.46 to −0.12; 6 studies; $N = 5043$) but remained statistically significant (Fig. 8 in Appendix).

3.3. Quality assessment

Nine studies (Patel et al., 2010; Oladeji et al., 2015; Adewuya et al., 2019; Ali et al., 2020; Gureje et al., 2019a,b; Petersen et al., 2021; Scazufca et al., 2022; Srinivasan et al., 2022) were rated as having a low risk of bias whereas one study (Chen et al., 2022) had some concerns mostly pertaining to imbalance in baseline characteristics between the groups which was not controlled for in the analysis. Two studies were rated as having a high risk of bias (Chen et al., 2015; Wagner et al., 2023).

Both the funnel plot (Fig. 9 in Appendix) and Egger's test indicated a risk of publication bias for dichotomous outcomes (beta1: 7.36, z = 2.52, $p = 0.012$). For continuous depression outcomes, there was a suggestion of publication bias based on funnel plot asymmetry (Fig. 10 in Appendix) but Egger's test result for small study effects was not significant (beta1: −3.03, z = −0.67, $p = 0.50$).

4. Discussion

4.1. Summary of main results

We summarised evidence from 12 trials conducted in LMICs to assess the effectiveness of CC for depression and anxiety disorders. Two of the included studies were conducted in older adults (Chen et al., 2015, 2022) and two included women in the perinatal period (Gureje et al., 2019a; Wagner et al., 2023). All the studies reported a higher percentage of women participants which is in line with the evidence regarding a higher prevalence of depression in women (Albert, 2015). CC was found to be more effective than UC/EUC for improving depression outcomes (both dichotomous and continuous) at short- (0–6 months), medium- (7–12 months) and long-term (24 months) follow up. Based on one post-hoc analysis (Suvada et al., 2023), the effect was not sustained at very long term follow up (>25 months). Given that in the real-world setting,

many healthcare facilities might not have any mental health support, the effectiveness of CC is likely to be greater.

We found two studies on the effectiveness of CC for anxiety reduction (Kemp et al., 2022; Scazufca et al., 2022), both reporting CC to be more effective than UC/EUC up to 12 months. Among the secondary outcomes, CC was not significantly more effective than UC/EUC for increasing medication use (Pillai et al., 2021; Ali et al., 2020; Gureje et al., 2019b; Petersen et al., 2021; Srinivasan et al., 2022; Wagner et al., 2023). For QoL, the pooled estimate based on three studies showed that CC was not significantly more effective than UC/EUC (Chen et al., 2015; Oladeji et al., 2015; Scazufca et al., 2022).

Based on the recommended outcomes in a recently developed core outcome set for multimorbidity trials (COSMOS) (Vidyasagaran et al., 2024), in the subset of studies including participants with a comorbid chronic condition, we additionally examined costs of CC. Only one study reported the costs, indicating CC incurred higher formal and informal costs (Emmert-Fees et al., 2023). However, in terms of DALYs, it reported a high probability that CC was cost-effective compared to UC.

4.2. Interpretation of findings in context

The effectiveness of CC for depression and anxiety outcomes are in line with what has been previously reported (Archer et al., 2012; van Straten et al., 2015; Muntingh et al., 2016), but our results are based on trials conducted in LMICs across three continents (Africa, Asia, and South America), highlighting the usefulness of the approach in diverse, resource-constrained settings. An earlier Cochrane review (Archer et al., 2012) found more studies (from HICs) that reported outcomes at long and very-long follow-ups, which they were able to pool. In contrast, we found only one study that reported these longer-term outcomes for depression (Suvada et al., 2023), which did not allow pooling. This lack of longer-term outcomes among studies based in LMICs has also been highlighted by a recent rapid review with narrative synthesis (Whitfield et al., 2023).

Archer et al. (2012) also reported pooled evidence of benefit in secondary outcomes (antidepressant use, and QoL), which did not reach statistical significance in our analyses. Overall, we found fewer studies reporting these outcomes. Antidepressant medication was reported at different time points and often it was not clear at which follow-up period it was assessed. For QoL, given the variability in measurement and reporting of outcomes, it was not possible to pool findings from all included studies.

The finding from our subgroup analyses (Appendix Fig. 3), that CC was effective for depression in the presence of chronic communicable or non-communicable illnesses is important given the high prevalence of mental and physical multimorbidity. This finding is also supported by a previous meta-regression (Coventry et al., 2014). However, in that study, in the multivariable model, only psychological interventions (alone or with medication) remained a statistically significant predictor of improvements in depressive outcomes, compared with those studies that included medication management alone. Whilst we did not conduct a meta-regression, our overall findings of effectiveness of CC when either pharmacotherapy, psychological therapy, or a combination of both is used (Appendix Fig. 5), supports patients' preference for the type of treatment, allowing for more patient-centred care.

Given the complexity of the CC model, it is difficult to unpick the particular elements that act as the 'active ingredient', and how these may have influenced the reported effect sizes in the individual studies (Archer et al., 2012; Whitfield et al., 2023). However, one aspect of the CC model that has been suggested as the key to effective collaborative care is the case management, usually undertaken by an assigned case manager. The case manager works closely with the other team members and is responsible for delivering psychological support and proactively following-up patients to monitor progress, treatment adherence and any change in treatment if required (Archer et al., 2012).

4.3. Strengths and weaknesses of the study

The strengths of our review include using a comprehensive search strategy, searching databases more likely to index LMIC studies, with no language limits. The majority of included trials were also of high methodological quality. Limitations include high levels of heterogeneity encountered in the meta-analyses, likely arising from differences in contexts, participants (including those with comorbid conditions), and CC interventions, as evident in our subgroup analyses. There was also indication of publication bias and 'small study effect', although the asymmetry in the funnel plot might be due to true heterogeneity in the included studies (Sterne et al., 2011).

4.4. Implications for clinicians, policymakers, and research

As is the case for HICs, we report pooled evidence from LMICs supporting the use of CC models of care for the treatment of depression. Our results suggest that models could use both psychotherapy and pharmacotherapy, and can incorporate a task sharing approach, including training lay or community workers without reducing effectiveness in various LMIC contexts. Only half of the included studies reported gathering data on fidelity of intervention delivery with only four reporting the results which ranged from moderate to good or high fidelity. Fidelity assessments can help to develop an understanding of which intervention components were more or less effective and therefore should be reported as part of trial results.

Despite the high burden of CMDs in LMICs, the number of trials conducted to test effectiveness of CC is remarkably low compared with HIC. Future studies should focus on the effectiveness of CC for anxiety outcomes, reporting fidelity of the intervention delivery, QoL outcomes, cost-effectiveness, and gathering data on strategies to implement the approach.

5. Conclusion

This review indicates that in LMIC settings, CC is more effective than UC in adults for improving depression and anxiety disorders, although the evidence for the latter is limited. Future work to support efforts to implement CC in real world low-resource settings should include estimates of its cost-effectiveness.

CRediT authorship contribution statement

Mehreen Riaz Faisal: Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Fakiha Tus Salam:** Writing – review & editing, Writing – original draft, Data curation. **Aishwarya Lakshmi Vidyasagaran:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Claire Carswell:** Writing – review & editing, Data curation. **Mohammad Wali Naseri:** Writing – review & editing, Data curation. **Zalmai Shinwari:** Writing – review & editing, Data curation. **Helen Fulbright:** Writing – review & editing, Data curation. **Gerardo A. Zavala:** Writing – review & editing, Visualization. **Simon Gilbody:** Writing – review & editing, Supervision, Conceptualization. **Najma Siddiqi:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing interests that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2024.07.086.

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