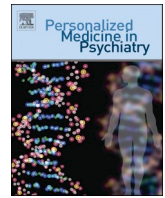




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# Personalized Medicine in Psychiatry

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## Effectiveness of stepped care for mental health disorders: An umbrella review of meta-analyses

Anthony Jeitani<sup>a</sup>, Paul P. Fahey<sup>b,c</sup>, Michael Gascoigne<sup>a,c</sup>, Abha Darnal<sup>b</sup>, David Lim<sup>c,d,\*</sup>

<sup>a</sup> School of Psychology, Western Sydney University, Australia

<sup>b</sup> School of Health Sciences, Western Sydney University, Australia

<sup>c</sup> Translational Health Research Institute, Western Sydney University, Australia

<sup>d</sup> Centre for Improving Palliative, Aged and Chronic Care Through Clinical Research and Translation, University of Technology Sydney, Australia

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### ABSTRACT

**Background:** Stepped care offers patients the least intensive intervention required for their mental health needs, with advancements to more intensive treatments as necessary. This umbrella review synthesized existing meta-analyses on the effectiveness of stepped care for mental health disorders.

**Methods:** PubMed, Embase, Web of Science Core Collection, and PsycINFO were systematically searched for published meta-analyses on the effectiveness of stepped care for mental health disorders since the databases' inception until August 2023. Protocol was preregistered with PROSPERO (CRD42023461710) and followed the JBI umbrella review methodology.

**Results:** Ten systematic reviews incorporating 38 primary studies on depression, anxiety and posttraumatic stress disorder were the source of data. In spite of the different models of stepped care, the treatment appeared to improve depression response (3–6 months RR = 1.52 [1.30, 1.78];  $I^2 = 74\%$ , N = 14. 9–12 months RR = 1.47 [1.23, 1.77],  $I^2 = 80\%$ , N = 13) and remission rate (4–6 months RR = 1.57 [1.30, 1.90];  $I^2 = 79\%$ , N = 14. 12 months RR = 1.60 [1.23, 2.07];  $I^2 = 94\%$ , N = 13) as well as anxiety (post-treatment SMD = -0.29 [-0.48, -0.10];  $I^2 = 0\%$ , N = 3. 12 months SMD = -0.57 [-0.53, -0.06];  $I^2 = 37\%$ , N = 2).

**Limitations:** Systematic reviews without meta-analyses and reviews published in languages other than English were not accounted for in this umbrella review.

**Conclusions:** Our results support the implementation of stepped care, particularly for the pooled effectiveness in depression treatment.

### Introduction

It was estimated that one in every eight people is living with some form of mental health disorder, and this number is projected to increase rapidly [1]. The burden of mental health challenges is a growing concern worldwide; not only will it cost trillions of dollars to the world economy over the coming decades, but it holds ongoing consequences for individuals and society, including difficulties with schooling or employment, reduced quality of life, increased the complexity in how care is delivered, and it may possibly further widen the equity gap [2–6]. Timely and effective treatment for mental health disorders is essential to mitigate this burden of illness. There are many efficacious psychotherapy treatments for mental disorders, often used before or in conjunction

with pharmacological treatment. Despite the effectiveness of pharmacological and psychological interventions, some people with mental disorders receive no or suboptimal treatment, often due to difficulties in accessing care [7–9]. Haaga [10] outlined how a 'stepped care' approach to mental health issues could maximise the effectiveness and efficiency of mental health services by systematically organising the provision of treatment on an 'as needed' basis.

In a stepped care model, treatments are arranged in a hierarchy ranging from low-intensity (such as self-help or group therapy) to high-intensity (such as specialised or multidisciplinary intervention). Bower and Gilbody [11] defined two core features of a stepped care model: least restrictive and self-correcting. The former posits that individuals receive the least intensive 'step' needed to address their concerns. In

\* Corresponding author at: THRI, Western Sydney University, Locked Bag 1797, Penrith, NSW 2751, Australia.

E-mail addresses: [22032668@student.westernsydney.edu.au](mailto:22032668@student.westernsydney.edu.au) (A. Jeitani), [p.fahey@westernsydney.edu.au](mailto:p.fahey@westernsydney.edu.au) (P.P. Fahey), [m.gascoigne@westernsydney.edu.au](mailto:m.gascoigne@westernsydney.edu.au) (M. Gascoigne), [david.lim@westernsydney.edu.au](mailto:david.lim@westernsydney.edu.au) (D. Lim).

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addition to being lower intensity, this step is often considered more cost-effective and less time-consuming [12–14]. Self-correcting denotes the tenet that individuals are systematically monitored (through validated symptom checklists, for example) as to whether they need to either increase or decrease the intensity of the intervention received (i.e., stepping-up or stepping-down, respectively) based on specific pre-defined criteria, such as their clinical response to intervention, the severity of their symptoms, or changes in risk/need. When incorporating these two features, different stepped care models are developed. A pure or progressive stepped care model is one in which almost all patients begin at the lowest level of care [15]. Whilst in a stratified stepped care model, delegation to a level of therapy within the stepped hierarchy is based on an initial assessment. In practice, the distinction between whether a model is progressive or stratified is often not made [15]. Another version of stepped care is a model in which treatments are sequential but not organised by intensity. For instance, they may vary in type (psychological or pharmacological) or modality (e.g., cognitive behaviour therapy or interpersonal psychotherapy), wherein intensity levels are difficult to discern. In this context, stepped care is defined by the potential for patients to switch or add treatments and is termed ‘adaptive care’ [13]. In addition, other healthcare models, such as the collaborative care model (in which a ‘case manager’ coordinates primary and secondary care for a patient), can also be ‘stepped’ [16].

Currently, the concept of stepped care is widely adopted. The National Institute for Health and Care Excellence recommends a stepped care approach to primary health care for depression, generalised anxiety disorder, panic disorder, post-traumatic stress disorder (PTSD), obsessive-compulsive disorder, and body dysmorphic disorder [17]. Since 2008, the National Health Service Talking Therapies for anxiety and depression stepped care (formerly known as the Improving Access to Psychological Therapies) has been implemented in the United Kingdom [18], with similar programs subsequently implemented in other countries including Australia [19], Ireland [20], Norway [21], Spain [22] and France [23]. In the United States, the American Psychiatric Association recommends a collaborative care model incorporating elements of stepped care [24]. Stepped care models have been implemented in communities, schools, and public or private mental healthcare services [24–26].

In theory, Meeuwissen [26] posits that stepped care meets patient needs at the micro-level, ensures efficiency and standardised practice in healthcare systems at the *meso*-level, and supports population health and resource allocation at the macro-level. Of these, the micro-level (i.e., meeting patient needs) is foundational and arguably most clinically crucial for supporting the implementation of stepped care. Questions regarding the effectiveness of stepped care at the micro-level include whether it is suitable for the prevention and treatment of mental health issues, how much it reduces symptoms (i.e., treatment response), how many people show a notable reduction in symptoms (i.e., response rate), and how many people no longer meet diagnosable or clinical levels (i.e., remission rate).

To synthesise the effectiveness of stepped care, systematic reviews and *meta*-analyses were conducted to combine study results to produce increasingly accurate estimates of the effectiveness of stepped care in mental ill health [12,18,27,28]. As the number of *meta*-analyses increases and the models of stepped care become increasingly diverse, there is a need to synthesise the *meta*-analyses inductively into one overarching umbrella review to inform decision-making, practice, guidelines and policy. An umbrella review could offer a broad perspective onstepped caremodels.

The main research question guiding this umbrella review was as follows: what is the effectiveness of stepped care in mental health conditions?

## Methods

### Research design and methods

The umbrella review followed the JBI methodology for umbrella reviews [29] based on an a priori protocol registered with PROSPERO (CRD42023461710).

### Data source and searches

A systematic search of PubMed (NLM), Embase (Ovid), Web of Science Core Collection (Clarivate), and PsycINFO (APA) was conducted, with the last search performed on 30th August 2023. Search terms included “mental disorder”, “mental illness”, “mental health”, “psychiatr\*”, majority of mental disorders listed in the Diagnostic and Statistical Manual of Mental Disorders (version III-R, IV, 5, or 5-TR) or International Classification of Disease (version ICPM, 9, 9-CM, 10, 10-CM, 10-CA, or 11), and various stepped care-related models (e.g., “stepped care”, “adaptive care”, “tiered treatment”, “matched care”, “treatment model”, “sequential treatment”, “collaborative care”). These terms and, where available, Subject Headings for “mental disorders” were combined. The search terms were modified to account for the terms employed in the first trench of included papers (July 2023). Searches were restricted to systematic reviews with *meta*-analyses and published in the English language since the inception of the respective databases. A manual search of the first 200 results on Google Scholar was also performed to identify potential additional studies. The reference list of each included paper was screened for additional papers. (See Additional File 1 for the search terms employed).

### Eligibility criteria

Systematic reviews were included if they had at least one *meta*-analysis of studies that met the following criteria: (a) participants had a diagnosed or clinically significant mental health disorder (or risk of developing a disorder in prevention studies), assessed by standard diagnostic criteria, diagnostic interviews, or standardized measures; (b) the intervention group received stepped care (i.e., an intervention with at least two explicit and pre-defined steps wherein individuals move to a more intense treatment according to a pre-specified criteria); (c) intervention was compared to a comparison group in a clinical trial setting; and (d) mental health outcomes reported were incidence (i.e., the proportion of people in prevention studies who develop a diagnosis or score above clinical cut-offs for specific outcome measures), treatment response (i.e., change in scores on standardized measures), response rate (i.e., the proportion of patients who show a predetermined percentage decrease in an outcome measure score), and/or remission rates (i.e., the proportion of patients who show an absence of symptoms or score below the clinical cut-offs for the specific outcome measures).

### Data abstraction

All citations identified through searches were uploaded into systematic review management software, Covidence Review (Veritas Health Innovation, Melbourne, Australia), and duplicates were removed. Three reviewers (AJ, AD and DL) collaboratively screened titles and abstracts against the inclusion criteria. Full texts of potentially relevant papers were then collaboratively reviewed against the inclusion criteria by two reviewers (AJ and DL). Reasons for the exclusion of full-text articles that did not meet the inclusion criteria were recorded and reported in a Preferred Reporting Items for Systematic Reviews and *Meta*-analyses (PRISMA) flow diagram [30]. Systematic reviews that contain the same primary studies were still included and were explicitly mentioned below. Systematic reviews that did not contain a *meta*-analysis were excluded.

Study quality

Three reviewers (AJ, AD and DL) independently appraised the methodological quality of each included systematic review using the 11-item JBI critical appraisal instrument [31]. Reviewers then met to discuss the independent quality appraisal; all initial disagreements were resolved through discussion. DL, PF and MG graded the certainty of the evidence against the GRADE criteria [32] and levels of recommendation for umbrella review [33].

Data synthesis and analysis

Two reviewers (AJ and AD) independently extracted data from the

included systematic reviews using the JBI data extraction tool, with all disagreements resolved through discussion. The data extracted included specific details about the review methods, populations, and outcomes of significance (e.g., effect sizes, confidence intervals, p-values, heterogeneity). Data extracted were audited (50 %) by the supervising author (DL). Relevant outcomes are reported in narrative form.

Where permitted by the available data reported in the included systematic reviews, we pooled results from individual studies with compatible outcome data using random effects meta-analyses. In this study, only categorical variables (response rates and remission rates) had sufficient data to warrant meta-analysis. Results are presented as pooled relative risks with associated confidence intervals and p-values. Heterogeneity between studies is reported as I<sup>2</sup> statistics and p-values.

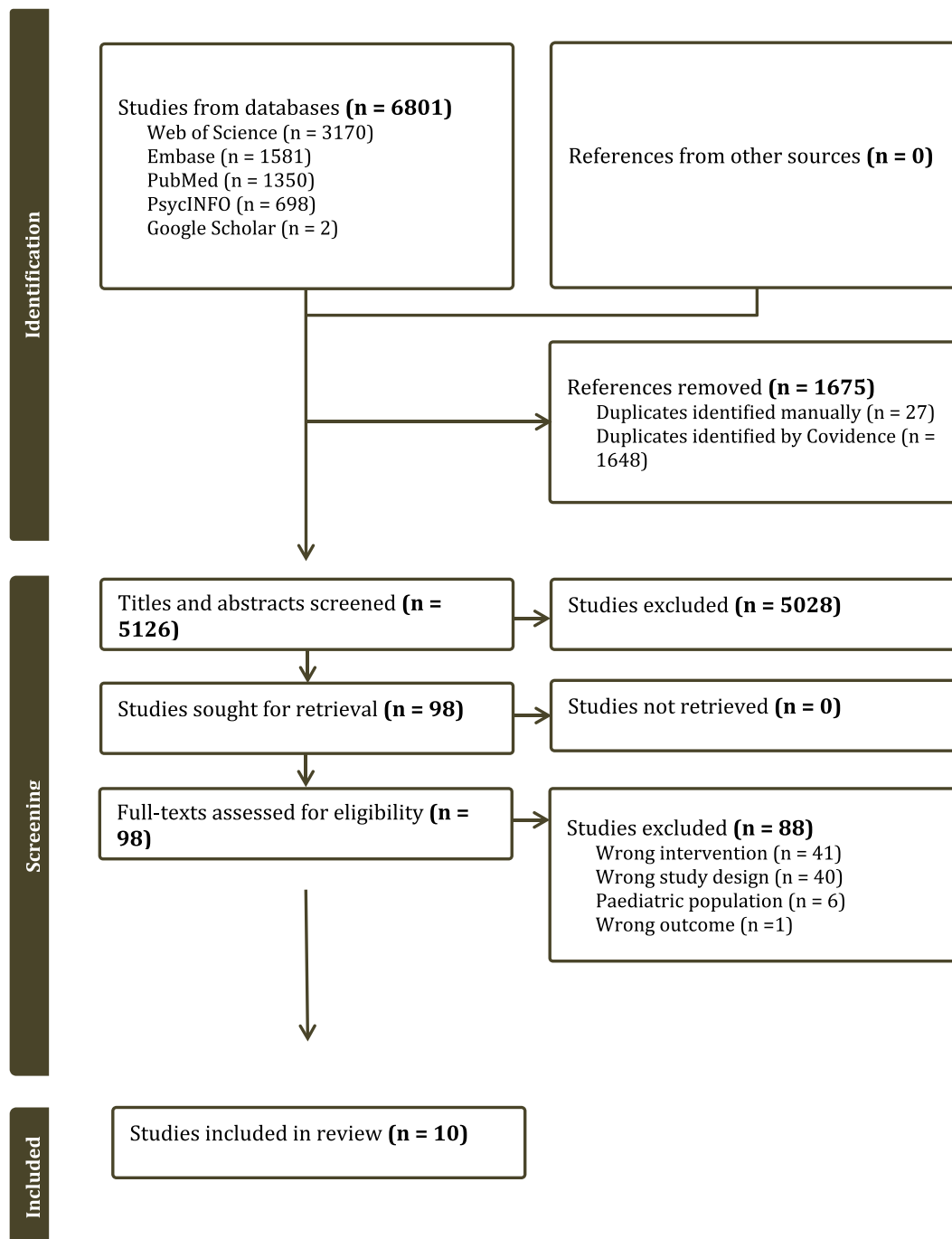


Fig. 1. PRISMA flow diagram detailing the search and review process.

from the Chi-square test for heterogeneity. Following the Cochrane Handbook [32], we viewed  $I^2$  between 50 % and 90 % as of having potentially substantial heterogeneity. Analyses were completed using RStudio version 4.3.1 using the metafor package [34].

## Results

### Study selection

The literature search produced 6,801 records, from which 1,675 duplicates were removed. After exclusions of 5,028 non-relevant titles and abstracts, 98 full texts were reviewed, and 88 of these were excluded. Ten systematic reviews were included. A flowchart of this screening process is depicted in Fig. 1 below.

**Table 1**  
Characteristics of included systematic reviews. PTSD: posttraumatic stress disorder.

Systematic Review	Databases searched (date range)	Years of included studies	Types of included studies	Total participants	Range of mean age (in years)	Countries of included studies	Mental health disorder
Atlantis, Fahey [36]	PubMed, Scopus, Cochrane Library, CINAHL, Health Source Nursing, MEDLINE, PsycINFO	2004–2013	Treatment: 7 RCTs [41–47]	1,895	54 to 71	USA [6], Australia [1]	Depression
Gehring, Freytag [40]	Inception to August 2013 Medline, Embase, PsycINFO, Cochrane Central Register of Controlled Trials, CINAHL	2010–2017	Treatment: 4 RCTs in 5 papers [48–52]	774	31.2 to 43.5	USA [4]	PTSD
Van Straten, Hill [28]	Inception to November 2016 PubMed, PsycINFO, EMBASE, Cochrane Central Register of Controlled Trials	2002–2013	Prevention: 3 RCTs [53–55] Treatment: 11 RCTs [43,46,56–64]	Prevention: 491 Treatment: 4,703	Not Reported	Netherlands [6], USA [6], Chile [1], India [1]	Depression
Hill [35]	Inception to April 2012 PubMed, PsycINFO, EMBASE, Cochrane Central Register of Controlled Trials	2002–2015	Prevention: 5 RCTs [53–55,65,66] Treatment: 16 trials [43,46,56–64,67–71]	Prevention: 996 Treatment: 5,368	Not Reported	USA [6], The Netherlands [9], The Netherlands and Belgium [1], UK [1], Chile [1], India [1], Nigeria [1], Hong Kong [1]	Depression
Ho, Yeung [12]	January 2012 onwards (no end date specified; included studies from previous search) Cochrane Central Register of Controlled Trials, PubMed, PsycINFO, CINAHL Plus, ProQuest Dissertations & Theses	2009–2014	Prevention: 4 RCTs across 6 papers [53–55,66,72,73] Treatment: 4 trials [39,64,67,74]	Prevention: 731 Treatment: 448	33.9 to 84.4	Treatment: The Netherlands [3], Not reported [1] Prevention: The Netherlands [3], Hong Kong [1]	Depression and/or Anxiety
Huang, Wei [37]	Inception to April 2015 Medline, Embase, Cochrane library, PsycINFO	2004–2011	Treatment: 8 RCTs [41,42,46,47,75–77]	2,238	57 to 70	USA [8]	Depression
Muntingh, van der Feltz-Cornelis [39]	Inception to March 2013 PubMed (Medline), PsycINFO, Embase, Cochrane Central Register of Controlled Trials, CINAHL	2001–2014	Treatment: 7 trials [39,51,67,78–81]	2,015	Not Reported	USA [4], The Netherlands [2], Germany [1]	Anxiety
Rivero-Santana, Perestelo-Perez [27]	Inception to March 2014 Medline, Embase, CINAHL, PsycINFO, Cochrane Central Register of Controlled Trials, Scopus, NHS-EED, EconLit	2002–2019	Treatment: 18 trials as 19 papers [16,56–58,63,67,69,82–93]	8,152	29.1 to 80.0	The Netherlands [5], USA [5], Nigeria [3], Chile [1], India [1], Italy [1], Germany [1], Spain [1]	Depression
Roberts and Nixon [14]	Inception to January 2020 PsycINFO, Medline (PubMed), PTSDpubs, Cochrane Central Register of Controlled Trials	2004–2021	Prevention: 8 trials across 9 papers [94–102] Treatment: 4 RCTs [48,50,103,104]	Prevention: 1,415 Treatment: 800	5.0 to 47.4	Prevention: USA [7], Australia [1] Treatment: USA [4]	PTSD
Wang, Hu [38]	Inception to June 2022 Embase, Scopus, PubMed, Cochrane, PsycINFO, CINAHL	1999–2017	Treatment: 12 RCTs [41–43,46,47,76,105–110]	3,109	Not Reported	USA [10], Canada [1], India [1]	Depression

### Characteristics of included systematic reviews

The ten included systematic reviews were published between 2013 and 2023 (see Table 1). These included 71 primary papers (see Additional File 2). The dissertation by Hill [35] included two systematic reviews: one published as a research article [28] and the other only available in the published thesis, which contained additional primary studies. Seven systematic reviews reported on depression [12,27,28,35–38], two on anxiety [12,39] and two on PTSD [14,40]. Two reviews included meta-analyses on prevention [12,14], seven on treatment response [12,27,28,35,36,39,40], four on response rates [27,37,38], and two on remission rates [27,37]; see Table 2 for summary of the meta-analyses.

**Table 2**

Summary of review findings. CAPS: Clinician Administered PTSD Scale; CBT: cognitive behavior therapy; CESD: Center for Epidemiological Studies Depression scale; EMDR: eye movement desensitization and reprocessing psychotherapy; HADS-A: Hospital Anxiety and Depression Scale, Anxiety subscale; IPT: interpersonal psychotherapy; NET: neuro emotional technique; OR: Odds ratio; PCL-C: PTSD Checklist, Civilian version; PTSD: posttraumatic stress disorder; RR: relative risk; SE: standard error; SMD: standardized mean difference.

Outcomes	Author	Findings	Heterogeneity	Conclusion	Stepped Care Content
Prevention – anxiety/depression	Ho, Yeung [12]	OR = 0.75 [0.41, 1.38], p = 0.36	45 %; N = 3 [54,55,66]	Chance of developing anxiety/depression in stepped care group not statistically different to usual care group at immediate post-treatment	Consists of four steps: watchful waiting as first step, self-help as second step, psychotherapy as third step, and referral to specialist as fourth step. Stepped-up approach if symptoms severity measured by CESD or HADS-A deteriorated.
Prevention – PTSD	Roberts and Nixon [14]	SMD = –0.24 [–0.52, 0.04], p = 0.10	71 %; N = 5 [94,95,97,99,101]	Chance of developing PTSD in stepped care group not statistically different to usual care group	Hospital setting. Consists of two to three treatment steps. Case management or self-guided therapies via workbook or online material was the common first step; followed by inclusion of motivational interviewing, behavioural activation, anxiety reduction, 2–4 sessions of CBT, or psychoeducation where required based on demonstration of emotion dysregulation, deterioration of HADS/CAPS and PCL-C, or discussion with treating team.
Depression – treatment response	Rivero-Santana, Perestelo-Perez [27]	3–6 months: g = –0.25 [–0.40, –0.10], p < 0.001 9–12 months: g = –0.21 [–0.40, –0.03], p = 0.02	86 %; N = 12 [16,56–58,69,82,84,85,87,88,90,92,93] 90 %; N = 11 [16,56,57,82,84–88,90,92]	Favoured stepped care over in reduction of depression symptoms, especially subgroup with higher depression severity (g = –0.34 [–0.53, –0.16]; I <sup>2</sup> = 86 %)	Included all studies that employed stepped care least intensive intervention approach for depression. Stepped-up includes psychotherapy, individual/ group/computerised CBT, IPT, behavioural activation, couple therapy, brief psychodynamic therapy, and/or mindfulness.
	Van Straten, Hill [28]	2–4 months: d = 0.57 [0.21, 0.94], p-value not reported 6 months: d = 0.34 [0.20, 0.48], p-value not reported 9–12 months: d = 0.43 [0.20, 0.65], p-value not reported	84 %; N = 4 (included papers not explicitly stated) 68 %; N = 10 [43,46,56–58,60–64] 75 %; N = 5 (included papers not explicitly stated)	Combined depression outcomes post-intervention favoured stepped care over usual care (d = 0.38 [0.18, 0.57]; I <sup>2</sup> = 82 %, N = 10). Sub-group analysis by country: US (d = 0.38 [0.29, 0.46]; I <sup>2</sup> = 0 %, N = 6), Netherlands (d = 0.18 [–0.22, 0.58]; I <sup>2</sup> = 34 %, N = 2). Sub-group analysis including physical co-morbidity (d = 0.32 [0.19, 0.44]; I <sup>2</sup> = 0 %, N = 5) and without physical co-morbidity (d = 0.35 [0.09, 0.62]; I <sup>2</sup> = 84 %, N = 5).	Stepped care models must include psychological therapy and more than one psychological treatment of different intensities or modality. Treatments did not have to be organized in hierarchy of low to high intensity. Included models of care where patients were specifically diagnosed with depression or presence of symptoms, as well as included studies that included co-morbidity; regardless of setting.
Depression – response rate	Hill [35]	3–4 months: d = 0.69 [0.46, 0.93], p-value not reported 6–9 months: months (d = 0.36 [0.23, 0.49]), p-value not reported 12–18 months (d = 0.40 [0.20, 0.61], p-value not reported)	38 %; N = 4 [56,58,63,67] 61 %; N = 11 [43,46,56–58,60–63,67,69] 68 %; N = 6 [43,46,56,62,63,67]	Author concluded that “primary analyses showed that stepped care had a moderate effect on depressive symptoms among patients with depression ... Secondary analyses found that stepped care had a moderate effect on depressive symptoms in patients with common mental health problems that included but were not limited to depression” (p.122)	Same definition as the above published manuscript.
	Rivero-Santana, Perestelo-Perez [27]	3–6 months: RR = 1.47 [1.23, 1.75], p < 0.001 9–12 months: RR = 1.49 [1.16, 1.93], p = 0.002	83 %; N = 10 [56,58,63,67,69,84,85,88,90,92] 80 %; N = 9 [16,56,63,67,84,85,88,90,92]	6-month pooled result across subgroup with mild/moderate/moderately severe/severe depression symptoms favoured stepped care (46.6 % vs. 30.2 %; RR = 1.47). Authors reported that two primary studies accounted for all the heterogeneity, and excluding the two primary studies marginally decreased the RR to 1.36 [1.25, 1.48].	See above
	Huang, Wei [37]	6 months: RR = 1.64 [1.28, 1.98], p = 0.09 12 months: RR =	54 %; N = 4 [44,46,76,77] 52 %; N = 4 [44,46,76,77]	Favoured stepped care over usual care.	Depression with co-morbidity diabetes. Primary health care setting. Structured stepped care

(continued on next page)

Table 2 (continued)

Outcomes	Author	Findings	Heterogeneity	Conclusion	Stepped Care Content
		1.42 [1.14, 1.76], p = 0.10			based on management plan developed in collaboration with patients.
	Wang, Hu [38]	24 months: RR = 1.25 [1.13, 1.39], p-value not reported	18 %; N = 2 [43,76]	Favoured stepped care over usual care.	Depression with co-morbidity diabetes. Primary health care setting. Structured stepped care based on management plan developed in collaboration with patients.
Depression – remission rate	Rivero-Santana, Perestelo-Perez [27]	4–6 months: RR = 1.63 [1.31, 2.02], p < 0.001 12 months: RR = 1.70 [1.20, 2.42], p = 0.003	83 %; N = 11 [56,58,63,67,83–85,88–90] 96 %; N = 11 [16,56,57,63,67,83–85,87,90]	Favoured stepped care model in terms of remission (38.3 % vs. 25.0 %; RR = 1.63). Similar effect at 12-months. Sub-group analysis of studies with higher than average baseline severity, the effect of stepped care was even more pronounced (RR = 1.90 [1.27, 2.83]; I <sup>2</sup> = 94 %, N = 7).	See above
	Huang, Wei [37]	6 months: RR = 1.33 [1.01, 1.75], p = 0.05 12 months: RR = 1.20 [0.93, 1.55], p = 0.16	0 %; N = 2 [76,77] 0 %; N = 2 [76,77]	Favourable outcomes for stepped care not observed at 12 months follow-up, but this was based on two trials (I <sup>2</sup> = 0 %).	See above
Anxiety – treatment response	Ho, Yeung [12]	Immediate post-treatment: SMD = –0.29 [–0.48, –0.10], p < 0.01	0 %; N = 3 [39,64,67]	Two out of the three included RCTs had significantly higher anxiety treatment response rate than usual care (supplementary material provided; OR = 2.38 [1.25, 4.52], p < 0.01; I <sup>2</sup> = 0 %).	See above
	Muntingh, van der Feltz-Cornelis [39]	12 months stepped care SMD = 0.57 [0.06, 0.53] vs. no stepped care SMD = 0.29 [0.16, 0.99], p = 0.041	37 %; N = 2 [39,67]	Both studies which favoured stepped care were from the Netherlands (p.12 of 15)	Primary care setting. Structured stepped care based on management plan developed in collaboration with patients and active monitoring of process and outcomes. Interventions include CBT with or without medication.
Anxiety – response rate	Ho, Yeung [12]	OR = 2.38 [1.25, 4.52], p = 0.008	0 %; N = 2 [39,67]	Favoured stepped care over usual care.	See above
PTSD – treatment response	Gehringer, Freytag [40]	SMD = –0.23 [–0.38, –0.08], p-value not reported	0 %; N = 2 [48,50]	Generalized linear mixed model of stepped care: $\beta = 0.94$ [SE = 0.52], p = 0.09	Primary care setting. Interventions include CBT, EMDR, NET, writing therapy, hypnotherapy, IPT, present centered therapy, eclectic psychotherapy and psychodynamic therapies. Include comorbidities.

### Characteristics of primary studies referenced in the meta-analyses

Thirty-eight primary papers, published between 1999 and 2019, were included in the following meta-analyses: of these, three papers addressed the prevention of anxiety and/or depression, five addressed the prevention of PTSD, 25 addressed the treatment response for depression, 13 addressed remission of depression, three papers addressed treatment response for anxiety, and two addressed treatment response for PTSD (see Table 2 and Additional File 2, Table S1a). These primary papers originated from 34 primary studies (see Additional File 2, Table S1b). The majority of the studies were based in the North America (N = 17) and the Europe (N = 10) continents, followed by Africa (N = 3), Asia (N = 2), South America (N = 1) and Australia (N = 1). The majority of the studies were located in primary care (N = 21). Whilst the focus of the studies was on mental health disorders, comorbidities such as diabetes mellitus (N = 3), cardiovascular disease (N = 2) and cancer (N = 1) were also included. Other intersectionalities that influenced social determinants of health, such as ethnicity and socio-economic disadvantage, were also included. These different stepped care models comprised two to four different steps. A description of the stepped care models for each of the studies is outlined in the Additional File 2, Table S1b.

### Quality assessment

All included systematic reviews were of high quality (see Additional File 3). The most common area for risk of bias was not adequately assessing for publication bias, attributable to the limited number of included studies preventing the completion of funnel plots. Methods for combining studies were appropriate across all reviews, though limited study numbers often hindered thorough subgroup analyses or meta-regressions. Four reviews provided recommendations for practice and research that were appropriate but vague or broad, such as general suggestions about the utility of stepped care or the need for further investigations in diverse populations [27,37,38,40].

### Prevention studies

Two meta-analyses reported on the use of stepped care to prevent deterioration of mental ill health. Preventative stepped care was defined as interventions that were provided to patients with high risk or sub-threshold symptoms to prevent the development of the diagnosable mental health disorder (see Table 2).

Ho, Yeung [12] reported no significant difference in the number of people who developed anxiety and/or depression (i.e., incidence) comparing preventative stepped care and usual care across three studies at immediate post-treatment (OR = 0.75 [0.41, 1.38], p = 0.36; I<sup>2</sup> = 45

%)

Likewise, Roberts and Nixon [14] reported no significant difference between preventative stepped care and usual care in reducing PTSD symptoms across five studies at the end of follow-up (SMD = -0.24 [-0.52, 0.04], p = 0.10; I<sup>2</sup> = 71 %).

Findings from the two meta-analyses did not support the use of stepped care in preventing the development of diagnosable mental

**Table 3**

Certainty of summarized findings. OR: odds ratio; PTSD: posttraumatic stress disorder; RR: relative risk; SMD: standardized mean difference. Prevention referred to the treatment (stepped care versus usual care) provided to patients at increased or high risk or had subthreshold symptoms of the said diagnosable mental health disorder, to prevent the development of that mental health disorder. Treatment response referred to changes in the scores on standardized measures for the said mental health disorder. Response rate referred to the proportion of patients who showed improvement in the outcome measure for the said mental health disorder. Remission rates referred to the proportion of patients who showed an absence of the symptoms for the said mental health disorder or scored below the clinical cut-offs for the same.

Meta-analysis	Findings	GRADE [32]	[33]
Prevention – anxiety/depression	Immediate post treatment: OR = 0.75 [0.41, 1.38]; I <sup>2</sup> = 45 %, N = 3 [12]	Moderate ⊕⊕⊕O	Weak evidence (Class IV)
Prevention – PTSD	End of follow-up: SMD = -0.24 [-0.52, 0.04]; I <sup>2</sup> = 71 %, N = 5 [14]	Low ⊕⊕OO	Not significant
Depression – treatment response	2–4 months: d = 0.57 [0.21, 0.94]; I <sup>2</sup> = 84 %, N = 4 [28] 3–4 months: d = 0.69 [0.46, 0.93]; I <sup>2</sup> = 38 %, N = 5 [35] 3–6 months: g = -0.25 [-0.40, -0.10]; I <sup>2</sup> = 86 %, N = 12 [27] 6 months: d = 0.34 [0.20, 0.48]; I <sup>2</sup> = 68 %, N = 10 [28] 6–9 months: d = 0.36 [0.23, 0.49]; I <sup>2</sup> = 61 %, N = 12 [35] 9–12 months: d = 0.43 [0.20, 0.65]; I <sup>2</sup> = 75 %, N = 5 [28] 9–12 months: g = -0.21 [-0.40, -0.03]; I <sup>2</sup> = 90 %, N = 11 [27] 12 months: SMD -0.31 [-0.40, -0.22]; I <sup>2</sup> = 79 %, N = 7 [36] 12–18 months: d = 0.40 [0.20, 0.61]; I <sup>2</sup> = 68 %, N = 7 [35]	Moderate ⊕⊕⊕O	Suggestive evidence (Class III)
Depression – response rate	3–6 months: RR = 1.52 [1.30, 1.78]; I <sup>2</sup> = 74 %, N = 14 (Fig. 2a) 9–12 months: RR = 1.47 [1.23, 1.77]; I <sup>2</sup> = 80 %, N = 13 (Fig. 2b)	Moderate ⊕⊕⊕O	Suggestive evidence (Class III)
Depression – remission rate	4–6 months: RR = 1.57 [1.30, 1.90]; I <sup>2</sup> = 79 %, N = 14 (Fig. 3a) 12 months: RR = 1.60 [1.23, 2.07]; I <sup>2</sup> = 94 %, N = 13 (Fig. 3b)	Moderate ⊕⊕⊕O	Suggestive evidence (Class III)
Anxiety – treatment response	Immediate post treatment: SMD = -0.29 [-0.48, -0.10]; I <sup>2</sup> = 0 %, N = 3 [12] 12 months: stepped care SMD = 0.57 [0.06, 0.53; N = 2] vs. no stepped care SMD = 0.29 [0.16, 0.99; N = 5], p = 0.041 [39]	Low ⊕⊕OO	Suggestive evidence (Class III)
Anxiety – response rate	OR = 2.38 [1.25, 4.52]; I <sup>2</sup> = 0 %, N = 2 [12]	Low ⊕⊕OO	Weak evidence (Class IV)
PTSD – treatment response	SMD = -0.23 [-0.38, -0.08]; I <sup>2</sup> = 0 %, N = 2 [40]	Low ⊕⊕OO	Weak evidence (Class IV)

health issues (see Table 3).

*Depression: Treatment response*

Four systematic reviews reported on the effectiveness of stepped care in reducing depressive symptoms (see Table 2).

Rivero-Santana, Perestelo-Perez [27] reported a significant reduction in symptoms favouring stepped care over treatment as usual across 12 studies at 3–6 months (Hedge’s g = -0.25 [-0.40, -0.10], p < 0.001; I<sup>2</sup> = 86 %) and 11 studies at 9–12 months (g = -0.21 [-0.40, -0.03], p = 0.02; I<sup>2</sup> = 90 %). Van Straten, Hill [28] also favoured stepped care over treatment as usual across four primary studies at 2–4 months (Cohen’s d = 0.57 [0.21, 0.94], p-value not reported; I<sup>2</sup> = 84 %), ten studies at 6 months (d = 0.34 [0.20, 0.48], p-value not reported; I<sup>2</sup> = 68 %), and five studies at 9–12 months (d = 0.43 [0.20, 0.65], p-value not reported; I<sup>2</sup> = 75 %). Subsequently, Hill [35] updated these meta-analyses to include additional primary studies. The pooled results, again, favoured stepped care at 3–4 months (d = 0.69 [0.46, 0.93], p-value not reported; I<sup>2</sup> = 38 %, N = 5), 6–9 months (d = 0.36 [0.23, 0.49], p-value not reported; I<sup>2</sup> = 61 %, N = 12), and 12–18 months (d = 0.40 [0.20, 0.61], p-value not reported; I<sup>2</sup> = 68 %, N = 7). Atlantis, Fahey [36] reported significant reduction of depression score with stepped care versus treatment as usual at 12 months (SMD -0.31 [-0.40, -0.22], p < 0.001; I<sup>2</sup> = 79 %, N = 7).

We did not conduct pooled analysis of the meta-analyses results due to the unreported sample sizes and differences in reported outcome measures employed, high heterogeneity would also limit the possibilities of pooled analysis.

*Depression: response rate*

The three systematic reviews on the effectiveness of stepped care defined ‘effectiveness’ as reducing depressive symptoms by a pre-determined amount (i.e., by ≥ 50 % in all studies with the exception of the primary study by Oosterbaan, Verbraak [67] that investigated improvement on the pre-post Centre for Epidemiologic Studies Depression Scale). These meta-analyses comprised a total of 16 primary studies: 11 included in Rivero-Santana, Perestelo-Perez [27], four in Huang, Wei [37], and two in Wang, Hu [38]; with one primary study being included in both Wang, Hu [38] and Huang, Wei [37].

Rivero-Santana, Perestelo-Perez [27] reported a response rate that favoured stepped care over treatment as usual when pooled across ten studies at 3–6 months (RR = 1.47 [1.23, 1.75], p < 0.001; I<sup>2</sup> = 83 %) and nine studies at 9–12 months (RR = 1.49 [1.16, 1.93], p = 0.002; I<sup>2</sup> = 80 %). Similarly, Huang, Wei [37] also found in favour of stepped care pooled across four studies at each of six months (RR = 1.64 [1.28, 1.98], p = 0.09; I<sup>2</sup> = 54 %), 12 months (RR = 1.42 [1.14, 1.76], p = 0.10; I<sup>2</sup> = 52 %). Wang, Hu [38] concurred with their two studies at 24 months (RR = 1.25 [1.13, 1.39], p-value not reported; I<sup>2</sup> = 18 %).

We conducted a pooled analysis using a random-effects model of primary studies included in these reviews and found stepped care to better improve depression response at 3–6 months (RR = 1.52 [1.30, 1.78], p < 0.001; I<sup>2</sup> = 74 %; Fig. 2a) and 9–12 months (RR = 1.47 [1.23, 1.77], p < 0.001; I<sup>2</sup> = 80 %; Fig. 2b) over usual care. Whilst there is high heterogeneity between studies included, the majority of the primary studies reported higher response rate for stepped care as compared to usual care (13 out of 14, and 12 out of 13, respectively), thus the heterogeneity score provides an estimated size of the pooled effect rather than the existence of the benefit.

*Depression: remission rates*

Two systematic reviews included meta-analyses on the effectiveness of stepped care in reducing depressive symptoms to below a pre-determined threshold. These meta-analyses comprised a total of 16 primary studies: 14 from Rivero-Santana, Perestelo-Perez [27] and two

(a) 3-6 months

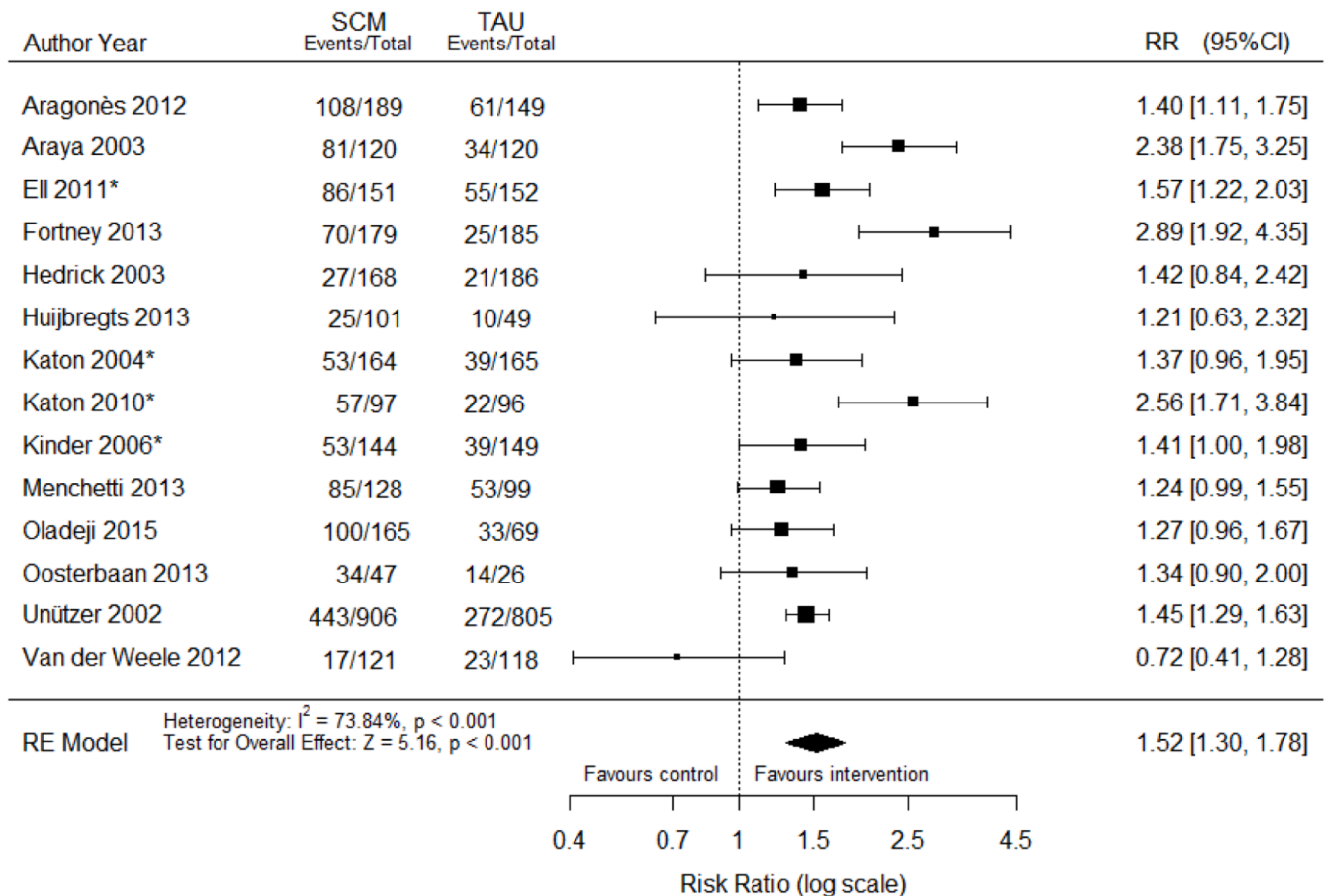


Fig. 2. Depression response rates to stepped care at 3–6 months (a) and 9–12 months (b) using random-effects models. SCM: Stepped care model; TAU: treatment as usual; RR: risk ratio; CI: confidence interval. Primary studies marked with asterisk (\*) are included in Huang, Wei [37], all other papers are included in Rivero-Santana, Perestelo-Perez [27].

from Huang, Wei [37], with no overlap in primary studies between reviews.

Rivero-Santana, Perestelo-Perez [27] reported a higher pooled depression remission rate for stepped care as compared to treatment as usual at 4–6 months (RR = 1.63 [1.31, 2.02],  $p < 0.001$ ;  $I^2 = 83\%$ ,  $N = 12$ ) and 12 months (RR = 1.70 [1.20, 2.42],  $p = 0.003$ ;  $I^2 = 96\%$ ,  $N = 11$ ). Huang, Wei [37] reported higher pooled remission rate at six months (RR = 1.33 [1.01, 1.75],  $p = 0.05$ ;  $I^2 = 0\%$ ,  $N = 2$ ) but not at 12 months (RR = 1.20 [0.93, 1.55],  $p = 0.16$ ;  $I^2 = 0\%$ ,  $N = 2$ ).

Our pooled analysis using a random-effects model of all included primary studies showed a higher remission rate with stepped care at 4–6 months (RR = 1.57 [1.30, 1.90],  $p < 0.001$ ;  $I^2 = 79\%$ ; Fig. 3a) and 12 months (RR = 1.60 [1.23, 2.07],  $p < 0.001$ ;  $I^2 = 94\%$ ; Fig. 3b).

Anxiety: treatment response

Two systematic reviews each included one meta-analysis on the effectiveness of stepped care in reducing anxiety levels.

Ho, Yeung [12] reported a greater reduction in anxiety following stepped care compared to treatment as usual across three studies at immediate post-treatment (SMD = -0.29 [-0.48, -0.10],  $p < 0.01$ ;  $I^2 = 0\%$ ). Employing the same two primary studies, Muntingh, van der Feltz-Cornelis [39] also reported favourably toward stepped care over treatment as usual at 12 months (stepped care SMD = 0.57 [0.06, 0.53] vs. no stepped care SMD = 0.29 [0.16, 0.99],  $p = 0.041$ ).

Due to the differences in time when treatment response was measured, we did not pool the reported meta-analyses.

Anxiety: response rate

Ho, Yeung [12] reported the only meta-analysis on reducing anxiety symptoms, favouring stepped care over treatment as usual across two studies at immediate post-treatment (OR = 2.38 [1.25, 4.52],  $p < 0.01$ ;  $I^2 = 0\%$ ).

Anxiety: remission rate

No meta-analysis was found.

Post-traumatic stress disorder: treatment response

In the only meta-analysis located on stepped care treatment for PTSD, Gehringer, Freytag [40] reported a greater reduction in PTSD symptoms with stepped care compared to treatment as usual across two studies at 12 or more months (SMD = -0.23 [-0.38, -0.08],  $p$ -value not reported;  $I^2 = 0\%$ ).

Post-traumatic stress disorder: response rate/symptom reduction

No meta-analyses on PTSD response or symptom reduction with

(b) 9-12 months

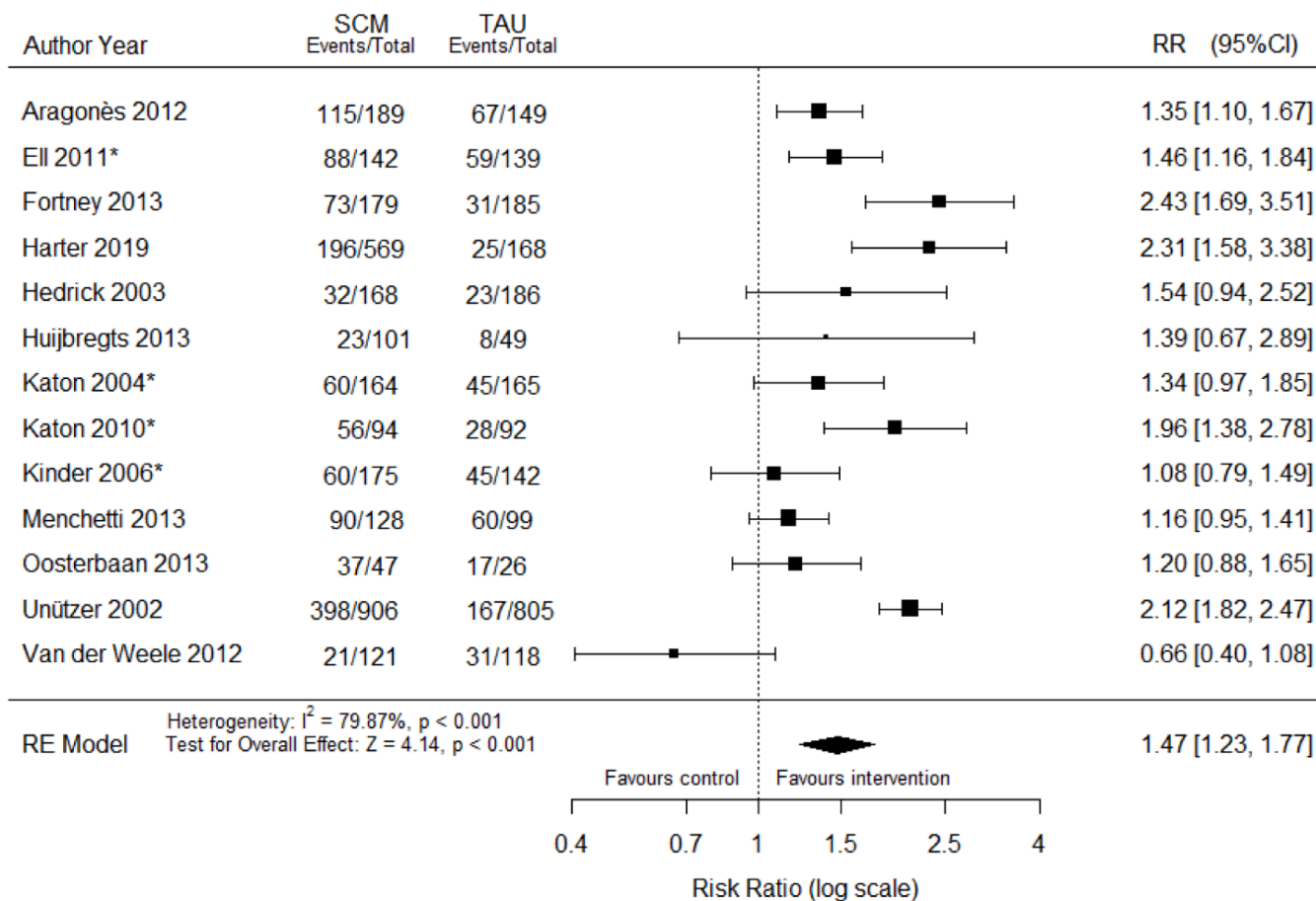


Fig. 2. (continued).

stepped care were found.

**Discussion**

A stepped care approach to the treatment of mental ill health has been perceived as an efficient method for organizing the delivery and monitoring of patient-centred care that is efficacious, while utilizing the least resource intensive treatment necessary. There is now a proliferation of different mental health stepped care models created, implemented, adopted, or adapted across different healthcare systems. This umbrella review, the first of its kind for stepped care research, summarized meta-analyses from ten high-quality systematic reviews on the effectiveness of different stepped care models for mental health disorders. We found the meta-analyses on the treatment effects of depression to be the most common variables, with stepped care generally improving treatment response and remission. Very few meta-analyses on stepped care treatment of anxiety and PTSD were located. Nonetheless, stepped care appeared to have positive effects in improving treatment response for anxiety and PTSD. Our finding is congruent with both the review [15] and the meta-analysis conducted of the specific United Kingdom Improving Access to Psychological Therapies model which likewise demonstrated positive pre-post treatment effect on depression ( $d = 0.87$  [0.78, 0.96]) and anxiety ( $d = 0.88$  [0.79, 0.97]) using practice-based data [18].

Qualitative research and commentary on stepped care found the general concept of stepped care to be acceptable to stakeholders as the guiding principles introduce more treatment options for patients; clinicians also reported being more comfortable with working in the lower-

level severity and greater sense of self-confidence in monitoring and responding to patients' symptoms changes over time [111]. Another qualitative study found stepped care to improve communication and service to be patient-centred [112]. Having different models of stepped care was not perceived to be a barrier but rather reflective of the needs for flexibility [12]. Conversely, findings of efficacy of stepped care may vary dependent on the structure and constituents of the stepped care models; for instance, Muntingh, van der Feltz-Cornelis [39] found US-based papers to be more homogenous than European stepped care papers because studies in the US tended to be conducted in larger, often university-affiliated clinics with specifically trained clinicians while European studies were conducted in more diverse setting with smaller practices (p.13).

With the goal to have less resources spent on acute care and prevent deterioration of chronic conditions, the move to stepped care for mental ill health is perceived to be a more efficient way of utilizing limited resources [11]. This is especially timely and relevant as government, insurers and patients deal with the cost of living crisis. By providing the patients with the appropriate care at the level (or 'step' as informed by their clinical needs) of what is required, there is potential to address current treatment gap in some health systems as well as cost-saving to the health system as a whole by providing the minimum essential or necessary resources for recovery and remission, while attenuating the potential for exacerbation and costs associated with more intensive monitoring, treatments and/or hospitalization.

The cost-effectiveness of stepped care was mentioned in three systematic reviews [12,14,28] but no meta-analysis was conducted. Van Straten, Hill [28] concluded, based on four US-based primary papers,

(a) 4-6 months

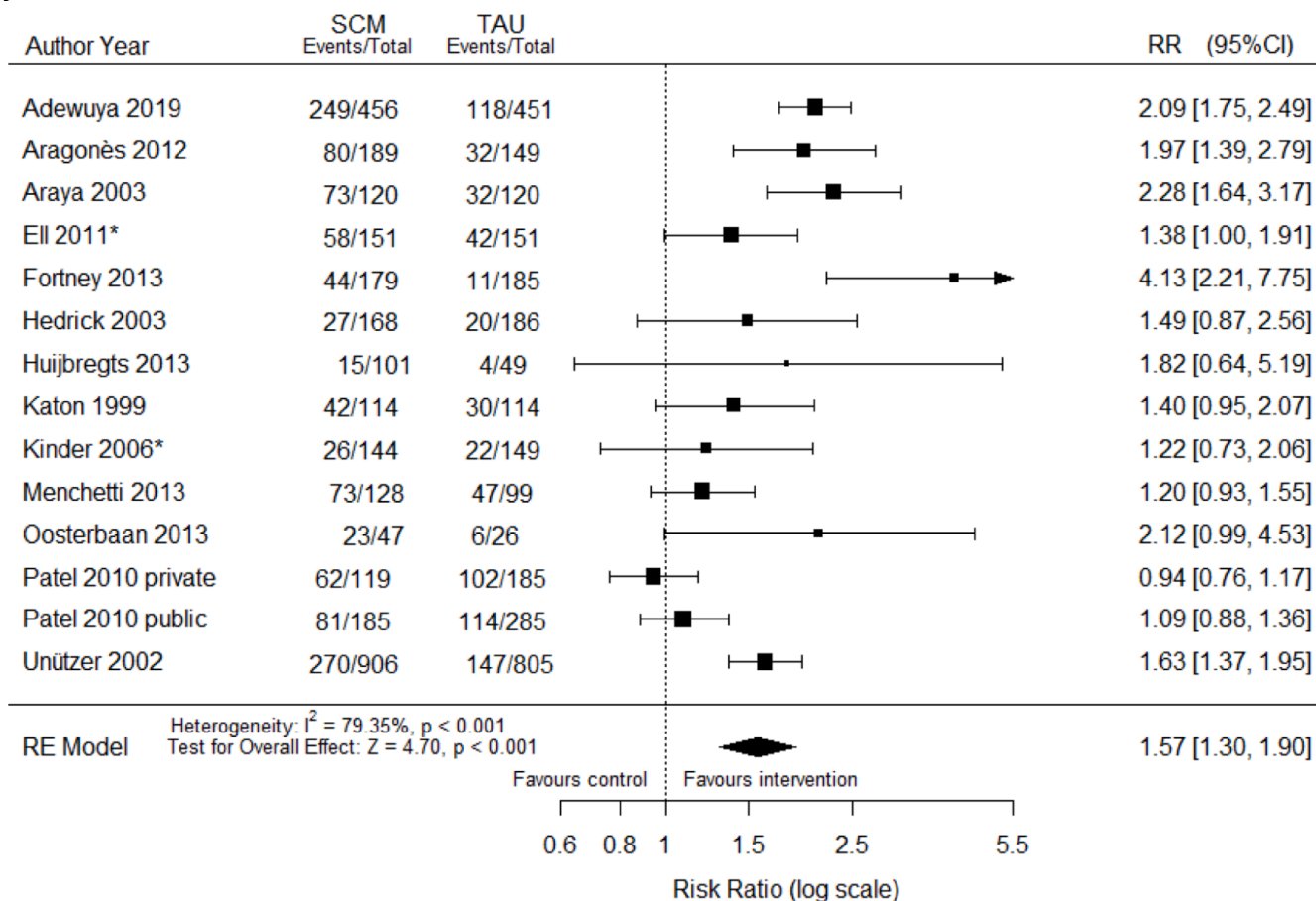


Fig. 3. Remission rates at 4–6 and 12 months using random-effects models. SCM: Stepped care model; TAU: Treatment as usual; RR: Risk Ratio; CI: Confidence interval. Primary studies marked with asterisks (\*) retrieved from Huang, Wei [37], and the remaining papers retrieved from Rivero-Santana, Perestelo-Perez [27].

that “savings or incremental costs [from stepped care] are offset by health gains” (p.243). This is in contrast to Roberts and Nixon [14], who referenced three included primary papers and made mention of three other stepped care interventions in other mental ill health, to conclude that stepped care may be more cost-effective (p.491). Whilst Ho, Yeung [12] referenced one primary paper that demonstrated no significant cost differences with stepped care, and another primary paper with an incremental cost of €4,367 per depression/ anxiety-free year. The cost of this incremental gain is well-below the cost-effectiveness acceptability threshold for high-income countries [113]. In more recent studies examining the cost-effectiveness of a stepped care, Goorden, Muntingh [114] examined the costs associated with stepped care management of anxiety in 43 primary care practices, and found the direct health service cost associated with stepped care to be higher than usual care (€1,854 vs. €1,503; 2014 value) but with the improvement in quality of life, the incremental cost was €6,965 per quality adjusted life year gained. When the authors included productivity gained from better mental health status, stepped care was dominant (i.e. both less costly and resulting in better health outcomes than comparator treatments) as the incremental cost was –€4,977 per quality adjusted life year. Cost-effectiveness of stepped care was also affirmed by Meeuwissen, Feenstra [115], Stiles, Chatterton [116] and Lee, Harris [117]. A meta-cost analysis is required to ascertain the quantum of cost-effectiveness and/or cost-utility of stepped care as compared to usual care or other forms of intensive mental health care.

Limitation

Meta-analytical evidence supporting an intervention is considered the highest level of evidence if there is homogeneity between the included randomised controlled trials. There is considerable heterogeneity in the 6 out of 26 primary meta-analyses considered (i.e.,  $I^2 > 75\%$  [27,28,36]; see Table 3). Consequently, the interpretability and level of evidence attached to those meta-analyses are diminished (see Table 3). Reviews can reflect the methodological flaws of included studies, further subgroup analysis or meta-regression analysis may assist in explaining or correcting for the observed heterogeneity.

Systematic reviews without meta-analyses and reviews published in languages other than English were not accounted for in this umbrella review.

Conclusion

Our umbrella review supports stepped care for depression response and remission.

CRediT authorship contribution statement

Anthony Jeitani: Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation. Paul P. Fahey: Writing – review & editing, Validation, Methodology, Investigation, Formal analysis. Michael Gascoigne: Writing – review & editing, Validation, Supervision, Project administration, Methodology. Abha

(b) 12 months

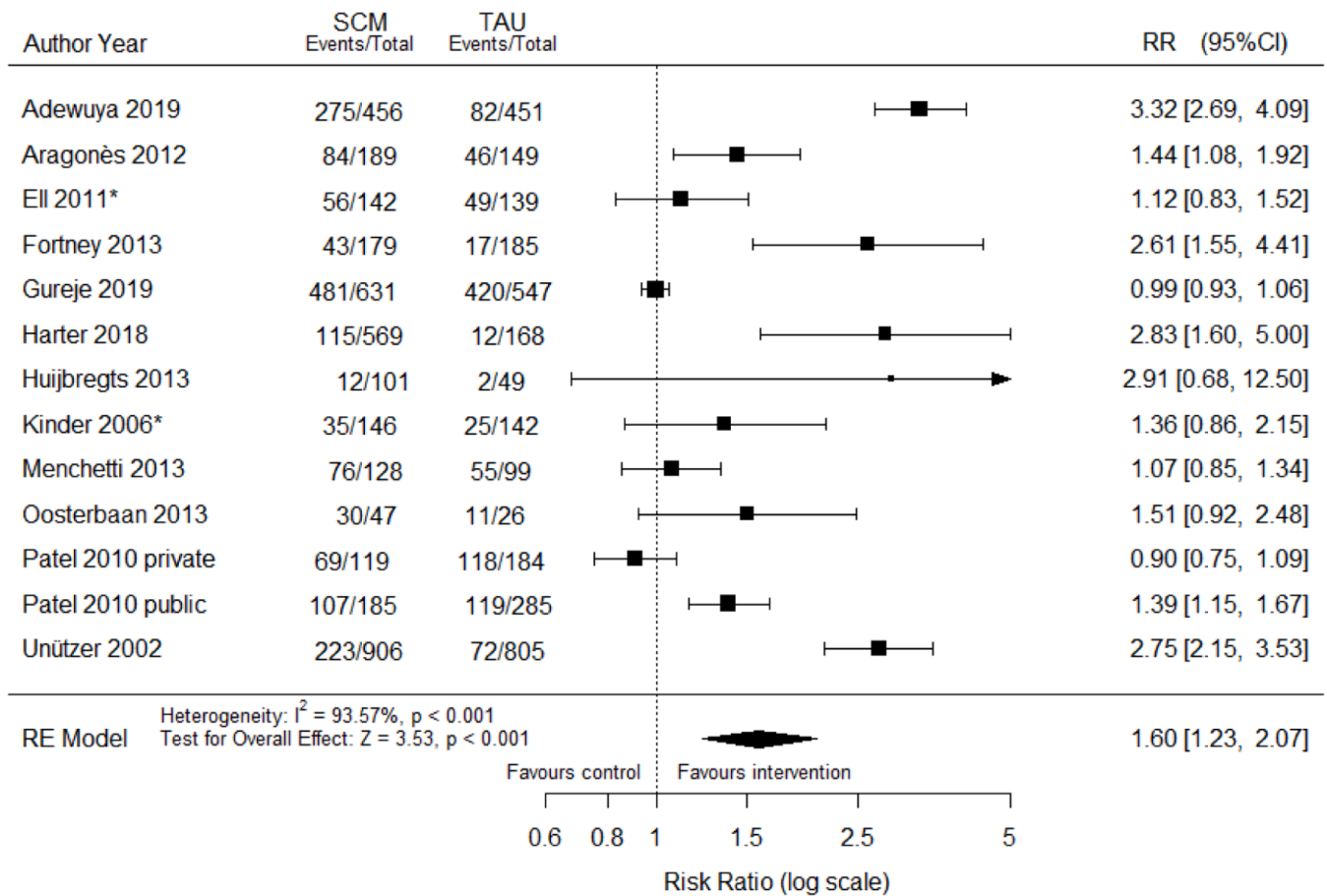


Fig. 3. (continued).

**Darnal:** Writing – review & editing, Investigation, Formal analysis, Data curation. **David Lim:** Writing – review & editing, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

**Declaration of competing interest**

The authors declare that they have no known competing financial interests or personal relationships 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.pmip.2024.100140>.

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