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World Health Organisation Guidance on Mental Health Training: a systematic review of the progress for non-specialist health workers

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World Health Organisation Guidance on Mental Health Training: a systematic review of the progress for non-specialist health workers

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ABSTRACT

Objective: To provide a state-of-the-art assessment of the global literature on mental health training courses for non-specialist health workers, according to the 2008 World Health Organisation guidelines.

Design: A systematic review was conducted according to PRISMA guidelines (PROSPERO No.: CRD42016033269).

Data sources: A comprehensive search including terms related to mental health, training, community and evaluation, was conducted in the following electronic databases on 31st May 2017: Pubmed, PsycINFO, CINAHL (using EBSCOHost interface), Cochrane, Web of Science. The search strategy was designed after examination of key studies in the literature, and following the Participants, Interventions, Comparators and Outcomes (PICO) process for evidence-based practice.

Eligibility criteria: Using the controlled search-terms, searches were conducted for articles published from January 2008 to May 2017. Peer-reviewed published and grey literature in English was included without restriction of country.

Outcomes: The framework by Liu et al. (2016) for assessing methodological quality of mental health training courses in Africa was adopted to allow wider comparisons within the field. This framework is based on a combination of validated methods, including the Newcastle-Ottawa Scale, Grading of Recommendations Assessment, Development and Evaluation (GRADE) and Methodological Index for Non-Randomised Studies (MINORS).

Results: 29 studies met the inclusion criteria. Since 2008, 16 of 195 countries implemented 29 relevant training courses (over half between 2014-2017), and ten in three high-income countries. Training courses varied enormously across all outcomes. Despite this, all 29 courses found some degree of improvement in outcomes after training.

Conclusions: Training non-specialist workers in mental healthcare is an effective strategy to increase global provision and capacity. It improves knowledge, attitude, skill and confidence amongst health workers, as well as clinical practice and patient outcome. Areas for future focus include the development of standardised evaluation methods and outcomes to allow cross-comparison between studies, and optimisation of course structure.

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Strength and Limitations of this Study:

- This is the first systematic review to evaluate on a global scale the effectiveness of short training courses for non-specialist health workers to increase mental healthcare capacity (as per WHO recommendations). Previous studies have focused on synthesising the evidence around task-shifting with a specific focus e.g. on Africa (Liu et al.)
- The study demonstrates that integrating mental health into primary care has a positive outcome; short training courses are an effective method of increasing capacity for mental healthcare, and benefit both trainees and patients across a wide range of outcomes.
- The study suggests areas for future development; more standardized data needs to be collected for conclusive results and optimisation of course structure across cultural settings, courses need to be implemented globally and not just in Western countries, and training should be extended to include non-medical professionals, who represent an important group of potential trainees within the wider (mental) healthcare system and especially with difficult-to-reach populations.
- Limitations are as follows. First, the study did not include training for medical students, specifically targeted sub-populations (e.g. refugees, elderly, children), or single condition specific training (e.g. depression only). Secondly, publications on training without evaluation were not included; hence, there might be several more (effective) mental health training courses for non-specialist health workers globally. Thirdly, it proved difficult to categorise outcomes according to the schema mentioned above; for instance, it is difficult to know whether to classify the ability to correctly recognise mental health disorders in vignettes as skill or knowledge. We are aware that the interpretation of other researchers on this point may vary.

Key words: Mental Health, Medical Education and Training, Public Health, International Health Services, Health Policy

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Introduction

Mental ill-health is a leading cause of disability worldwide[1], accounting for more than 13% of the global burden of disease[2]. Responsible for 33% of total years lived with disability[3], mental ill-health is projected to affect at least one in three people over their lifetime[4]. People with severe mental illness (e.g. schizophrenia, bipolar disorder and severe depression), are 60% more likely to die prematurely than those unaffected[5]. Furthermore, such high prevalence has major economic consequences. It is estimated that mental ill-health will cost the global economy $16.3 trillion between 2011 and 2030,[6] which has serious implications for development of countries and standards of living. Despite this global picture, the burden, stigma, governmental apathy and other barriers to treatment persist, exacerbating the current state of mental healthcare worldwide[7,8].

Aiming to address these concerns, an influential Lancet series published in 2007,[9] with follow up series in 2011, marked the beginning of an era that recognizes the importance of mental health in global health policy. Expanding on this, the World Health Organisation (WHO) issued a comprehensive report in 2008 on the current state of mental health provisions globally[10]. In response to its clinical, epidemiological and health economic findings, United Nations policy recommended a transition from tertiary, institutionalised mental healthcare towards the integration of mental health services into primary care with community support. This was projected to improve health outcomes, cost-effectiveness, access to services, and reduce human rights abuses and stigma.

To help countries achieve this, WHO identified ten key principles for mental healthcare integration, drawn from best practice examples worldwide[10]. One of these points recommended adequate training of primary care workers in diagnosing and treating mental ill-health, laid out in the WHO Mental Health Action Plan (2013-2020)[5] and the WHO Mental Health Gap Action Programme. Such training is crucial to increase capacity for mental healthcare delivery across countries, particularly those with small or previously non-existent budgets for mental health. However, the effectiveness of such provisions in treating mental health disorders has not been systematically assessed.

Therefore, the purpose of this systematic review was to identify the global response to the 2008 WHO policy on mental health training of non-specialist health workers. By identifying all training courses that took place following WHO guidance, we aimed to systematically assess whether countries have responded to WHO's call for action, identify how such courses were run and evaluated, and identify patterns of good practice and outcomes of this training. The results of our analysis enabled us to develop a list of recommendations for future courses, as well as to improve outcome and evaluation methods.

Data Collection

Search Strategy

This systematic review was completed and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[11]. The review and procedure are listed in PROSPERO (registration number: CRD42016033269). As this was an evidence synthesis of existing research, ethical approval was not required; however, we fully complied with the Declaration of Helsinki on medical research.

Aiming to identify publications on mental health training for non-specialist groups worldwide, we searched for terms related to mental health, training, community and evaluation in the following electronic databases on the 31st of May 2017: Pubmed, PsycINFO, CINAHL (using EBSCOHost interface), Cochrane and Web of Science. We included controlled vocabulary terms for each database and searched for articles published from January 2008 to May 2017 (inclusive). The search strategy (Table 1) was designed after careful examination of key studies in the literature, and by following the Participants, Interventions, Comparators and Outcomes (PICO) process for evidence-based practice[12].

Table 1 Systematic review search strategy following the PICO process for evidence-based practice.

Participants	Intervention		Outcome
Mental health	Train* (train, training)	Primary care	Evaluat* (evaluate, evaluation, evaluating)

Mental illness	Educat* (educate, education, educating)	Primary healthcare	Outcome
Mental disorder	Program (programme)	Primary health care	Detect* (detect, detection, detecting)
	Toolkit (tool kit)	Community care	Diagnos* (diagnose, diagnosis, diagnosing)
		Community healthcare	Measur* (measure, measurement, measuring)
		Community health care	Attitude
		Integration	Stigma
		Integrated care	
		Integrated healthcare	
		Integrated health care	

We included studies reported in English, meeting the following criteria in line with the PICO design:

- **Participants:** Following WHO guidance for increasing mental healthcare capacity through task-shifting, we included studies in which trainees were non-specialist healthcare workers (e.g. generalist medical practitioners, nurses, general community mental healthcare workers, and non-medical volunteers). Studies focusing on specialists, such as psychiatrists, and medical students were excluded.
- **Intervention:** Studies describing training course format and outcome in general mental health, were included. Duration or format were not used as selection criteria. We excluded studies providing training to care for specific sub-populations (e.g. children, veterans, and/or specific ethnic groups), for one specific mental illness (e.g. depression alone), and those covering substance abuse (e.g. alcoholism) or mental illnesses secondary to other medical conditions (e.g. HIV/AIDS). A further search term, related to 'primary care', was instead used to identify courses that focused on integration of mental health into primary care in line with WHO guidelines.
- **Comparison:** Studies were not required to have a control comparison group, due to the exploratory nature of the review.
- **Outcomes:** We included studies that evaluated training course outcomes via quantitative or qualitative methods, or a combination of both. We excluded studies that did not provide any evaluation data.

References identified through the search strategy were uploaded into EndNote (X7, Thomson Reuters). After deduplication, titles and abstracts were independently double-screened following eligibility criteria. Studies meeting the inclusion criteria were obtained as full text articles and independently double-screened by two reviewers using the same criteria. Entries that matched between the two reviewers were included. Un-matched entries were only included following resolution through discussion. Additional quality control was completed by a third reviewer on randomly selected papers.

Data Extraction

Standardized piloted data extraction sheets were developed to ensure consistency between studies. Data were extracted by one reviewer and independently double-checked by another. Additional quality control of a random sample was carried out by a third reviewer. Data extracted for each study included, where possible: primary care factors (country of origin, World Bank economic status, number and type of trainees), training factors (types of disorder included, method of training, duration and type of course) and outcome factors (outcomes measured, method and timing of evaluation). Any disagreements were resolved through discussion.

Methodological Assessment

We followed the schema established by Liu et al. (2016)[13] for assessing methodological quality of mental health training courses in Africa, to allow wider comparisons within the field. This framework is based on a

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combination of validated methods, including the Newcastle-Ottawa Scale[14], Grading of Recommendations Assessment, Development and Evaluation (GRADE)[15] and Methodological Index for Non-Randomised Studies (MINORS)[16]. It examines the selection (five criteria) and evaluation methods (five criteria) in each study. Studies are given one point for each of the criteria they satisfy. Authors AC, GL and DV undertook this assessment and resolved any disagreements through discussion; TVB performed the quality control.

Classification of Training Courses and Outcomes

Course trainees were categorised according to WHO classifications of healthcare workers[17]. Since this only includes healthcare workers, we added three further categories, namely: volunteers, mental health consumers/carers, and non-medical staff. The latter included police officers, farm inspection officers, disaster relief staff, educators and housing outreach workers. Studies identified and included these groups as first-line contacts for communities in distress or difficult to reach.

In terms of content, courses were classified as 'specific' if they addressed one particular aspect of mental healthcare (e.g. a specific management or counselling technique), and 'general' if they covered general psychiatry. A third category, 'emergency mental health', covered courses teaching Mental Health First Aid and Mental Health in Disaster Settings.

Following Liu et al.[13], interventions were classified as 'didactic' when exclusively made up of lectures and as 'interactive' when including active trainee participation such as role play, small-group work, case discussions or clinical skills. 'Mixed sessions' included both didactic and interactive elements. Similarly, we used the schema adapted from Kirkpatrick[18] to classify types of evaluative outcome into one or more of seven areas: (a) satisfaction with training (evaluation of reaction), (b) change in attitude towards the importance of mental health, (c) change in confidence, (d) change in knowledge, (e) change in clinical skills (evaluation of learning), (f) change in clinical practice (evaluation of behaviour), and (g) change in patient outcomes (evaluation of results)[19]. For the purpose of this systematic review, we defined skill as the ability to perform a task well, usually gained by training or experience[20]. We then reported how this skill was measured. We deliberately followed similar classification strategies to Liu et al.[13] to encourage establishment of a systematic method of review in this area, allowing cross-comparison between reviews.

Patient and Public Involvement

There was no patient or public involvement in this review, this was a synthesis of existing published data.

Findings

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Our initial search identified 17,877 results after deduplication (n=3,600). Screening of abstracts for PICO eligibility criteria resulted in inclusion of 47 papers from Reviewer 1 and 64 papers from Reviewer 2. Studies were discussed by reviewers to agree upon validity of inclusion. Papers describing the same study were evaluated and excluded if they added no new information. A total of 30 studies were ultimately included, of which one was unobtainable. A random selection of papers was quality-controlled. Full PRISMA search strategy flow shown in Figure 1.

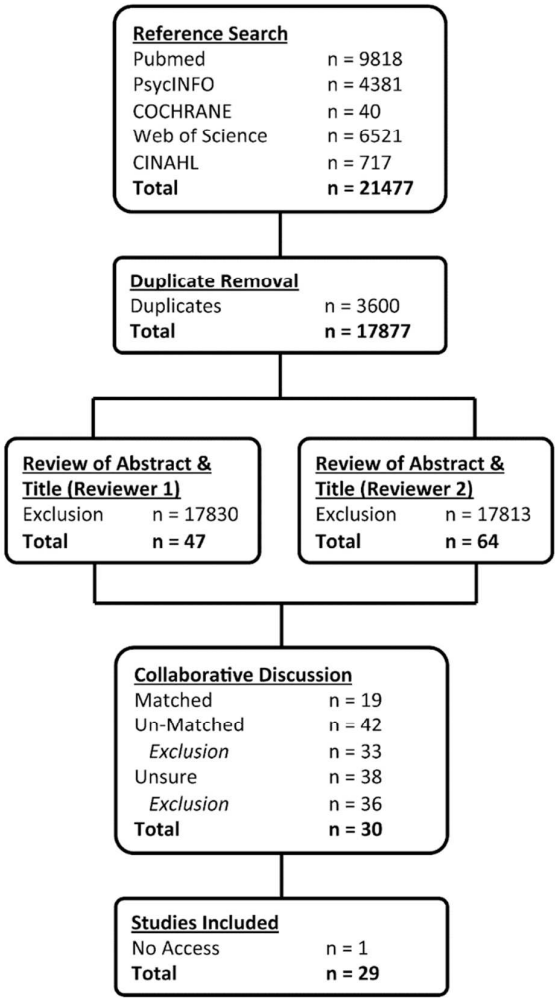

Figure 1

Country and Economic Status

This systematic review identified that training interventions were implemented in 16 countries (Figure 2): four in the United Kingdom, three each in Australia, Canada and India, two each in China, Malawi, Nigeria and Zimbabwe, and one each in Iraq, Kenya, Nepal, Norway, Sierra Leone, Sri Lanka, United States of America and Pacific Small Island States. Countries were classified according to World Bank Economic Status (source: World Bank). Under this classification, six training courses took place in Low-Income settings, seven in Lower-Middle-Income settings, two in Upper-Middle-Income and 13 in High-Income settings. Pacific Small Island States was categorized as an 'Aggregates' nation. International organisations were involved in the implementation of two of the courses: the Catholic Agency For Overseas Development provided medication and

funded counsellors' salaries for the course in Sierra Leone[24], and the International Medical Corps appointed mental health advisors to oversee training in Iraq[46].

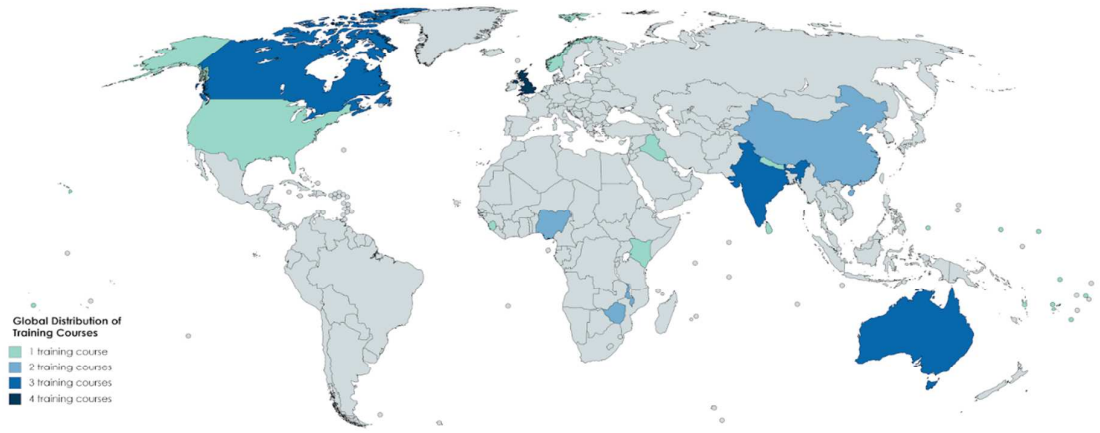

Figure 2

Methodological Quality

Studies were independently assessed by two reviewers using methodological criteria outlined by Lui et al (Table 2).[13]. Upon comparison of findings, differences and discrepancies were resolved through discussion. Two areas proved challenging to assess. First, a joint definition of a threshold for 'sufficient' detail for selection of training samples was required. Second, many studies did not provide an evaluation of their entire study population and it was often unclear whether the subset was representative or not. In many cases, these seemed convenience samples, based on who was available and willing to feedback rather than a representative group.

The median score of the studies in the methodological evaluation was five. A training sample of over 30 people was recruited in 22 (76%) studies, while 17 (59%) used a cohort that was representative of the target population. Selection of the sample was adequately described in 17 (59%) studies. Only six (21%) trials (5, 9, 14, 16, 18, 26) used a control cohort, of which five used randomisation (four at clinic level and two by individual participants).

Selection of the evaluation sample was well characterised in 26 (90%) studies, but only 19 (66%) fully reported their evaluation and ensured their samples were representative. Pre-intervention assessment was carried out in 19 (66%) studies and only 13 (45%) included long-term evaluation. The six studies that used a control cohort all used more detailed assessment tools than simple questionnaires, such as blinded reviewer scoring of competence of simulated patient consultations, rate of accurate clinic detection of mental disorders, data on diagnoses made by participants and direct observation of health worker skills. Therefore, the high-quality studies differentiated themselves through randomisation and moving beyond evaluation through the standard pre- and post-intervention questionnaire.

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	Training Sample					Evaluation of Intervention					Total Score
	Number of Trainees >30?	Training cohort representative of target training population?	Sufficient detail given for selection of training sample?	A control cohort?	Random assignment to a cohort?	Selection of evaluation sample clearly described?	A pre-intervention assessment of outcome measures done?	Is evaluation fully reported and representative of training sample?	Is there masked evaluation?	Long-term post-intervention evaluation (≥1 month) of outcomes?	
Adebowale et al (2015)	1	0	1	0	0	1	1	1	0	0	5
Alonso et al (2014)	0	0	0	0	0	0	0	0	0	1	1
Armstrong et al (2010)	1	0	1	1	1	1	1	1	1	0	8
Armstrong et al (2011)	1	1	0	0	0	1	1	1	0	1	6
Bowers et al (2009)	0	1	0	0	0	1	1	0	0	0	3
Chew-Graham et al (2014)	1	1	0	0	0	1	0	0	0	0	3
Church et al (2010)	1	0	0	0	0	1	1	0	0	1	4
Ekers et al (2013)	0	1	0	0	0	1	0	1	0	0	3
Ferraz et al (2009)	1	0	1	0	0	1	1	0	0	1	5
Hossain et al (2010)	1	0	1	0	0	1	0	0	0	1	4
Jenkins et al (2013)	1	1	1	1	1	1	0	1	1	1	9
Jordans et al (2012)	1	1	1	0	0	1	1	1	0	1	7
Kauye et al (2014)	0	1	1	1	1	1	1	1	1	0	8
Li et al (2014)	1	1	1	0	0	1	1	1	0	0	6
MacCarthy et al (2013)	1	1	0	0	0	1	0	1	0	1	5
Morawska et al (2012)	1	1	1	0	0	1	1	0	0	1	6

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Paudel et al (2014)	0	0	0	0	0	1	0	0	0	0	1
Ravitz et al (2013)	1	1	1	0	0	1	1	1	0	0	6
Sadik et al (2011)	1	1	0	1	0	1	1	1	1	0	7
Usher et al (2015)	0	0	1	0	0	1	1	1	0	0	4
Wright et al (2014)	1	1	1	0	0	1	1	1	0	1	7
Total number of studies (N=22)	16	14	13	4	3	21	15	13	4	10	5

Table 2. Ten point, methodological assessment scale of studies

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Classification and Number of Trainees

Community health workers were the most common type of trainee (Table 3), featuring in more than half of interventions: 16 (55%). A total of ten courses (34%) trained nurses, seven (24%) trained general medical practitioners, seven (24%) trained social workers and/or counsellors, two (7%) trained health service managers, and one (3%) trained paramedics and clerical support workers. Seven courses (24%) trained non-medical staff, two (7%) trained volunteers, and one (3%) trained service users and carers. In 12 interventions, more than one type of trainee participated. Of these, five courses trained two different types of participants, two trained three types of participants, four trained four types of participants, and one trained five types of participants. The latter course was particularly diverse, with trainees drawn from five different backgrounds, including physicians, nurses, social workers, paramedics and police officers. The number of trainees varied widely between interventions, ranging from just three to over 3500.

Course Content

Training course curricula varied (Table 3): 15 courses (52%) covered a 'general' curriculum, of which one also taught Mental Health First Aid, one additionally addressed stigma, and one included both. Of these general courses, two followed the same 5-day curriculum, namely the Kenya Medical Training College mental health primary care training toolkit created in Kenya and subsequently adapted for other countries. Eleven courses (38%) taught a 'specific' aspect of mental healthcare using a variety of previously established psychotherapies (e.g. Cognitive Behavioural Therapy, Behavioural Activation and Solution Focused Brief Therapy, Motivational Interviewing), or focused on the development of teamwork skills via the New Ways of Working Framework, Access to Mental Health in Primary Care Programme, Rural Mental Health Inter-professional Training Programme, and Friendship Bench Programme. These teamwork development programmes were specifically created for the training interventions, most of which were tailored to the socio-cultural background of the country in which they were implemented. Moreover, three courses (10%) focused on emergency mental health, of which two taught Mental Health First Aid and one taught Mental Health in Natural Disasters.

In terms of teaching methods, five courses used didactic methods and six used interactive methods, though the majority of courses (62%) used a combination of methods providing an immersive learning experience. One course also offered a choice of teaching methods, based on participants' favoured learning styles. In this case, trainees were more likely to drop out of self-directed learning than small group teaching. To provide access for remote trainees, two courses used videoconferencing.

Course lengths varied ranging from one day to spread across two years. More than half the courses (18) ranged in length from one day to two weeks, and nine courses lasted from two weeks to two years. Length of training could not be determined for two courses. Of the 29 courses identified by this study, 15 (52%) ran training over a continuous period, and 13 (45%) courses were sessional spread over a longer period. Course structure could not be determined for one course.

Evaluation Methods

Evaluation design for the majority of courses (66%) was a pre- and post-intervention method (Table 3). Eleven courses also collected evaluation data at later time-points post-course to assess longer-term changes, four were randomised controlled and one was a controlled trial. A total of ten courses (34%) collected outcome after the intervention only. Of these, three collected data at repeated time points post-intervention and one was a randomised controlled trial. One course was designed for data collection during the course itself, consisting of written feedback gathered from participants at the end of each training session.

The type of data collected and tools used for data collection varied enormously across interventions. The majority of courses (52%) collected quantitative data alone, whilst three courses (10%) collected qualitative data alone, and 11 courses (38%) collected both. The evaluation methods varied greatly with the majority of courses using written tools in the form of questionnaires or clinical vignettes. Further, focus groups or interviews with trainees were commonly used to establish the outcome of training courses. Some other courses examined case records or clinical notes of encounters to collect evaluation data, in several cases comparing clinical notes to

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patient status determined by previously validated screening tools, such as the General Health Questionnaire, Self-Rating Questionnaire and Structured Clinical Interview for DSM-IV for depression. In addition, a few courses used views of third parties as evaluation data (e.g. course facilitator's field notes, or subjecting trainees to observation by blinded psychiatrists who watched simulated videotaped consultations or clinical encounters with real patients).

Evaluation Outcomes

Course evaluation measures also varied (Table 3). The most commonly measured outcome (15 courses) was change in trainees' attitude towards mental health. Of these, 13 courses found an improvement in attitude (with six (2, 14, 19, 20, 22, 28) reporting significant improvement), five (1, 10, 23, 24, 25) found a qualitative improvement and two (21, 26) found an absolute improvement from baseline. One course (6) found no significant change in trainees' attitude pre- and post-intervention, and one course (11) was an observational study testing significant difference in knowledge, attitude and clinical practice across trainee demographics, years of practice, practice setting, etc. The second most common outcome measured (13 courses) was knowledge. Of these, ten courses found an improvement in knowledge post-intervention, with six (13, 14, 17, 24, 28, 29) reporting significant improvement and four (7, 26, 27) an absolute improvement. One course measured post-intervention knowledge only, reporting it as 'impressive', one course (20) reported no significant improvement, and one (11) was the observational study reported above. Clinical practice and clinical skills were measured by 11 courses. Measurement of clinical practice was largely qualitative in nature (4, 8, 10, 21, 23, 25, 29), but suggested positive change in practice following training. Three courses attempted quantifying change in clinical practice, of which two found a significant improvement (13, 26) and one found no change (19). Clinical skills were assessed by 11 courses. Of these, seven (3, 5, 6, 18, 22, 26, 28) found a statistically significant improvement in clinical skills, two (24, 25) found a qualitative improvement, and two (16, 29) no improvement from baseline. Change in confidence was assessed by nine courses, with seven (5, 10, 14, 19, 21, 24, 29) founding statistically significant improvement in confidence, and two (7, 15) an absolute improvement from baseline. Clinical outcome was assessed by six courses (1, 4, 9, 12, 16, 21), which all showed positive outcomes. Finally, nine courses (1, 8, 10, 12, 15, 21, 25, 26, 27) assessed trainees' satisfaction with the course. All received positive feedback from trainees, except the use of videoconferencing to facilitate remote learning (8). Trainees often offered helpful suggestions for improvement for future courses.

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	Author	Location	Economic Status	Training Cohort	Content	Delivery Method	Length	Course Type	Research Design	Outcome Measure	Outcome Type	Outcome Method	Significance
1	Abas et al .(2016)	Zimbabwe	Low Income	40-60 Community Health Workers	Specific: Friendship Bench	Combination	8 days	Continuous	Post-Intervention	Satisfaction, Attitude, Clinical Outcome	Mixed	Interview/Focus Group	
2	Abayomi et al. (2012)	Nigeria	Lower Middle Income	31 Volunteers	General	Didactic	6 weeks	Sessional	Pre-Post Intervention	Attitude	Quantitative	Questionnaire	Significant improvement
3	Adebowale et al. (2015)	Nigeria	Lower Middle Income	80 Community Health Workers, Nursing Professionals	General	Combination	3 days	Continuous	Pre-Post Intervention	Clinical Skills	Quantitative	Vignette	Significant improvement
4	Alonso et al. (2014)	Sierra Leone	Low Income	3 Nursing Professionals, Social Work and Counselling Professionals	General	Combination	8 weeks	Continuous	Post-intervention (RM)	Clinical Outcome, Clinical Practice	Quantitative	Questionnaires, Case Record Examination	
5	Armstrong et al. (2010)	Australia	High Income	30 Social Work, Counselling Professionals	Specific: Cognitive Behavioural Therapy	Combination	3 weeks	Sessional	Pre-Post Intervention (RCT)	Confidence, Clinical Skills	Quantitative	Questionnaire, Interview	Significant improvement
6	Armstrong et al. (2011)	India	Lower Middle Income	70 Community Health Workers	General (+MHFA)	Combination	4 days	Continuous	Pre-Post Intervention (RM)	Attitude, Clinical Skills	Quantitative	Vignette	Significant improvement
7	Bowers and Burnett (2009)	UK	High Income	26 Community Health Workers	Specific: New Ways of Working Framework	Didactic	4 months	Sessional	Pre-Post Intervention	Confidence and Knowledge	Quantitative	Questionnaire	
8	Chew-Graham et al. (2014)	UK	High Income	68 Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Social Work and Counselling Professionals	Specific: Access to Mental Health in Primary Care Program Training*plus*	Didactic	Variable (1-7 sessions over unknown period)	Sessional	Post-intervention	Clinical Practice, Satisfaction	Qualitative	Interview/Focus Group	

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9	Chibanda et al. (2016)	Zimbabwe	Low Income	96-288	Community Health Workers	Specific: Friendship Bench	Combination	9 days	Sessional	Pre-Post Intervention (RM; RCT)	Clinical Outcome	Quantitative	Questionnaire	Significant improvement
10	Church et al. (2010)	Canada	High Income	125	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Paramedical Practitioners, Social Work and Counselling Professionals	Specific: Rural Mental Health Interprofessional Training Program	Interactive	4 months	Sessional	Pre-Post Intervention (RM)	Attitude, Clinical Practice, Confidence, Satisfact ion	Mixed	Questionnaire, Written Feedback, Interview/Focus group, Facilitator's Notes	Significant improvement
11	Cook et al. (2017)	USA	High Income	394	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Social Work and Counselling Professionals	Specific: Motivational Interviewing	Combination	4-8 hours	Sessional	Post-intervention	Attitude, Clinical Practice, Knowledge	Mixed	Questionnaire	
12	Ekers et al. (2013)	UK	High Income	10	Nursing Professionals	Specific: Behavioural Activation	Combination	5 days	Continuous	Post-intervention	Clinical Outcome and Satisfaction	Mixed	Questionnaire	
13	Ferraz and Wellman (2009)	UK	High Income	66	Health Service Managers, Volunteers	Specific: Solution Focused Brief Therapy	Interactive	2 days	Continuous	Pre-Post Intervention (RM)	Clinical Practice, Knowledge	Quantitative	Questionnaire	Significant improvement
14	Hofmann-Braussard et al. (2017)	India	Lower Middle Income	56	Community Health Workers	General (+MHFA +Stigma)	Combination	4 days	Sessional	Pre-Post Intervention (CT)	Attitude, Confidence, Knowledge	Mixed	Questionnaire, Vignette	Significant improvement
15	Hossain et al. (2010)	Australia	High Income	32	Non-Medical Staff	Emergency Mental Health: MHFA	Didactic	2 days	Continuous	Post-intervention	Confidence, Knowledge, Satisfaction	Mixed	Interview/Focus Group	
16	Jenkins et al. (2013)	Kenya	Lower Middle Income	98	Community Health Workers	General	Combination	5 days	Continuous	Post-intervention (RM; RCT)	Clinical Outcome, Clincal Skills	Quantitative	Questionnaire, Clinical Notes	Significant improvement

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17	Jordans et al. (2012)	Nepal	Low Income	109	Non-Medical Staff	Emergency Mental Health: Disaster Settings	Combination	2 days	Continuous	Pre-Post Intervention (RM)	Knowledge	Quantitative	Questionnaire, Vignette	Significant improvement
18	Kauye et al. (2014)	Malawi	Low Income	22	Community Health Workers	General	Combination	5 days	Continuous	Pre-Post Intervention (RCT)	Clinical Skills	Quantitative	Questionnaire, Clinical Notes	Significant improvement
19	Lam et al. (2016)	Hong Kong (China)	High Income	151	Community Health Workers	General	Interactive	10 days	Sessional	Pre-Post Intervention	Attitude, Confidence, Clinical Practice	Mixed	Questionnaire	Significant improvement
20	Li et al. (2014)	China	Upper Middle Income	99	Community Health Workers	General (+Stigma)	Didactic	1 day	Continuous	Pre-Post Intervention	Attitude and Knowledge	Quantitative	Questionnaire, Vignette	Significant improvement
21	MacCarthy et al. (2013)	Canada	High Income	>1400	Generalist Medical Practitioners	Specific: Cognitive Behavioural Interpersonal Skills (+MHFA)	Combination	3 days	Sessional	Post-intervention (RM)	Attitude, Confidence, Clinical Outcome, Clinical Practice, Satisfaction	Quantitative	Questionnaire	Significant improvement
22	Morawska et al. (2013)	Australia	High Income	458	Consumers or Carers, Health Service Managers, NonMedical Staff	Emergency Mental Health: MHFA	Interactive	2 days	Continuous	Pre-Post Intervention (RM)	Attitude, Clinical Skills	Mixed	Questionnaire, Vignette, Interview/Focus Group	Significant improvement
23	Paudel et al. (2014)	India	Lower Middle Income	24	Community Health Workers	General	Interactive	ND	ND	Post-intervention	Attitude, Knowledge, Practice	Qualitative	Focus Group	
24	Ravitz et al. (2013)	Canada	High Income	93	Community Health Workers, Nursing Professionals, Non-Medical Staff	Specific: Cognitive Behavioural Therapy, Interpersonal Psychotherapy, Motivational Interviewing, Dialectical Behaviour Therapy	Interactive	5 weeks	Sessional	Pre-Post Intervention	Attitude, Clinical Skills, Confidence, Knowledge,	Mixed	Questionnaire, Focus Group	Significant improvement
25	Ruud et al. (2016)	Norway	High Income	>3500	Community Health Workers, Generalist	General	Combination	2 years	Sessional	Post-intervention	Attitude, Clinical Skills, Practice,	Qualitative	Questionnaire, Interview	

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				Medical Practitioners, Nursing Professionals, Social Work and Counselling Professionals					Satisfaction				
26	Sadik et al. (2011)	Iraq	Upper Middle Income	317	Community Health Workers, Generalist Medical Practitioners, Nursing Professionals, Social Work and Counselling Professionals	General	Combination	10 days	Continuous	Pre-Post Intervention (RM)	Attitude, Clinical Skills, Clinical Practice, Knowledge, Satisfaction	Quantitative	Questionnaire, Clinical Notes, Interview	Significant improvement
27	Siriwardhana et al. (2016)	Sri Lanka	Lower Middle Income	12	Generalist Medical Practitioners	General	Combination	3 days	Continuous	Pre-Post Intervention	Knowledge, Satisfaction	Mixed	Questionnaire, Interview	
28	Usher et al. (2014)	Pacific Island Small States	Aggregates	18	Community Health Workers, Nursing Professionals	General	Combination	4 weeks	Continuous	Pre-Post Intervention	Attitude, Clinical Skills, Knowledge	Quantitative	Questionnaire	Significant improvement
29	Wright et al. (2014)	Malawi	Low Income	271	Community Health Workers	General	Combination	6 months	Sessional	Pre-Post Intervention (RM)	Confidence, Clinical Practice, Clinical Skills, Knowledge	Mixed	Questionnaire, Clinical Notes	Significant improvement

Table 3. Interventions from Studies Included in our Systematic Review

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Discussion

Short mental health training for generalised health workers improve knowledge, attitude, skill and confidence, leading to improved clinical practice and better patient outcome. Crucially, such courses are cost-effective in low-resource settings and well-accepted by trainees.

Based on our search criteria, 16 of the 195 countries globally implemented 29 relevant training courses since 2008, across a range of economic status categories. Over a third of training courses (ten out of 29) ran in three high-income countries: United Kingdom, Canada and Australia. This may suggest that it is easier to run in high-income settings, especially when considering the costs associated with implementing such courses, and the fact that low-income settings may lack a comprehensive primary care system into which to integrate mental healthcare. However, eight low- or lower-middle income countries set up 13 training courses; hence, perhaps a more important factor is the commitment of mental health researchers and stakeholders within these countries. This is supported by the fact that half of the countries involved set up more than one training course since 2008. Another factor may be international collaborations where high-income partners help deliver training in low- and middle-income settings.

Training courses varied enormously in size and in background of trainees, including GP practice receptionists, police officers, disaster relief staff, educators and farm inspection officers. This is in line with the WHO strategy of moving mental healthcare into the community, including training those with access to remote or difficult-to-reach communities. Notably, new categories were created in our study for trainees who did not fit into the current WHO classification of healthcare workers. This suggests that the WHO classification needs updating as healthcare roles can be valuably filled by those without formal healthcare training and with unique access to hard-to-reach communities.

World Health Organisation did not define the suggested length for short mental health training, meaning optimum length of training was interpreted very differently between courses ranging from one day to two years. Likewise, training methods widely varied. Each course was specifically adapted to individual circumstances, taking into account cultural setting, resources and prior knowledge, in line with WHO's publication of ten 'best practice' vignettes encouraging context-specific integration of mental health into primary care. It was clear from qualitative feedback from trainees that culturally appropriate interventions, along with flexibility of training, were best-received. These 'culturally and context specific' lessons are very useful for the design of future courses, as they often throw up idiosyncratic improvements for different situations, such as the success of yoga in India[50], seed planting in Uganda[51], or the Friendship Bench in Zimbabwe and Canada[29]. It is encouraging to see many courses measuring change in attitude amongst healthcare workers as stigma remains a key problem in access to good mental healthcare globally.

This systematic review found that data collection in the field was markedly inconsistent, a problem also noted by Liu et al.[13]. Method, timing and outcomes varied enormously, making it difficult to compare data across studies and draw out bigger trends, though we acknowledge that this is a common difficulty due to the culturally-specific nature of mental health training. Nevertheless, progress in the field is promising. All 29 courses found at least some degree of improvement in outcome after training, suggesting that training non-specialist health workers is a cost-effective strategy in increasing global capacity for mental healthcare. Of the 10-year period covered by our review, over half the training courses took place between 2014-2017 reflecting a growing interest in mental health.

The recognition of mental health within global health and development priorities is also reflected by its incorporation into the United Nations Sustainable Development Agenda for 2030, and the launch of the WHO/World Bank 2016 event 'Out of the Shadows: Making Mental Health a Global Priority'.

Limitations

This study has some limitations. Firstly, it did not include training for medical students, specifically targeted sub-populations (e.g. refugees, elderly, children), or single condition specific training (e.g. depression only). Secondly, publications on training without evaluation were not included; hence, there might be several more (effective) mental health training courses for non-specialist health workers globally. Thirdly, it proved sometimes difficult to categorise outcomes according to the schema mentioned above; for instance, it is difficult

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to know whether to classify the ability to correctly recognise mental health disorders in vignettes as skill or knowledge. We consistently categorized this as skill, in line with the definition of skill used by Li et al.[40] as 'the ability to perform a task well, usually gained by training or experience'. We are aware that the interpretation of other researchers on this point may vary.

Conclusions

Training non-specialist health workers is an effective strategy in increasing global capacity for mental healthcare, improving knowledge, attitude, skill and confidence as well as clinical practice and patient outcome. Existing studies provide examples of many training and evaluation methods, but evidence to draw conclusions on the efficacy of different training techniques is insufficient. Areas for future focus include developing standardised evaluation methods and outcomes to allow cross-comparison between studies, and optimisation of course structure.

Contributionship Statement

- Alexandra Caulfield* - literature search, figures, study design, data collection, data analysis, data interpretation, writing, critical revision

- Deniz Vatansever* - literature search, figures, study design, data collection, data analysis, data interpretation, writing, critical revision, referencing

- Gabriel Lambert - data analysis, data interpretation

- Tine Van Bortel - literature search, data collection, data analysis, data interpretation, writing, critical revision

*These authors contributed equally to this work.

Declaration of Interests

The authors declare no conflicts of interest.

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Data Sharing Statement

No additional data available.

Figure Legends

Figure 1. PRISMA search strategy flow diagram of included studies

Figure 2. Distribution of Mental Health Training Courses since 2008 (created on MapChart.net)

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4-5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5-6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5-6
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5-6

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Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	5-6
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	5-6
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-16
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8-10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9-10
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	11-12
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	11-12
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	11-12
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	17
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17-18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	18

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World Health Organisation Guidance on Mental Health Training: a systematic review of the progress for non-specialist health workers

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ABSTRACT

Objective: To provide a comprehensive assessment of global literature on mental health training courses for non-specialist health workers, based on 2008 World Health Organisation guidelines.

Design: A systematic review was conducted according to PRISMA guidelines (PROSPERO No.: CRD42016033269).

Data sources: A comprehensive search was conducted in the following electronic databases on 31st May 2017: PubMed, PsycINFO, CINAHL (using EBSCOHost interface), Cochrane, Web of Science, after examination of key studies in the literature.

Eligibility criteria: Searches were conducted for articles published in English from January 2008 to May 2017, using search terms related to mental health, training, community care and evaluation/outcome, and following the Participants, Interventions, Comparators and Outcomes (PICO) process for evidence-based practice.

Outcomes: Data were collected across the following categories; trainees (number and background), training course (curriculum, teaching method, length), evaluation method (timing of evaluation, collection method, and measures assessed) and evaluation outcome (any improvement recorded from baseline). In addition, studies were assessed for their methodological quality using the framework established by Liu et al. (2016).

Results: 29 evaluations of relevant training courses met the inclusion criteria. These were implemented in 16 countries since 2008 (over half between 2014-2017), with ten in three high-income countries. Evaluation methods varied enormously, but all 29 studies found some improvement after training in at least one area, specifically assessing trainees' attitude, knowledge, clinical practice, skills, confidence, satisfaction or patient outcome.

Conclusions: Training non-specialist workers in mental healthcare is an effective strategy to increase global provision and capacity, and improves knowledge, attitude, skill and confidence amongst health workers, as well as clinical practice and patient outcome. Areas for future focus include the development of standardised evaluation methods and outcomes to allow cross-comparison between studies, and optimisation of course structure.

Strength and Limitations of this Study:

- This review evaluates on a global scale the literature on the effectiveness of short mental health training courses.
- The PICO process for evidence-based practice was followed to perform a wide search across five electronic databases and extract data across a wide range of categories in order to suggest future policy directions.
- Studies were assessed for methodological quality using a standardized outcome framework, and accuracy ensured through multiple checking processes, including independent data extraction by reviewers, and additional random sampling.
- This review only included studies which provided an evaluation of training; other 'unevaluated' courses may have contributed to a broader 'global' uptake.
- This review attempted to cover 'general mental health' and did not include studies which evaluated training for medical specialists (ie. non- general practitioners) or students, or training targeted for specific sub-populations (e.g. refugees), or single conditions (e.g. depression only).

Key words: Mental Health, Medical Education and Training, Public Health, International Health Services, Health Policy, Task-shifting and Task-sharing

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Introduction

Mental ill-health is a leading cause of disability worldwide[1], accounting for more than 13% of the global burden of disease[2]. Responsible for 33% of total years lived with disability[3], mental ill-health is projected to affect at least one in three people over their lifetime[4]. People with severe mental illness (e.g. schizophrenia, bipolar disorder and severe depression), are 60% more likely to die prematurely than those unaffected[5]. Furthermore, such high prevalence has major economic consequences. It is estimated that mental ill-health will cost the global economy $16.3 trillion between 2011 and 2030,[6] which has serious implications for development of countries and standards of living. Despite this global picture, stigma, governmental apathy and other barriers to treatment persist, exacerbating the current state of mental healthcare worldwide[7,8].

Aiming to address these concerns, an influential Lancet series published in 2007,[9] with follow up series in 2011, [10] marked the beginning of an era that recognizes the importance of mental health in global health policy. Expanding on this, the World Health Organisation (WHO) issued a comprehensive report in 2008 on the current state of mental health provisions globally[11]. In response to its clinical, epidemiological and health economic findings, United Nations policy recommended a transition from tertiary, institutionalised mental healthcare towards the integration of mental health services into primary care with community support. This was projected to improve health outcomes, cost-effectiveness, access to services, and reduce human rights abuses and stigma.

To help countries achieve this, WHO identified ten key principles for mental healthcare integration, drawn from best practice examples worldwide[11]. One of these points recommended adequate training of primary care workers in diagnosing and treating mental ill-health, laid out in the WHO Mental Health Action Plan (2013-2020)[5] and the WHO Mental Health Gap Action Programme[12]. Such training is crucial to increase capacity for mental healthcare delivery across countries, particularly those with small or previously non-existent budgets for mental health. However, the effectiveness of such provisions in treating mental health disorders has not been systematically assessed.

Therefore, the purpose of this systematic review was to examine the global response to 2008 WHO policy on mental health training of non-specialist health workers. By identifying all published reports on evaluations of training that took place following WHO guidance, we aimed to systematically assess whether countries have responded to WHO's call for action, identify how such courses were run and evaluated, and identify patterns of good practice and outcomes of this training. The results of our analysis enabled us to develop recommendations for future courses, as well as to improve outcome and evaluation methods.

Data Collection

Search Strategy

This systematic review was completed and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[13]. The review and procedure are listed in PROSPERO (registration number: CRD42016033269). As this was an evidence synthesis of existing research, ethical approval was not required; however, we fully complied with the Declaration of Helsinki on medical research.

Aiming to identify publications on mental health training for non-specialist groups worldwide, we searched for terms related to mental health, training, community and evaluation in the following electronic databases on 31st May 2017: PubMed, PsycINFO, CINAHL (using EBSCOHost interface), Cochrane and Web of Science. We included controlled vocabulary terms for each database and searched for articles published from January 2008 to May 2017 (inclusive). The search strategy (Table 1) was designed after careful examination of key studies in the literature, and by following the Participants, Interventions, Comparators and Outcomes (PICO) process for evidence-based practice[14]. The full search strategy for the PubMed database is provided in the Supplementary Material.

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Table 1. Systematic review search strategy following the PICO process for evidence-based practice.

Participants	Intervention		Outcome
Mental health	Train* (train, training)	Primary care	Evaluat* (evaluate, evaluation, evaluating)
Mental illness	Educat* (educate, education, educating)	Primary healthcare	Outcome
Mental disorder	Program (programme)	Primary health care	Detect* (detect, detection, detecting)
	Toolkit (tool kit)	Community care	Diagnos* (diagnose, diagnosis, diagnosing)
		Community healthcare	Measur* (measure, measurement, measuring)
		Community health care	Attitude
		Integration	Stigma
		Integrated care	
		Integrated healthcare	
		Integrated health care	

We included studies reported in English, meeting the following criteria in line with the PICO design:

- **Participants:** Following WHO guidance for increasing mental healthcare capacity through task-shifting[12], we included studies in which trainees were non-specialist healthcare workers (e.g. generalist medical practitioners, nurses, general community mental healthcare workers, and non-medical volunteers). Studies focusing on specialists, such as psychiatrists were excluded. In line with WHO guidelines, we were interested in the efficacy of programs that could be readily administered without extensive training. Given that medical students could have been receiving both specialist education and the training program, we wanted to ensure that this confound was removed from our search strategy.
- **Intervention:** Studies describing training course format and outcome in general mental health, were included. Duration or format were not used as selection criteria. We excluded studies providing training to care for specific sub-populations (e.g. children, veterans, and/or specific ethnic groups), for one specific mental illness (e.g. depression alone), and those covering substance abuse (e.g. alcoholism) or mental illnesses secondary to other medical conditions (e.g. HIV/AIDS). A further search term, related to 'primary care', was instead used to identify courses that focused on integration of mental health into primary care in line with WHO guidelines.
- **Comparison:** Studies were not required to have a control comparison group, due to the exploratory nature of the review.
- **Outcomes:** We included studies that evaluated training course outcomes via quantitative or qualitative methods, or a combination of both. We excluded studies that did not provide any evaluation data.

References identified through the search strategy were uploaded into EndNote (X7, Thomson Reuters). After deduplication, titles and abstracts were independently double-screened following eligibility criteria. Studies meeting the inclusion criteria were obtained as full text articles and independently double-screened by two reviewers using the same criteria. Entries that matched between the two reviewers were included. Un-matched entries were only included following resolution through discussion.

Data Extraction

Standardized piloted data extraction sheets were developed to ensure consistency between studies. Data were extracted by one reviewer and independently double-checked by another. Additional quality control of a random sample was carried out by a third reviewer. Data extracted for each study included, where possible: primary care factors (country of origin, World Bank economic status, number and type of trainees), training factors (types of disorder included, method of training, duration and type of course, and frequency of training) and outcome

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factors (outcomes measured, method and timing of evaluation). Any disagreements were resolved through discussion.

Methodological Assessment

We followed the schema established by Liu et al.[15] for assessing methodological quality of mental health training courses in Africa, to allow wider comparisons within the field. This framework is based on a combination of validated methods, including the Newcastle-Ottawa Scale[16], Grading of Recommendations Assessment, Development and Evaluation (GRADE)[17] and Methodological Index for Non-Randomised Studies (MINORS)[18]. It examines the selection (five criteria) and evaluation methods (five criteria) in each study. Studies are given one point for each of the criteria they satisfy. Authors AC, GL and DV undertook this assessment and resolved any disagreements through discussion; TVB performed the quality control.

Classification of Training Courses and Outcomes

Course trainees were categorised according to WHO classifications of healthcare workers[19]. Since this only includes healthcare workers, we added three further categories, namely: volunteers, mental health consumers/carers, and non-medical staff. The latter included police officers, farm inspection officers, disaster relief staff, educators and housing outreach workers. Studies identified and included these groups as first-line contacts for communities in distress or difficult to reach.

In terms of content, courses were classified as 'specific' if they addressed one particular aspect of mental healthcare (e.g. a specific management or counselling technique), and 'general' if they covered general psychiatry. A third category, 'emergency mental health', covered courses teaching Mental Health First Aid and Mental Health in Disaster Settings. Additionally, we screened courses to identify if they had specifically used the mhGAP guide create training modules.

Following Liu et al.[15], interventions were classified as 'didactic' when exclusively made up of lectures and as 'interactive' when including active trainee participation such as role play, small-group work, case discussions or clinical skills. 'Mixed sessions' included both didactic and interactive elements. Similarly, we used the schema adapted from Kirkpatrick[20] to classify types of evaluative outcome into one or more of seven areas: (a) satisfaction with training (evaluation of reaction), (b) change in attitude towards the importance of mental health, (c) change in confidence, (d) change in knowledge, (e) change in clinical skills (evaluation of learning), (f) change in clinical practice (evaluation of behaviour), and (g) change in patient outcomes (evaluation of results)[21]. For the purpose of this systematic review, we defined skill as the ability to perform a task well, usually gained by training or experience[22]. We then reported how this skill was measured. We deliberately followed similar classification strategies to Liu et al. to encourage establishment of a systematic method of review in this area, allowing cross-comparison between reviews.

Patient and Public Involvement

There was no patient or public involvement in this review, this was a synthesis of existing published data.

Findings

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Our initial search identified 17,877 results after deduplication (n=3,600). Screening of abstracts for PICO eligibility criteria resulted in inclusion of 47 papers from Reviewer 1 and 64 papers from Reviewer 2. Studies were discussed by reviewers to agree upon validity of inclusion. Papers describing the same study were evaluated and excluded if they added no new information. A total of 30 studies were ultimately included, of which one was unobtainable. A random selection of papers was quality-controlled. Full PRISMA search strategy flow shown in Figure 1.

Figure 1. Prisma Search Strategy

Country and Economic Status

This systematic review identified that training interventions were implemented in 16 countries (Figure 2): four in the United Kingdom, three each in Australia, Canada and India, two each in China, Malawi, Nigeria and Zimbabwe, and one each in Iraq, Kenya, Nepal, Norway, Sierra Leone, Sri Lanka, United States of America and Pacific Small Island States. Countries were classified according to World Bank Economic Status (source: World Bank). Under this classification, six training courses took place in Low-Income settings, seven in Lower-Middle-Income settings, two in Upper-Middle-Income and 13 in High-Income settings. Pacific Small Island States was categorized as an 'Aggregates' nation. International organisations were involved in the implementation of two of the courses: The Catholic Agency for Overseas Development provided medication and funded counsellors' salaries for the course in Sierra Leone (4), and the International Medical Corps appointed mental health advisors to oversee training in Iraq (26).

Figure 2. Global Distribution of Training Courses for Included Studies Methodological Quality

Studies were independently assessed by two reviewers using methodological criteria outlined by Liu et al (Table 2). Upon comparison of findings, differences were resolved through discussion. Two areas proved challenging to assess; first, an agreed threshold for 'sufficient' detail for selection of the training sample, and second an agreed threshold for 'representative' selection of the evaluation sample. To clarify, the 'training sample' were the participants selected as trainees for each course, and the 'evaluation sample' the subgroup of trainees selected to participate in feedback/evaluation. In many cases, the evaluation samples were convenience samples, based on who was available and willing to provide feedback, rather than a representative group.

The median score of the studies in the methodological evaluation was five. A training sample of over 30 people was recruited in 22 (76%) studies, while 17 (59%) used a cohort that was representative of the target population. Selection of the training sample was adequately described in 17 (59%) studies. Only six (21%) trials (5, 9, 14, 16, 18, 26) used a control cohort, of which five used randomisations (four at clinic level and two by individual participants).

Selection of the evaluation sample was well characterised in 26 (90%) studies, but only 19 (66%) fully reported their evaluation and ensured evaluation samples were representative. Pre-intervention assessment was carried out in 19 (66%) studies and only 13 (45%) included long-term evaluation. The six studies that used a control cohort all used more detailed assessment tools than simple questionnaires, such as blinded reviewer scoring of competence of simulated patient consultations, rate of accurate clinic detection of mental disorders, data on diagnoses made by participants and direct observation of health worker skills. Therefore, the high-quality studies differentiated themselves through randomisation and moving beyond evaluation through the standard pre- and post-intervention questionnaire.

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Table 2. Ten-point, methodological assessment scale of studies

		Training Sample					Evaluation of Intervention					Total Score
	Authors	Number of Trainees >30?	Training cohort representative of target training population?	Sufficient detail given for selection of training sample?	A control cohort?	Random assignment to a cohort?	Selection of evaluation sample clearly described?	A pre-intervention assessment of outcome measures done?	Is evaluation fully reported and representative of training sample?	Is there masked evaluation?	Long-term post-intervention evaluation (≥1 month) of outcomes?	Total Score
1	Abas et al (2016)	1	0	0	0	0	0	0	0	1	2	
2	Abayomi (2012)	1	1	1	0	0	1	1	0	0	0	5
3	Adebowale et al (2015)	1	0	1	0	0	1	1	1	0	0	5
4	Alonso et al (2014)	0	0	0	0	0	0	0	0	0	1	1
5	Armstrong et al (2010)	1	0	1	1	1	1	1	1	1	0	8
6	Armstrong et al (2011)	1	1	0	0	0	1	1	1	0	1	6
7	Bowers et al (2009)	0	1	0	0	0	1	1	0	0	0	3
8	Chew-Graham et al (2014)	1	1	0	0	0	1	0	0	0	0	3
9	Chibanda et al (2016)	1	1	1	1	1	1	1	1	1	1	10
10	Church et al (2010)	1	0	0	0	0	1	1	0	0	1	4
11	Cook (2017)	1	1	1	0	0	1	0	1	0	0	5
12	Ekers et al (2013)	0	1	0	0	0	1	0	1	0	0	3
13	Ferraz et al (2009)	1	0	1	0	0	1	1	0	0	1	5
14	Hofmann-Braussard (2017)	1	1	1	1	1	1	1	1	1	0	9
15	Hossain et al (2010)	1	0	1	0	0	1	0	0	0	1	4
16	Jenkins et al (2013)	1	1	1	1	1	1	0	1	1	1	9
17	Jordans et al (2012)	1	1	1	0	0	1	1	1	0	1	7
18	Kauye et al (2014)	0	1	1	1	1	1	1	1	1	0	8
19	Lam et al (2016)	1	0	0	0	0	1	1	1	0	0	4
20	Li et al (2014)	1	1	1	0	0	1	1	1	0	0	6
21	MacCarthy et al (2013)	1	1	0	0	0	1	0	1	0	1	5
22	Morawska et al (2012)	1	1	1	0	0	1	1	1	0	1	7
23	Paudel et al (2014)	0	0	0	0	0	1	0	0	0	0	1
24	Ravitz et al (2013)	1	1	1	0	0	1	1	1	0	0	6
25	Ruud et al (2016)	1	0	0	0	0	0	0	0	0	1	2
26	Sadik et al (2011)	1	1	0	1	0	1	1	1	1	0	7
27	Siriwardhana et al (2016)	0	0	1	0	0	1	1	1	0	0	4
28	Usher et al (2015)	0	0	1	0	0	1	1	1	0	0	4

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29	Wright et al (2014)	1	1	1	0	0	1	1	1	0	1	7
	TOTAL	**22**	**17**	**17**	**6**	**5**	**26**	**19**	**19**	**6**	**13**	**150**

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Classification and Number of Trainees

Community health workers were the most common type of trainee (Table 3), featuring in more than half of interventions: 16 (55%). A total of ten courses (34%) trained nurses, seven (24%) trained general medical practitioners, seven (24%) trained social workers and/or counsellors, two (7%) trained health service managers, and one (3%) trained paramedics and clerical support workers. Seven courses (24%) trained non-medical staff, two (7%) trained volunteers, and one (3%) trained service users and carers. In 12 interventions, more than one type of trainee participated. Of these, five courses trained two different types of participants, two trained three types of participants, four trained four types of participants, and one trained five types of participants. The latter course was particularly diverse, with trainees drawn from five different backgrounds, including physicians, nurses, social workers, paramedics and police officers. The number of trainees varied widely between interventions, ranging from just three to over 3500.

Course Content

Training course curricula varied (Table 3): 15 courses (52%) covered a 'general' curriculum, of which one also taught Mental Health First Aid, one additionally addressed stigma, and one included both. Of these general courses, two followed the same 5-day curriculum, namely the Kenya Medical Training College mental health primary care training toolkit created in Kenya and subsequently adapted for other countries. Eleven courses (38%) taught a 'specific' aspect of mental healthcare using a variety of previously established psychotherapies (e.g. Cognitive Behavioural Therapy), or focused on the development of teamwork skills via the New Ways of Working Framework, Access to Mental Health in Primary Care Programme, Rural Mental Health Inter-Professional Training Programme, and Friendship Bench Programme. These teamwork development programmes were specifically created for the training interventions, most of which were tailored to the socio-cultural background of the country in which they were implemented. Moreover, three courses (10%) focused on emergency mental health, of which two taught Mental Health First Aid and one taught Mental Health in Natural Disasters.

In terms of teaching methods, five courses used didactic methods and six used interactive methods, though the majority of courses (62%) used a combination of methods providing an immersive learning experience. One course also offered a choice of teaching methods, based on participants' favoured learning styles. In this case, trainees were more likely to drop out of self-directed learning than small group teaching. To provide access for remote trainees, two courses used videoconferencing.

Course lengths varied ranging from one day to spread across two years. More than half the courses (18) ranged in length from one day to two weeks, and nine courses lasted from two weeks to two years. Length of training could not be determined for two courses. Of the 29 courses identified by this study, 15 (52%) ran training over a continuous period, and 13 (45%) courses were sessional spread over a longer period. Course structure could not be determined for one course.

Frequency of Training

Twelve studies incorporated data from the same course run on multiple occasions across different localities (to improve access for trainees) (3, 8, 10, 13, 15, 17, 18, 19, 20, 22, 26, 29). The total numbers trained across these courses are listed in Table 3. A further 8 studies reviewed courses which had already been evaluated elsewhere and then adapted to incorporate changes (1, 9, 11, 16, 19, 21, 24, 25). It was difficult to determine total numbers trained over time for each project. Of note, one study (9) provided a follow-up randomised clinical trial for the Friendship Bench Project in Zimbabwe, as recommended by (1) in their earlier evaluation of the same project.

Evaluation Methods

Evaluation design for the majority of courses (66%) was a pre- and post-intervention method (Table 3). Eleven courses also collected evaluation data at later time-points post-course to assess longer-term changes, four were randomised controlled and one was a controlled trial. A total of ten courses (34%) collected outcome measures after the intervention only. Of these, three collected data at repeated time points post-intervention and one was a randomised controlled trial. One course was designed for data collection during the course itself, consisting of

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written feedback gathered from participants at the end of each training session.

The type of data collected and tools used for data collection varied enormously across interventions. The majority of courses (52%) collected quantitative data alone, whilst three courses (10%) collected qualitative data alone, and 11 courses (38%) collected both. The evaluation methods varied greatly with the majority of courses using written tools in the form of questionnaires or clinical vignettes. Further, focus groups or interviews with trainees were commonly used to establish the outcome of training courses. Some other courses examined case records or clinical notes of encounters to collect evaluation data, in several cases comparing clinical notes to patient status determined by previously validated screening tools, such as the General Health Questionnaire, Self-Rating Questionnaire and Structured Clinical Interview for DSM-IV for depression. In addition, a few courses used views of third parties as evaluation data (e.g. course facilitator's field notes, or subjecting trainees to observation by blinded psychiatrists who watched simulated videotaped consultations or clinical encounters with real patients).

Evaluation Outcomes

Course evaluation measures also varied (Table 3). The most commonly measured outcome (15 courses) was change in trainees' attitude towards mental health. Of these, 13 courses found an improvement in attitude (with six (2, 14, 19, 20, 22, 28) reporting significant improvement), five (1, 10, 23, 24, 25) found a qualitative improvement and two (21, 26) found an absolute improvement from baseline. One course (6) found no significant change in trainees' attitude pre- and post-intervention, and one course (11) was an observational study testing significant difference in knowledge, attitude and clinical practice across trainee demographics, years of practice, practice setting, etc. The second most common outcome measured (13 courses) was knowledge. Of these, ten courses found an improvement in knowledge post-intervention, with six (13, 14, 17, 24, 28, 29) reporting significant improvement and four (7, 26, 27) an absolute improvement. One course measured post-intervention knowledge only, reporting it as 'impressive', one course (20) reported no significant improvement, and one (11) was the observational study reported above. Clinical practice and clinical skills were measured by 11 courses. Measurement of clinical practice was largely qualitative in nature (4, 8, 10, 21, 23, 25, 29), but suggested positive change in practice following training. Three courses attempted quantifying change in clinical practice, of which two found a significant improvement (13, 26) and one found no change (19). Clinical skills were assessed by 11 courses. Of these, seven (3, 5, 6, 18, 22, 26, 28) found a statistically significant improvement in clinical skills, two (24, 25) found a qualitative improvement, and two (16, 29) no improvement from baseline. Change in confidence was assessed by nine courses, with seven (5, 10, 14, 19, 21, 24, 29) finding statistically significant improvement in confidence, and two (7, 15) an absolute improvement from baseline. Clinical outcome was assessed by six courses (1, 4, 9, 12, 16, 21), which all showed positive outcomes. Finally, nine courses (1, 8, 10, 12, 15, 21, 25, 26, 27) assessed trainees' satisfaction with the course. All received positive feedback from trainees, except the use of videoconferencing to facilitate remote learning (8). Trainees often offered helpful suggestions for improvement for future courses.

WHO Policy Uptake and Direction of Future Research

A total of six studies (3, 4, 14, 27, 28, 29) referenced the WHO Mental Health Gap Action Plan (World Health Organization, 2008) as their guiding principle, and five of these (3, 4, 27, 28, 29) specifically used the mhGAP Intervention Guide to design training modules. A further 9 studies (6, 9, 12, 16, 18, 19, 20, 23, 26) used other works of the World Health Organization in their studies; in particular, the World Health Organization Disability Assessment Schedule version 2.0 (WHODAS 2.0)[23] to assess the outcomes of training (9, 16), and the WHO Primary Care Guidelines for Mental Health[24]. One study (17) was funded by WHO Department of Mental Health and Substance Abuse.

Four studies (21, 23, 25, 26) detailed plans for ongoing training and two studies (1, 27) were run as pilot studies for a future more comprehensive version of the training course. Most studies suggested themes for future research, including the need for larger and more diverse training samples, more objective outcomes, and more robust evidence in the form of randomised trials.

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Table 3. Interventions from Studies Included in our Systematic Review

	Author	Location	Economic Status	Training Cohort		Content	Delivery Method	Length	Course Type	Research Design	Outcome Measure	Outcome Type	Outcome Method	Significance
1	Abas et al .(2016)	Zimbabwe	Low Income	40-60	Community Health Workers	Specific: Friendship Bench	Combination	8 days	Continuous	Post-Intervention	Satisfaction, Attitude, Clinical Outcome	Mixed	Interview/Focus Group	
2	Abayomi et al. (2012)	Nigeria	Lower Middle Income	31	Volunteers	General	Didactic	6 weeks	Sessional	Pre-Post Intervention	Attitude	Quantitative	Questionnaire	Significant improvement
3	Adebowale et al. (2015)	Nigeria	Lower Middle Income	80	Community Health Workers, Nursing Professionals	General (*mhGAP)*	Combination	3 days	Continuous	Pre-Post Intervention	Clinical Skills	Quantitative	Vignette	Significant improvement
4	Alonso et al. (2014)	Sierra Leone	Low Income	3	Nursing Professionals, Social Work and Counselling Professionals	General (*mhGAP)*	Combination	8 weeks	Continuous	Post-intervention (RM)	Clinical Outcome, Clinical Practice	Quantitative	Questionnaires, Case Record Examination	
5	Armstrong et al. (2010)	Australia	High Income	30	Social Work, Counselling Professionals	Specific: Cognitive Behavioural Therapy	Combination	3 weeks	Sessional	Pre-Post Intervention (RCT)	Confidence, Clinical Skills	Quantitative	Questionnaire, Interview	Significant improvement
6	Armstrong et al. (2011)	India	Lower Middle Income	70	Community Health Workers	General (+MHFA)	Combination	4 days	Continuous	Pre-Post Intervention (RM)	Attitude, Clinical Skills	Quantitative	Vignette	Significant improvement
7	Bowers and Burnett (2009)	UK	High Income	26	Community Health Workers	Specific: New Ways of Working Framework	Didactic	4 months	Sessional	Pre-Post Intervention	Confidence and Knowledge	Quantitative	Questionnaire	
8	Chew-Graham et al. (2014)	UK	High Income	68	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Social Work and Counselling Professionals	Specific: Access to Mental Health in Primary Care Program Training*plus*	Didactic	Variable (1-7 sessions over unknown period)	Sessional	Post-intervention	Clinical Practice, Satisfaction	Qualitative	Interview/Focus Group	

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9	Chibanda et al. (2016)	Zimbabwe	Low Income	96-288	Community Health Workers	Specific: Friendship Bench	Combination	9 days	Sessional	Pre-Post Intervention (RM; RCT)	Clinical Outcome	Quantitative	Questionnaire	Significant improvement
10	Church et al. (2010)	Canada	High Income	125	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Paramedical Practitioners, Social Work and Counselling Professionals	Specific: Rural Mental Health Interprofessional Training Program	Interactive	4 months	Sessional	Pre-Post Intervention (RM)	Attitude, Clinical Practice, Confidence, Satisfact ion	Mixed	Questionnaire, Written Feedback, Interview/Focus group, Facilitator's Notes	Significant improvement
11	Cook et al. (2017)	USA	High Income	394	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Social Work and Counselling Professionals	Specific: Motivational Interviewing	Combination	4-8 hours	Sessional	Post-intervention	Attitude, Clinical Practice, Knowledge	Mixed	Questionnaire	
12	Ekers et al. (2013)	UK	High Income	10	Nursing Professionals	Specific: Behavioural Activation	Combination	5 days	Continuous	Post-intervention	Clinical Outcome and Satisfaction	Mixed	Questionnaire	
13	Ferraz and Wellman (2009)	UK	High Income	66	Health Service Managers, Volunteers	Specific: Solution Focused Brief Therapy	Interactive	2 days	Continuous	Pre-Post Intervention (RM)	Clinical Practice, Knowledge	Quantitative	Questionnaire	Significant improvement
14	Hofmann-Braussard et al. (2017)	India	Lower Middle Income	56	Community Health Workers	General (+MHFA +Stigma)	Combination	4 days	Sessional	Pre-Post Intervention (CT)	Attitude, Confidence, Knowledge	Mixed	Questionnaire, Vignette	Significant improvement
15	Hossain et al. (2010)	Australia	High Income	32	Non-Medical Staff	Emergency Mental Health: MHFA	Didactic	2 days	Continuous	Post-intervention	Confidence, Knowledge, Satisfaction	Mixed	Interview/Focus Group	
16	Jenkins et al. (2013)	Kenya	Lower Middle Income	98	Community Health Workers	General	Combination	5 days	Continuous	Post-intervention (RM; RCT)	Clinical Outcome, Clincal Skills	Quantitative	Questionnaire, Clinical Notes	Significant improvement

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17	Jordans et al. (2012)	Nepal	Low Income	109	Non-Medical Staff	Emergency Mental Health: Disaster Settings	Combination	2 days	Continuous	Pre-Post Intervention (RM)	Knowledge	Quantitative	Questionnaire, Vignette	Significant improvement
18	Kauye et al. (2014)	Malawi	Low Income	22	Community Health Workers	General	Combination	5 days	Continuous	Pre-Post Intervention (RCT)	Clinical Skills	Quantitative	Questionnaire, Clinical Notes	Significant improvement
19	Lam et al. (2016)	Hong Kong (China)	High Income	151	Community Health Workers	General	Interactive	10 days	Sessional	Pre-Post Intervention	Attitude, Confidence, Clinical Practice	Mixed	Questionnaire	Significant improvement
20	Li et al. (2014)	China	Upper Middle Income	99	Community Health Workers	General (+Stigma)	Didactic	1 day	Continuous	Pre-Post Intervention	Attitude and Knowledge	Quantitative	Questionnaire, Vignette	Significant improvement
21	MacCarthy et al. (2013)	Canada	High Income	>1400	Generalist Medical Practitioners	Specific: Cognitive Behavioural Interpersonal Skills (+MHFA)	Combination	3 days	Sessional	Post-intervention (RM)	Attitude, Confidence, Clinical Outcome, Clinical Practice, Satisfaction	Quantitative	Questionnaire	Significant improvement
22	Morawska et al. (2013)	Australia	High Income	458	Consumers or Carers, Health Service Managers, NonMedical Staff	Emergency Mental Health: MHFA	Interactive	2 days	Continuous	Pre-Post Intervention (RM)	Attitude, Clinical Skills	Mixed	Questionnaire, Vignette, Interview/Focus Group	Significant improvement
23	Paudel et al. (2014)	India	Lower Middle Income	24	Community Health Workers	General	Interactive	ND	ND	Post-intervention	Attitude, Knowledge, Practice	Qualitative	Focus Group	
24	Ravitz et al. (2013)	Canada	High Income	93	Community Health Workers, Nursing Professionals, Non-Medical Staff	Specific: Cognitive Behavioural Therapy, Interpersonal Psychotherapy, Motivational Interviewing, Dialectical Behaviour Therapy	Interactive	5 weeks	Sessional	Pre-Post Intervention	Attitude, Clinical Skills, Confidence, Knowledge,	Mixed	Questionnaire, Focus Group	Significant improvement

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25	Ruud et al. (2016)	Norway	High Income	>3500	Community Health Workers, Generalist Medical Practitioners, Nursing Professionals, Social Work and Counselling Professionals	General	Combination	2 years	Sessional	Post-intervention	Attitude, Clinical Skills, Practice, Satisfaction	Qualitative	Questionnaire, Interview	
26	Sadik et al. (2011)	Iraq	Upper Middle Income	317	Community Health Workers, Generalist Medical Practitioners, Nursing Professionals, Social Work and Counselling Professionals	General	Combination	10 days	Continuous	Pre-Post Intervention (RM)	Attitude, Clinical Skills, Clinical Practice, Knowledge, Satisfaction	Quantitative	Questionnaire, Clinical Notes, Interview	Significant improvement
27	Siriwardhana et al. (2016)	Sri Lanka	Lower Middle Income	12	Generalist Medical Practitioners	General (*mhGAP)*	Combination	3 days	Continuous	Pre-Post Intervention	Knowledge, Satisfaction	Mixed	Questionnaire, Interview	
28	Usher et al. (2014)	Pacific Island Small States	Aggregates	18	Community Health Workers, Nursing Professionals	General (*mhGAP)*	Combination	4 weeks	Continuous	Pre-Post Intervention	Attitude, Clinical Skills, Knowledge	Quantitative	Questionnaire	Significant improvement
29	Wright et al. (2014)	Malawi	Low Income	271	Community Health Workers	General (*mhGAP)*	Combination	6 months	Sessional	Pre-Post Intervention (RM)	Confidence, Clinical Practice, Clinical Skills, Knowledge	Mixed	Questionnaire, Clinical Notes	Significant improvement

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Discussion

Short mental health training for generalised health workers improve knowledge, attitude, skill and confidence, leading to improved clinical practice and better patient outcome. Crucially, such courses are cost-effective in low-resource settings and well-accepted by trainees.

Based on our search criteria, 29 studies evaluated relevant training courses since 2008 across 16 countries globally, and across a range of economic status categories. Over a third of courses (ten) ran in three high-income countries: United Kingdom, Canada and Australia. Courses may be easier to run in high-income settings, especially considering the associated costs, and the fact that low-income settings may lack a comprehensive primary care system to allow integration of mental healthcare. Despite this, eight low- or lower-middle income countries set up 13 training courses; hence, perhaps a more important factor is the commitment of mental health researchers and stakeholders within these countries, which is supported by the fact that half of the countries involved set up more than one training course since 2008. Another factor may be international collaborations where high-income partners help deliver training in low- and middle-income settings. It is also important to note that this review only included studies which provided an evaluation of training; other 'unevaluated' courses may have contributed to a broader 'global' uptake. Evaluations done well are costly and time-consuming so it may be that funds have been focussed on training at the cost of evaluation.

Training courses varied enormously in size and trainee demographics, including practice receptionists, police officers, disaster relief staff, educators and farm inspection officers. This is in line with the WHO strategy of integrating mental healthcare into the community. Notably, new categories were required in our review for trainees who did not fit the current WHO classification of healthcare workers. This suggests that the classification may need updating to reflect the role of individuals without formal healthcare training who have unique access to remote or difficult-to-reach communities.

The World Health Organisation did not define a suggested length for short mental health training courses, leading to varied interpretations, ranging from one day to two years. Training methods also varied. This flexibility is important for optimising each course to its particular cultural setting and available resources, and is in line with WHO's publication of ten 'best practice' vignettes encouraging context-specific integration of mental health into primary care. Qualitative feedback from trainees suggest that culturally specific interventions, and flexibility of training, are key to course acceptability. These 'culturally and context specific' lessons are very useful for the design of future courses, as they often throw up idiosyncratic improvements for different situations, such as the success of yoga in India[25], seed planting in Uganda[26], or the Friendship Bench in Zimbabwe (1).

This systematic review found that data collection in the field was markedly inconsistent, a problem also noted by Liu et al. Method, timing and outcomes for evaluation varied enormously, making it difficult to compare data across studies and draw out bigger trends, though this is perhaps a necessary evil of ensuring that courses remain 'culturally and context specific'. It is encouraging to see many courses measuring change in attitude amongst healthcare workers as stigma remains a key problem in access to good mental healthcare globally. However, it is not clear if an improvement in many of the outcomes measured (trainee knowledge, attitude, confidence etc.) actually correlates with an improved outcome for patients, and a disappointing number of studies focussed on outcomes for people with mental health problems. This may be due to logistical and ethical difficulties, or possibly ongoing stigma, and represents a key area for future research.

Interestingly, though this review was designed to evaluate progress since the 2008 World Health Organisation policy recommending integration of mental healthcare into primary care, only 16 of studies identified used works by the WHO to help design their training courses, and only 6 used mhGAP specifically, perhaps reflecting increased need for awareness of global policy change and available tools, or a tendency by individual countries to base new schemes on past government-led initiatives. Nevertheless, progress in the field is promising. All 29 courses found at least some degree of improvement in outcome after training, suggesting that training non-specialist health workers is a cost-effective strategy in increasing global capacity for mental healthcare, and a field of increasing interest, with over half the studies taking place from 2014-2017.The recognition of mental health within global health and development priorities is also reflected by its incorporation into the United Nations Sustainable Development Agenda for 2030, and the launch of the WHO/World Bank 2016 event 'Out of the Shadows: Making Mental Health a Global Priority'.

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Limitations

This study has some limitations. Firstly, it did not include studies which evaluated training for medical specialists (i.e. non- general practitioners) or students, or training targeting specific sub-populations (e.g. refugees), or single conditions (e.g. depression only). Secondly, publications on training without evaluation were not included; hence, there might be several more (effective) mental health training courses for non-specialist health workers globally. Thirdly, it proved sometimes difficult to categorise outcomes according to the schema mentioned above; for instance, it is difficult to know whether to classify the ability to correctly recognise mental health disorders in vignettes as skill or knowledge. We consistently categorized this as skill, in line with the definition of skill used by Kirkpatrick et al. (20) as 'the ability to perform a task well, usually gained by training or experience'. We are aware that the interpretation of other researchers on this point may vary. Unfortunately, due to lack of resources and the unavailability of the researchers involved in this project, we were unable to re-run our search after 31st May 2017; more studies may well have been published since the end date of our search, which are not included in this review.

Conclusions

Training non-specialist health workers is an effective strategy in increasing global capacity for mental healthcare, improving knowledge, attitude, skill and confidence as well as clinical practice and patient outcome. Existing studies provide examples of many training and evaluation methods, but evidence to draw conclusions on the efficacy of different training techniques is insufficient. Areas for future focus include developing standardised evaluation methods and outcomes to allow cross-comparison between studies, and optimisation of course structure.

Authorship Contribution Statement

- Alexandra Caulfield* - literature search, figures, study design, data collection, data analysis, data interpretation, writing, critical revision

- Deniz Vatansever* - literature search, figures, study design, data collection, data analysis, data interpretation, writing, critical revision, referencing

- Gabriel Lambert - data analysis, data interpretation

- Tine Van Bortel - literature search, data collection, data analysis, data interpretation, writing, critical revision

*These authors contributed equally to this work.

Declaration of Interests

The authors declare no conflicts of interest.

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Data Sharing Statement

No additional data available.

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Figure Legends

Figure 1. Primary Search Strategy

Figure 2. Global Distribution of Training Courses for Included Studies Methodological Quality

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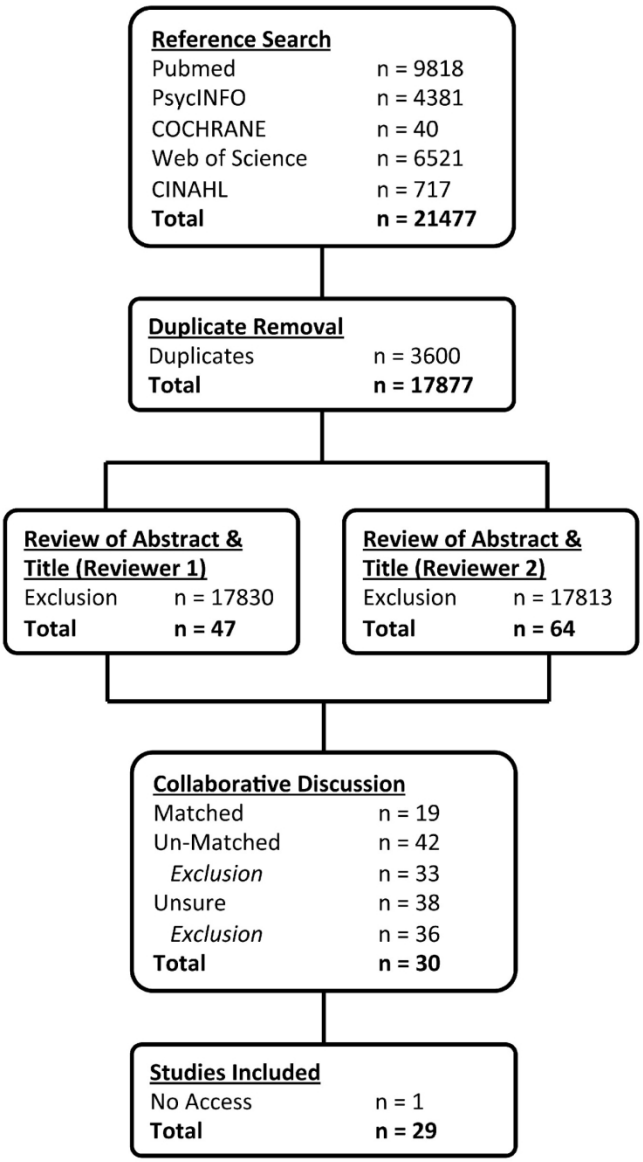

Figure 1. Prisma Search Strategy

118x211mm (300 x 300 DPI)

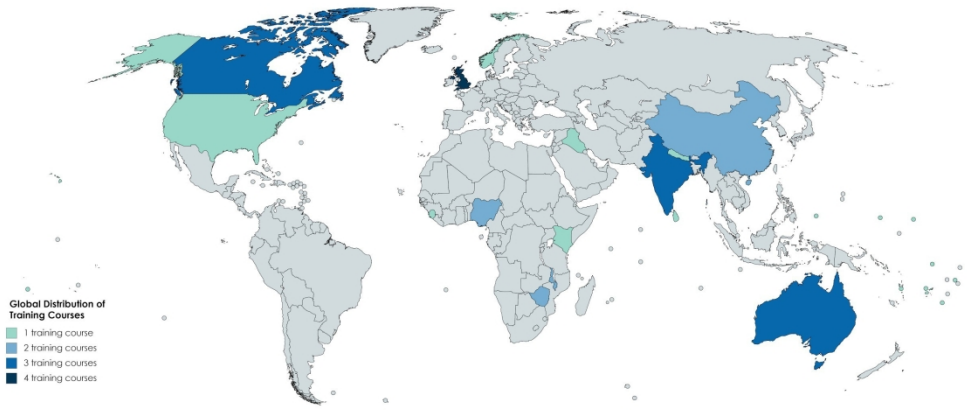

Figure 2. Global Distribution of Training Courses for Included Studies Methodological Quality (created with mapchart.net)

Supplementary Material: World Health Organisation Guidance on Mental Health Training: a systematic review of the progress for non-specialist health workers

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Supplementary Methods

We provide the full search strategy for the PubMed database including user query, the database specific translation, the final query translation and the associated PubMed MeSH terms.

PubMed Query

((((((mental health) OR mental illness) OR mental disorder)) AND (((((((((train) OR training) OR educate) OR education) OR educating) OR program) OR programme) OR toolkit) OR tool kit)) AND ((((((((((primary care) OR primary healthcare) OR primary health care) OR community care) OR community healthcare) OR community health care) OR integration) OR integrated care) OR integrated healthcare) OR integrated health care)) AND ((((((((((((((evaluate) OR evaluation) OR evaluating) OR outcome) OR detect) OR detection) OR detecting) OR diagnose) OR diagnosis) OR diagnosing) OR measure) OR measurement) OR measuring) OR attitude) OR stigma)

Table S1. PubMed Translation

mental health	"mental health"[MeSH Terms] OR ("mental"[All Fields] AND "health"[All Fields]) OR "mental health"[All Fields]
mental illness	"mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "illness"[All Fields]) OR "mental illness"[All Fields]
mental disorder	"mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "disorder"[All Fields]) OR "mental disorder"[All Fields]
training	"education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields]
educate	"teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educate"[All Fields]
education	"education"[Subheading] OR "education"[All Fields] OR "educational status"[MeSH Terms] OR ("educational"[All Fields] AND "status"[All Fields]) OR "educational status"[All Fields] OR "education"[All Fields] OR "education"[MeSH Terms]
educating	"teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educating"[All Fields]
primary care	"primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "care"[All Fields]) OR "primary care"[All Fields]
primary healthcare	"primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields]
primary health care	"primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields]
community	"residence characteristics"[MeSH Terms] OR ("residence"[All Fields] AND "characteristics"[All Fields]) OR "residence characteristics"[All Fields] OR "community"[All Fields]
community healthcare	"community health services"[MeSH Terms] OR ("community"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "community health services"[All Fields] OR ("community"[All Fields] AND "healthcare"[All Fields]) OR "community healthcare"[All Fields]
community health care	"community health services"[MeSH Terms] OR ("community"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "community health services"[All Fields] OR ("community"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "community health care"[All Fields]

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integration	"Integration"[Journal] OR "Integration (Amst)"[Journal] OR "integration"[All Fields]
integrated care	"Int J Integr Care"[Journal] OR ("integrated"[All Fields] AND "care"[All Fields]) OR "integrated care"[All Fields]
healthcare	"delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR "healthcare"[All Fields]
health care	"delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR ("health"[All Fields] AND "care"[All Fields]) OR "health care"[All Fields]
evaluation	"Evaluation"[Journal] OR "Evaluation (Lond)"[Journal] OR "evaluation"[All Fields]
diagnose	"diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnose"[All Fields]
diagnosis	"diagnosis"[Subheading] OR "diagnosis"[All Fields] OR "diagnosis"[MeSH Terms]
diagnosing	"diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnosing"[All Fields]
measure	"weights and measures"[MeSH Terms] OR ("weights"[All Fields] AND "measures"[All Fields]) OR "weights and measures"[All Fields] OR "measure"[All Fields]
measurement	"Measurement (Lond)"[Journal] OR "Measurement (Mahwah N J)"[Journal] OR "measurement"[All Fields]
attitude	"attitude"[MeSH Terms] OR "attitude"[All Fields]
stigma	"social stigma"[MeSH Terms] OR ("social"[All Fields] AND "stigma"[All Fields]) OR "social stigma"[All Fields] OR "stigma"[All Fields]

PubMed Query Translation

(((((("mental health"[MeSH Terms] OR ("mental"[All Fields] AND "health"[All Fields]) OR "mental health"[All Fields]) OR ("mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "illness"[All Fields]) OR "mental illness"[All Fields])) OR ("mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "disorder"[All Fields]) OR "mental disorder"[All Fields])) AND (((((((train[All Fields] OR ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR ("teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educate"[All Fields])) OR ("education"[Subheading] OR "education"[All Fields] OR "educational status"[MeSH Terms] OR ("educational"[All Fields] AND "status"[All Fields]) OR "educational status"[All Fields] OR "education"[All Fields] OR "education"[MeSH Terms])) OR ("teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educating"[All Fields])) OR program[All Fields]) OR programme[All Fields]) OR toolkit[All Fields]) OR (tool[All Fields] AND kit[All Fields]))) AND ((((((((("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "care"[All Fields]) OR "primary care"[All Fields]) OR ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields])) OR ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields])) OR (("residence characteristics"[MeSH Terms] OR ("residence"[All Fields] AND "characteristics"[All Fields]) OR "residence characteristics"[All Fields] OR "community"[All Fields]) AND care[All Fields])) OR ("community health services"[MeSH Terms] OR ("community"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "community health services"[All Fields] OR ("community"[All Fields] AND "healthcare"[All Fields]) OR "community healthcare"[All Fields])) OR ("community health services"[MeSH Terms] OR ("community"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "community health services"[All Fields] OR ("community"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "community health care"[All Fields])) OR ("Integration"[Journal] OR "Integration (Amst)"[Journal] OR "integration"[All Fields])) OR ("Int J Integr Care"[Journal] OR ("integrated"[All Fields] AND "care"[All Fields]) OR "integrated care"[All Fields])) OR (integrated[All Fields] AND ("delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health

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care"[All Fields] OR "healthcare"[All Fields])) OR (integrated[All Fields] AND ("delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR ("health"[All Fields] AND "care"[All Fields]) OR "health care"[All Fields]))) AND ((((((((((((evaluate[All Fields] OR ("Evaluation"[Journal] OR "Evaluation (Lond)"[Journal] OR "evaluation"[All Fields])) OR evaluating[All Fields]) OR outcome[All Fields]) OR detect[All Fields]) OR detection[All Fields]) OR detecting[All Fields]) OR ("diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnose"[All Fields])) OR ("diagnosis"[Subheading] OR "diagnosis"[All Fields] OR "diagnosis"[MeSH Terms])) OR ("diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnosing"[All Fields])) OR ("weights and measures"[MeSH Terms] OR ("weights"[All Fields] AND "measures"[All Fields]) OR "weights and measures"[All Fields] OR "measure"[All Fields])) OR ("Measurement (Lond)"[Journal] OR "Measurement (Mahwah N J)"[Journal] OR "measurement"[All Fields])) OR measuring[All Fields]) OR ("attitude"[MeSH Terms] OR "attitude"[All Fields])) OR ("social stigma"[MeSH Terms] OR ("social"[All Fields] AND "stigma"[All Fields]) OR "social stigma"[All Fields] OR "stigma"[All Fields]))

Table S2. PubMed MeSH Terms

Entry Term	MeSH Terms
mental health	• Health, Mental • Mental Hygiene • Hygiene, Mental
mental disorders	• Disorder, Mental • Disorders, Mental • Mental Disorder • Diagnosis, Psychiatric • Psychiatric Diagnosis • Behavior Disorders • Disorders, Behavior • Mental Disorders, Severe • Disorder, Severe Mental • Disorders, Severe Mental • Mental Disorder, Severe • Severe Mental Disorder • Severe Mental Disorders
education	• Workshops • Workshop • Training Programs • Program, Training • Programs, Training • Training Program • Educational Activities • Activities, Educational • Activity, Educational • Educational Activity • Literacy Programs • Literacy Program • Program, Literacy • Programs, Literacy
teaching	• Training Techniques • Technique, Training • Techniques, Training

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	• Training Technique • Training Technics • Technic, Training • Technics, Training • Training Technic • Pedagogy • Pedagogies • Teaching Methods • Method, Teaching • Methods, Teaching • Teaching Method • Academic Training • Training, Academic • Training Activities • Activities, Training • Training Activity • Techniques, Educational • Technics, Educational • Educational Technics • Educational Technic • Technic, Educational • Educational Techniques • Educational Technique • Technique, Educational
educational status	• Educational Achievement • Status, Educational • Achievement, Educational • Achievements, Educational • Educational Achievements • Educational Status, Maternal • Status, Maternal Educational • Maternal Educational Status • Educational Status, Paternal • Status, Paternal Educational • Paternal Educational Status
primary health care	• Care, Primary Health • Health Care, Primary • Primary Healthcare • Healthcare, Primary • Primary Care • Care, Primary
community	• Characteristic, Residence • Characteristics, Residence • Residence Characteristic • Domicile • Domiciles • Residential Selection • Residential Selections • Selection, Residential • Selections, Residential • Neighborhood • Neighborhoods • Place of Birth

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	• Birth Place • Community • Communities • Living Arrangements • Arrangement, Living • Arrangements, Living • Living Arrangement
community health services	• Health Services, Community • Community Health Service • Health Service, Community • Service, Community Health • Services, Community Health • Community Health Care • Care, Community Health • Health Care, Community • Community Healthcare • Community Healthcares • Healthcare, Community • Healthcares, Community
delivery of health care	• Healthcare Delivery • Deliveries, Healthcare • Delivery, Healthcare • Delivery of Healthcare • Healthcare Deliveries • Health Care Delivery • Delivery, Health Care • Contraceptive Distribution • Contraceptive Distributions • Distribution, Contraceptive • Distributions, Contraceptive • Delivery of Dental Care • Dental Care Delivery • Delivery, Dental Care • Health Care • Care, Health • Healthcare • Health Care Systems • Health Care System • System, Health Care • Systems, Health Care • Healthcare Systems • Healthcare System • System, Healthcare • Systems, Healthcare • Nonclinical Distribution • Distributions, Nonclinical • Nonclinical Distributions • Distribution, Nonclinical • Distribution, Non-Clinical • Distribution, Non Clinical • Distributions, Non-Clinical • Non-Clinical Distributions • Non-Clinical Distribution • Non Clinical Distribution • Community-Based Distribution

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	• Community Based Distribution • Community-Based Distributions • Distribution, Community-Based • Distributions, Community-Based • Distributional Activities • Activities, Distributional • Activity, Distributional • Distributional Activity
diagnosis	• Diagnoses • Diagnoses and Examinations • Examinations and Diagnoses • Postmortem Diagnosis • Diagnoses, Postmortem • Diagnosis, Postmortem • Postmortem Diagnoses • Antemortem Diagnosis • Antemortem Diagnoses • Diagnoses, Antemortem • Diagnosis, Antemortem
weights and measures	• Measures and Weights • Weights • Measures • Measure • Scales
attitude	• Attitudes • Opinions • Opinion
social stigma	• Social Stigmas • Stigmas, Social • Stigma, Social

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4-5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5-6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5-6
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5-6

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	5-6
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	5-6
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-16
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8-10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9-10
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	11-12
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	11-12
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	11-12
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	17
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17-18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	18

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World Health Organisation Guidance on Mental Health Training: A Systematic Review of the Progress for Non-specialist Health Workers

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ABSTRACT

Objective: To assess existing literature on the effectiveness of mental health training courses for non-specialist health workers, based on the World Health Organisation guidelines (2008).

Design: A systematic review was carried out, complying with the PRISMA checklist (PROSPERO No.: CRD42016033269).

Data sources: After examination of key studies in the literature, a comprehensive search was performed within the following electronic databases on 31st May 2017: PubMed, PsycINFO, CINAHL (using EBSCOHost interface), Cochrane, Web of Science.

Eligibility criteria: Searches were conducted for articles published in English from January 2008 to May 2017, using search terms related to mental health, training, community care and evaluation/outcome, following the Participants, Interventions, Comparators and Outcomes (PICO) process for evidence-based practice.

Outcomes: Data were collected across the following categories; trainees (number and background), training course (curriculum, teaching method, length), evaluation method (timing of evaluation, collection method, and measures assessed) and evaluation outcome (any improvement recorded from baseline). In addition, studies were assessed for their methodological quality using the framework established by Liu et al. (2016).

Results: 29 studies with relevant training courses met the inclusion criteria. These were implemented across 16 countries since 2008 (over half between 2014-2017), with ten in three high-income countries. Evaluation methods and outcomes showed high variability across studies, with courses assessing trainees' attitude, knowledge, clinical practice, skills, confidence, satisfaction and/or patient outcome. All 29 studies found some improvement after training in at least one area, and 10 studies found this improvement to be significant.

Conclusions: Training non-specialist workers in mental healthcare is an effective strategy to increase global provision and capacity, and improves knowledge, attitude, skill and confidence amongst health workers, as well as clinical practice and patient outcome. Areas for future focus include the development of standardised evaluation methods and outcomes to allow cross-comparison between studies, and optimisation of course structure.

Strength and Limitations of this Study:

- This review evaluated the existing literature on the effectiveness of short mental health training courses with the aim of informing future policymaking.
- The PICO process for evidence-based practice was followed to perform a wide search across five electronic databases and extract data in a wide range of categories.
- Studies were assessed for methodological quality using a standardized outcome framework, and accuracy was ensured through multiple quality assurance processes, including independent data extraction by reviewers, and additional random sampling.
- This review only included studies which provided an evaluation of training; other 'unevaluated' courses may have contributed to a broader 'global' uptake.
- This review covered 'general mental health' and did not include studies which evaluated training targeted for specific sub-populations (e.g. refugees), for single conditions (e.g. depression only), for medical students or specialists (ie. non-generalist practitioners).

Key words: Mental Health, Medical Education and Training, Public Health, International Health Services, Health Policy, Task-shifting and Task-sharing

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Introduction

Mental ill-health is a leading cause of disability worldwide[1], accounting for more than 13% of the global burden of disease[2]. Responsible for 33% of total years lived with disability[3], mental health problems are projected to affect at least one in three people over their lifetime[4]. Furthermore, it is estimated that people with severe mental illness (e.g. schizophrenia, bipolar disorder and severe depression) are 60% more likely to die prematurely than those unaffected[5]. Such high prevalence also has major economic consequences. It is estimated that mental ill-health will cost the global economy $16.3 trillion between 2011 and 2030,[6] which has serious implications for socioeconomic development and standards of living. Despite this global picture, stigma, governmental apathy and other barriers to treatment persist, exacerbating the current state of mental healthcare worldwide[7,8].

Aiming to address these concerns, an influential Lancet series published in 2007,[9] with follow up series in 2011, [10] marked the beginning of an era that recognizes the importance of mental health in global health policy. Expanding on this, the World Health Organisation (WHO) issued a comprehensive report in 2008 on the current state of mental health provisions globally[11]. In response to its clinical, epidemiological and health economic findings, United Nations policy recommended a transition from tertiary, institutionalised mental healthcare towards the integration of mental health services into primary care with community support. This was projected to improve health outcomes, cost-effectiveness, access to services, and reduce human rights abuses and stigma.

To help countries achieve this, WHO identified ten key principles for mental healthcare integration, drawn from best practice examples worldwide[11]. One of these points recommended adequate training of primary care workers in diagnosing and treating mental ill-health, laid out in the WHO Mental Health Action Plan (2013-2020)[5] and the WHO Mental Health Gap Action Programme[12]. Such training is crucial to increase capacity for mental healthcare delivery across countries, particularly those with small or previously non-existent budgets for mental health. However, the effectiveness of such provisions in treating mental health disorders has not been systematically assessed.

Therefore, the purpose of this systematic review was to examine the global response to 2008 WHO policy on mental health training of non-specialist health workers. By identifying all published reports on evaluations of training that took place following WHO guidance, we aimed to systematically assess whether countries have responded to WHO's call for action, identify how such courses were run and evaluated, and identify patterns of good practice and outcomes of this training. The results of our analysis enabled us to develop recommendations for future courses, as well as to improve outcome and evaluation methods.

Data Collection

Search Strategy

This systematic review was completed and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[13]. The review and procedure are listed in PROSPERO (registration number: CRD42016033269). As this was an evidence synthesis of existing research, ethical approval was not required; however, we fully complied with the Declaration of Helsinki on medical research.

Aiming to identify publications on mental health training for non-specialist groups worldwide, we searched for terms related to mental health, training, community and evaluation in the following electronic databases on 31st May 2017: PubMed, PsycINFO, CINAHL (using EBSCOHost interface), Cochrane and Web of Science. We included controlled vocabulary terms for each database and searched for articles published from January 2008 to May 2017 (inclusive). The search strategy (Table 1) was designed after careful examination of key studies in the literature, and by following the Participants, Interventions, Comparators and Outcomes (PICO) process for evidence-based practice[14]. The full search strategy for the PubMed database is provided as an example in the Supplementary Material.

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Table 1. Systematic review search strategy following the PICO process for evidence-based practice.

Participants	Intervention		Outcome
Mental health	Train* (train, training)	Primary care	Evaluat* (evaluate, evaluation, evaluating)
Mental illness	Educat* (educate, education, educating)	Primary healthcare	Outcome
Mental disorder	Program (programme)	Primary health care	Detect* (detect, detection, detecting)
	Toolkit (tool kit)	Community care	Diagnos* (diagnose, diagnosis, diagnosing)
		Community healthcare	Measur* (measure, measurement, measuring)
		Community health care	Attitude
		Integration	Stigma
		Integrated care	
		Integrated healthcare	
		Integrated health care	

We included studies reported in English, meeting the following criteria in line with the PICO design:

- **Participants:** Following WHO guidance for increasing mental healthcare capacity through task-shifting[12], we included studies in which trainees were non-specialist healthcare workers (e.g. generalist medical practitioners, nurses, general community mental healthcare workers, and non-medical volunteers). Studies focusing on specialists (e.g. psychiatrists) and medical students were excluded as these groups may have received specialist training in addition to a short training course. In line with WHO guidance, we were interested in the efficacy of programs that could be readily administered without extensive training. We therefore wanted to ensure that this potential confounding factor was removed from our search strategy.
- **Intervention:** Studies describing the training course format and outcome in general mental health were included. Duration or format were not used as selection criteria. We excluded studies providing training to care for specific sub-populations (e.g. children, veterans, and/or specific ethnic groups), for one specific mental illness (e.g. depression alone), and those covering substance abuse (e.g. alcoholism) or mental illnesses secondary to other medical conditions (e.g. HIV/AIDS). A further search term, related to 'primary care', was instead used to identify courses that focused on integration of mental health into primary care in line with WHO guidelines.
- **Comparison:** Studies were not required to have a control comparison group, due to the exploratory nature of the review.
- **Outcomes:** We included studies that evaluated training course outcomes via quantitative or qualitative methods, or a combination of both. We excluded studies that did not provide any evaluation data.

References identified through the search strategy were uploaded into EndNote (X7, Thomson Reuters). After deduplication, titles and abstracts were independently double-screened following the eligibility criteria. Studies meeting the inclusion criteria were obtained as full text articles and independently double-screened by two reviewers using the same criteria. Entries that matched between the two reviewers were included. Un-matched entries were only included following resolution through discussion.

Data Extraction

Standardized, piloted data extraction sheets were developed to ensure consistency between studies. Data were extracted by one reviewer and independently double-checked by another. Additional quality control of a random sample was carried out by a third reviewer. Data extracted for each study included, where possible: primary care factors (country of origin, World Bank economic status, number and type of trainees), training factors (types of

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disorder included, method of training, duration and type of course, and frequency of training) and outcome factors (outcomes measured, method and timing of evaluation). Any disagreements were resolved through discussion.

Methodological Assessment

We followed the schema established by Liu et al.[15] for assessing methodological quality of mental health training courses in Africa, to allow wider comparisons within the field. This framework is based on a combination of validated methods, including the Newcastle-Ottawa Scale[16], Grading of Recommendations Assessment, Development and Evaluation (GRADE)[17] and Methodological Index for Non-Randomised Studies (MINORS)[18]. It examines the selection (five criteria) and evaluation methods (five criteria) in each study. Studies are given one point for each of the criteria they satisfy. Authors AC, GL and DV undertook this assessment and resolved any disagreements through discussion; TVB performed the quality control.

Classification of Training Courses and Outcomes

Course trainees were categorised according to WHO classifications of healthcare workers[19]. Since this only includes healthcare workers, we added three further categories, namely: volunteers, mental health consumers/carers, and non-medical staff. The latter included police officers, farm inspection officers, disaster relief staff, educators and housing outreach workers. Studies identified and included these groups as first-line contacts for communities in distress or those which are difficult to reach.

In terms of content, courses were classified as 'specific' if they addressed one particular aspect of mental healthcare (e.g. a specific management or counselling technique), and 'general' if they covered general psychiatry. A third category, 'emergency mental health', covered courses teaching Mental Health First Aid and Mental Health in Disaster Settings. Additionally, we screened courses to identify if they had specifically used the *mhGAP* guide to create training modules.

Following Liu et al.[15], interventions were classified as 'didactic' when they were exclusively made up of lectures and as 'interactive' when they included active trainee participation such as role play, small-group work, case discussions or clinical skills. 'Mixed sessions' included both didactic and interactive elements. We also used the schema adapted from Kirkpatrick[20] to classify types of evaluative outcome into one or more of seven areas: (a) satisfaction with training (evaluation of reaction), (b) change in attitude towards the importance of mental health, (c) change in confidence, (d) change in knowledge, (e) change in clinical skills (evaluation of learning), (f) change in clinical practice (evaluation of behaviour), and (g) change in patient outcomes (evaluation of results)[21]. For the purpose of this systematic review, we defined skill as the ability to perform a task well, usually gained by training or experience[22]. We then reported how this skill was measured. We deliberately followed similar classification strategies to Liu et al.[15] to encourage establishment of a systematic method of review in this area, allowing cross-comparison between reviews.

Patient and Public Involvement

There was no patient or public involvement in this review, this was a synthesis of existing published data.

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Findings

Our initial search identified 17,877 results after deduplication (n=3,600). Screening of abstracts for PICO eligibility criteria resulted in inclusion of 47 papers from Reviewer 1 and 64 papers from Reviewer 2. Studies were discussed by reviewers to agree upon validity of inclusion. Papers describing the same study were evaluated and excluded if they added no new information. A total of 30 studies were ultimately included, of which one was unobtainable. A random selection of papers was quality-controlled. Full PRISMA search strategy flow shown in Figure 1.

Figure 1. Prisma Search Strategy

Country and Economic Status

This systematic review identified that training interventions were implemented in 16 countries (Figure 2): four in the United Kingdom, three each in Australia, Canada and India, two each in China, Malawi, Nigeria and Zimbabwe, and one each in Iraq, Kenya, Nepal, Norway, Sierra Leone, Sri Lanka, United States of America and Pacific Small Island States. Countries were classified according to World Bank Economic Status (source: World Bank). Under this classification, six training courses took place in Low-Income settings, seven in Lower-Middle-Income settings, two in Upper-Middle-Income and 13 in High-Income settings. Pacific Small Island States was categorized as an 'Aggregates' nation. International organisations were involved in the implementation of two of the courses: The Catholic Agency for Overseas Development provided medication and funded counsellors' salaries for the course in Sierra Leone, and the International Medical Corps appointed mental health advisors to oversee training in Iraq.

Figure 2. Global Distribution of Training Courses for Included Studies

Studies were independently assessed by three reviewers using methodological criteria outlined by Liu et al.[15] (Table 2). Upon comparison of findings, differences were resolved through discussion. Two areas proved challenging to assess; first, an agreed threshold for 'sufficient' detail for selection of the training sample, and second an agreed threshold for 'representative' selection of the evaluation sample. To clarify, the 'training sample' were the participants selected as trainees for each course, and the 'evaluation sample' consisted of the subgroup of trainees selected to participate in feedback/evaluation. In many cases, the evaluation samples were convenience samples, based on who was available and willing to provide feedback, rather than a representative group.

The median score of the studies in the methodological evaluation was five. A training sample of over 30 people was recruited in 22 (76%) studies, while 17 (59%) used a cohort that was representative of the target population. Selection of the training sample was adequately described in 17 (59%) studies. Only six (21%) trials used a control cohort, of which five used randomisations (four at clinic level and two by individual participants).

Selection of the evaluation sample was well characterised in 26 (90%) studies, but only 19 (66%) fully reported their evaluation and ensured evaluation samples were representative. Pre-intervention assessment was carried out in 19 (66%) studies and only 13 (45%) included long-term evaluation. The six studies that used a control cohort all used more detailed assessment tools than simple questionnaires, such as blinded reviewer scoring of competence of simulated patient consultations, rate of accurate clinic detection of mental disorders, data on diagnoses made by participants and direct observation of health worker skills. Therefore, the high-quality studies differentiated themselves through randomisation and moving beyond evaluation through the standard pre- and post-intervention questionnaire.

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Table 2. Ten-point, methodological assessment scale of studies

		Training Sample					Evaluation of Intervention					Total Score
	Authors	Number of Trainees >30?	Training cohort representative of target training population?	Sufficient detail given for selection of training sample?	A control cohort?	Random assignment to a cohort?	Selection of evaluation sample clearly described?	A pre-intervention assessment of outcome measures done?	Is evaluation fully reported and representative of training sample?	Is there masked evaluation?	Long-term post-intervention evaluation (≥1 month) of outcomes?	Total Score
1	Abas et al (2016)	1	0	0	0	0	0	0	0	0	1	2
2	Abayomi (2012)	1	1	1	0	0	1	1	0	0	0	5
3	Adebowale et al (2015)	1	0	1	0	0	1	1	1	0	0	5
4	Alonso et al (2014)	0	0	0	0	0	0	0	0	0	1	1
5	Armstrong et al (2010)	1	0	1	1	1	1	1	1	1	0	8
6	Armstrong et al (2011)	1	1	0	0	0	1	1	1	0	1	6
7	Bowers et al (2009)	0	1	0	0	0	1	1	0	0	0	3
8	Chew-Graham et al (2014)	1	1	0	0	0	1	0	0	0	0	3
9	Chibanda et al (2016)	1	1	1	1	1	1	1	1	1	1	10
10	Church et al (2010)	1	0	0	0	0	1	1	0	0	1	4
11	Cook (2017)	1	1	1	0	0	1	0	1	0	0	5
12	Ekers et al (2013)	0	1	0	0	0	1	0	1	0	0	3
13	Ferraz et al (2009)	1	0	1	0	0	1	1	0	0	1	5
14	Hofmann-Braussard (2017)	1	1	1	1	1	1	1	1	1	0	9
15	Hossain et al (2010)	1	0	1	0	0	1	0	0	0	1	4
16	Jenkins et al (2013)	1	1	1	1	1	1	0	1	1	1	9
17	Jordans et al (2012)	1	1	1	0	0	1	1	1	0	1	7
18	Kauye et al (2014)	0	1	1	1	1	1	1	1	1	0	8
19	Lam et al (2016)	1	0	0	0	0	1	1	1	0	0	4
20	Li et al (2014)	1	1	1	0	0	1	1	1	0	0	6
21	MacCarthy et al (2013)	1	1	0	0	0	1	0	1	0	1	5
22	Morawska et al (2012)	1	1	1	0	0	1	1	1	0	1	7
23	Paudel et al (2014)	0	0	0	0	0	1	0	0	0	0	1
24	Ravitz et al (2013)	1	1	1	0	0	1	1	1	0	0	6
25	Ruud et al (2016)	1	0	0	0	0	0	0	0	0	1	2
26	Sadik et al (2011)	1	1	0	1	0	1	1	1	1	0	7

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27	Siriwardhana et al (2016)	0	0	1	0	0	1	1	1	0	0	4
28	Usher et al (2015)	0	0	1	0	0	1	1	1	0	0	4
29	Wright et al (2014)	1	1	1	0	0	1	1	1	0	1	7
	TOTAL	**22**	**17**	**17**	**6**	**5**	**26**	**19**	**19**	**6**	**13**	**150**

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Classification and Number of Trainees

Community health workers were the most common type of trainee (Table 3), featuring in more than half of interventions: 16 (55%). A total of ten courses (34%) trained nurses, seven (24%) trained general medical practitioners, seven (24%) trained social workers and/or counsellors, two (7%) trained health service managers, and one (3%) trained paramedics and clerical support workers. Seven courses (24%) trained non-medical staff, two (7%) trained volunteers, and one (3%) trained service users and carers. In 12 interventions (41%), more than one type of trainee participated. Of these, five courses (17%) trained two different types of participants, two (7%) trained three types of participants, four (14%) trained four types of participants, and one (3%) trained five types of participants. The latter course was particularly diverse, with trainees drawn from five different backgrounds, including physicians, nurses, social workers, paramedics and police officers. The number of trainees varied widely between interventions, ranging from just three to over 3500.

Course Content

Training course curricula varied (Table 3): 15 courses (52%) covered a 'general' curriculum, of which one also taught Mental Health First Aid, one additionally addressed stigma, and one included both. Of these general courses, two (7%) followed the same 5-day curriculum, namely the Kenya Medical Training College mental health primary care training toolkit created in Kenya and subsequently adapted for other countries. Eleven courses (38%) taught a 'specific' aspect of mental healthcare using a variety of previously established psychotherapies (e.g. Cognitive Behavioural Therapy), or focused on the development of teamwork skills via the New Ways of Working Framework, Access to Mental Health in Primary Care Programme, Rural Mental Health Inter-Professional Training Programme, and Friendship Bench Programme. These teamwork development programmes were specifically created for the training interventions, most of which were tailored to the socio-cultural background of the country in which they were implemented. Moreover, three courses (10%) focused on emergency mental health, of which two taught Mental Health First Aid and one taught Mental Health in Natural Disasters.

In terms of teaching methods, five courses (17%) used didactic methods and six (21%) used interactive methods, though the majority of courses (62%) used a combination of methods providing an immersive learning experience. One course (3%) also offered a choice of teaching methods, based on participants' favoured learning styles. In this case, trainees were more likely to drop out of self-directed learning than small group teaching. To provide access for remote trainees, two (7%) courses used videoconferencing.

Course lengths varied ranging from one day to spread across two years. More than half the courses (62%) ranged in length from one day to two weeks, and nine courses (31%) lasted between two weeks and two years. Length of training could not be determined for two courses (7%). Of the 29 courses identified by this study, 15 (52%) ran training over a continuous period, and 13 (45%) courses were sessional spread over a longer period. Course structure could not be determined for one course (3%).

Frequency of Training

Twelve studies (41%) incorporated data from the same course run on multiple occasions in different localities (to improve access for trainees). The total numbers trained across these courses are listed in Table 3. A further 8 studies (28%) reviewed courses which had already been evaluated elsewhere and then adapted to incorporate changes. It was difficult to determine total numbers trained over time for these courses. Of note, one study was a follow-up randomised clinical trial for the Friendship Bench Project in Zimbabwe, as recommended in an earlier evaluation of the same project.

Evaluation Methods

The majority of courses (66%) used a pre- and post-intervention design (Table 3). Eleven courses (38%) also collected evaluation data at later time-points post-course to assess longer-term changes, four were (14%) randomised controlled trials and one (3%) was a controlled trial. A total of ten courses (34%) collected outcome measures after the intervention only. Of these, three (10%) collected data at repeated time points post-intervention and one (3%) was a randomised controlled trial. One course (3%) was designed for data collection

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while the course was ongoing, comprising written feedback gathered from participants at the end of each training session.

The type of data collected and tools used for data collection varied enormously across interventions. The majority of courses (52%) collected quantitative data alone, whilst three courses (10%) collected qualitative data alone, and 11 courses (38%) collected both. The evaluation methods varied greatly with the majority of courses using written tools in the form of questionnaires or clinical vignettes. Further, focus groups or interviews with trainees were commonly used to establish the outcome of training courses. Some other courses examined case records or clinical notes of encounters to collect evaluation data, in several cases comparing clinical notes to patient status determined by previously validated screening tools, such as the General Health Questionnaire, Self-Rating Questionnaire and Structured Clinical Interview for DSM-IV for depression. In addition, a few courses used views of third parties as evaluation data (e.g. course facilitator's field notes, or subjecting trainees to observation by blinded psychiatrists who watched simulated videotaped consultations or clinical encounters with real patients).

Evaluation Outcomes

Course evaluation measures also varied (Table 4). The most commonly measured outcome (52%) was change in trainees' attitude towards mental health. Of these 15 courses, 13 found an improvement in attitude with six reporting significant improvements, five found a qualitative improvement and two found an absolute improvement from baseline. One course found no significant change in trainees' attitude pre- and post-intervention, and one course was an observational study testing significant difference in knowledge, attitude and clinical practice across trainee demographics, years of practice, practice setting, etc. The second most common outcome measured (45%) was knowledge. Of these, ten courses found an improvement in knowledge post-intervention, with six reporting significant improvement and four an absolute improvement. One course measured post-intervention knowledge only, reporting it as 'impressive', one course reported no significant improvement, and one was the observational study reported above. Clinical practice and clinical skills were measured by 11 courses (38%). Measurement of clinical practice was largely qualitative in nature, and suggested positive change in practice following training. Three courses (10%) attempted to quantify change in clinical practice, of which two found a significant improvement and one found no change. Clinical skills were assessed by 11 courses (38%). Of these, seven found a statistically significant improvement in clinical skills, two found a qualitative improvement, and two no improvement from baseline. Change in confidence was assessed by nine courses (31%), with seven finding statistically significant improvement in confidence, and two an absolute improvement from baseline. Clinical outcome was assessed by six courses (21%), which all showed positive outcomes. Finally, nine courses (31%) assessed trainees' satisfaction with the course. All received positive feedback from trainees, except the use of videoconferencing to facilitate remote learning. Trainees often offered helpful suggestions for improvement for future courses.

WHO Policy Uptake and Direction of Future Research

A total of six studies (21%) referenced the WHO Mental Health Gap Action Plan (World Health Organization, 2008) as their guiding principle, and five of these specifically used the mhGAP Intervention Guide to design training modules. A further nine studies (31%) used other works of the World Health Organization in their studies; in particular, the World Health Organization Disability Assessment Schedule version 2.0 (WHODAS 2.0)[23] to assess the outcomes of training, and the WHO Primary Care Guidelines for Mental Health[24]. One study (3%) was funded by WHO Department of Mental Health and Substance Abuse.

Four studies (14%) detailed plans for ongoing training and two studies (7%) were run as pilot studies for a future more comprehensive version of the training course. Most studies suggested themes for future research, including the need for larger and more diverse training samples, more objective outcomes, and more robust evidence in the form of randomised trials.

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Table 3. Details of the employed interventions from studies included in the systematic review

n	Authors	Location	Economic Status	Training Cohort Size	Training Cohort Occupations	Training Course Content	Delivery Method	Length	Course Type	Research Design
1	Abas et al. (2016)	Zimbabwe	Low Income	40-60	Community Health Workers	Specific: Friendship Bench	Combination	8 days	Continuous	Post-Intervention
2	Abayomi et al. (2012)	Nigeria	Lower Middle Income	31	Volunteers	General	Didactic	6 weeks	Sessional	Pre-Post Intervention
3	Adebowale et al. (2015)	Nigeria	Lower Middle Income	80	Community Health Workers, Nursing Professionals	General (*mhGAP)*	Combination	3 days	Continuous	Pre-Post Intervention
4	Alonso et al. (2014)	Sierra Leone	Low Income	3	Nursing Professionals, Social Work and Counselling Professionals	General (*mhGAP)*	Combination	8 weeks	Continuous	Post-intervention (RM)
5	Armstrong et al. (2010)	Australia	High Income	30	Social Work, Counselling Professionals	Specific: Cognitive Behavioural Therapy	Combination	3 weeks	Sessional	Pre-Post Intervention (RCT)
6	Armstrong et al. (2011)	India	Lower Middle Income	70	Community Health Workers	General (+MHFA)	Combination	4 days	Continuous	Pre-Post Intervention (RM)
7	Bowers and Burnett (2009)	UK	High Income	26	Community Health Workers	Specific: New Ways of Working Framework	Didactic	4 months	Sessional	Pre-Post Intervention
8	Chew-Graham et al. (2014)	UK	High Income	68	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Social Work and Counselling Professionals	Specific: Access to Mental Health in Primary Care Program Training*plus*	Didactic	Variable (1-7 sessions over unknown period)	Sessional	Post-intervention
9	Chibanda et al. (2016)	Zimbabwe	Low Income	96-288	Community Health Workers	Specific: Friendship Bench	Combination	9 days	Sessional	Pre-Post Intervention (RM; RCT)
10	Church et al. (2010)	Canada	High Income	125	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Paramedical Practitioners, Social Work and Counselling Professionals	Specific: Rural Mental Health Interprofessional Training Program	Interactive	4 months	Sessional	Pre-Post Intervention (RM)

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11	Cook et al. (2017)	USA	High Income	394	Generalist Medical Practitioners, Nursing Professionals, Non-Medical Staff, Social Work and Counselling Professionals	Specific: Motivational Interviewing	Combination	4-8 hours	Sessional	Post-intervention
12	Ekers et al. (2013)	UK	High Income	10	Nursing Professionals	Specific: Behavioural Activation	Combination	5 days	Continuous	Post-intervention
13	Ferraz and Wellman (2009)	UK	High Income	66	Health Service Managers, Volunteers	Specific: Solution Focused Brief Therapy	Interactive	2 days	Continuous	Pre-Post Intervention (RM)
14	Hofmann-Braussard et al. (2017)	India	Lower Middle Income	56	Community Health Workers	General (+MHFA +Stigma)	Combination	4 days	Sessional	Pre-Post Intervention (CT)
15	Hossain et al. (2010)	Australia	High Income	32	Non-Medical Staff	Emergency Mental Health: MHFA	Didactic	2 days	Continuous	Post-intervention
16	Jenkins et al. (2013)	Kenya	Lower Middle Income	98	Community Health Workers	General	Combination	5 days	Continuous	Post-intervention (RM; RCT)
17	Jordans et al. (2012)	Nepal	Low Income	109	Non-Medical Staff	Emergency Mental Health: Disaster Settings	Combination	2 days	Continuous	Pre-Post Intervention (RM)
18	Kauye et al. (2014)	Malawi	Low Income	22	Community Health Workers	General	Combination	5 days	Continuous	Pre-Post Intervention (RCT)
19	Lam et al. (2016)	Hong Kong (China)	High Income	151	Community Health Workers	General	Interactive	10 days	Sessional	Pre-Post Intervention
20	Li et al. (2014)	China	Upper Middle Income	99	Community Health Workers	General (+Stigma)	Didactic	1 day	Continuous	Pre-Post Intervention
21	MacCarthy et al. (2013)	Canada	High Income	>1400	Generalist Medical Practitioners	Specific: Cognitive Behavioural Interpersonal Skills (+MHFA)	Combination	3 days	Sessional	Post-intervention (RM)
22	Morawska et al. (2013)	Australia	High Income	458	Consumers or Carers, Health Service Managers, NonMedical Staff	Emergency Mental Health: MHFA	Interactive	2 days	Continuous	Pre-Post Intervention (RM)

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23	Paudel et al. (2014)	India	Lower Middle Income	24	Community Health Workers	General	Interactive	ND	ND	Post-intervention
24	Ravitz et al. (2013)	Canada	High Income	93	Community Health Workers, Nursing Professionals, Non-Medical Staff	Specific: Cognitive Behavioural Therapy, Interpersonal Psychotherapy, Motivational Interviewing, Dialectical Behaviour Therapy	Interactive	5 weeks	Sessional	Pre-Post Intervention
25	Ruud et al. (2016)	Norway	High Income	>3500	Community Health Workers, Generalist Medical Practitioners, Nursing Professionals, Social Work and Counselling Professionals	General	Combination	2 years	Sessional	Post-intervention
26	Sadik et al. (2011)	Iraq	Upper Middle Income	317	Community Health Workers, Generalist Medical Practitioners, Nursing Professionals, Social Work and Counselling Professionals	General	Combination	10 days	Continuous	Pre-Post Intervention (RM)
27	Siriwardhana et al. (2016)	Sri Lanka	Lower Middle Income	12	Generalist Medical Practitioners	General (*mhGAP)*	Combination	3 days	Continuous	Pre-Post Intervention
28	Usher et al. (2014)	Pacific Island Small States	Aggregates	18	Community Health Workers, Nursing Professionals	General (*mhGAP)*	Combination	4 weeks	Continuous	Pre-Post Intervention
29	Wright et al. (2014)	Malawi	Low Income	271	Community Health Workers	General (*mhGAP)*	Combination	6 months	Sessional	Pre-Post Intervention (RM)

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Table 4. Outcomes and key findings of the studies included in the systematic review

n	Authors	Location	Economic Status	Outcome Measure	Outcome Type	Outcome Method	Significance	Key Findings
1	Abas et al. (2016)	Zimbabwe	Low Income	Satisfaction, Attitude, Clinical Outcome	Mixed	Interview/Focus Group		Training was positively received by patients, and was found rewarding for lay health workers to deliver.
2	Abayomi et al. (2012)	Nigeria	Lower Middle Income	Attitude	Quantitative	Questionnaire	Significant improvement	Training reduced perceived dangerousness and improved attitude towards persons with mental health problems.
3	Adebowale et al. (2015)	Nigeria	Lower Middle Income	Clinical Skills	Quantitative	Vignette	Significant improvement	Training improved knowledge and expected mental health practice with greater effect on case management than case recognition.
4	Alonso et al. (2014)	Sierra Leone	Low Income	Clinical Outcome, Clinical Practice	Quantitative	Questionnaires, Case Record Examination		Trained primary health workers could deliver safe and effective treatment for mental health disorders.
5	Armstrong et al. (2010)	Australia	High Income	Confidence, Clinical Skills	Quantitative	Questionnaire, Interview	Significant improvement	Training improved objective competence and subjective confidence in delivering cognitive behavioural therapy.
6	Armstrong et al. (2011)	India	Lower Middle Income	Attitude, Clinical Skills	Quantitative	Vignette	Significant improvement	Training improved ability to recognise mental disorders, reduced faith in unhelpful interventions and reduced stigmatising attitudes.
7	Bowers and Burnett (2009)	UK	High Income	Confidence and Knowledge	Quantitative	Questionnaire		Training increased confidence regarding mental health disorder assessments and in making clinical diagnoses.
8	Chew-Graham et al. (2014)	UK	High Income	Clinical Practice, Satisfaction	Qualitative	Interview/Focus Group		Training increased awareness, recognition and respect for the needs of patients from under-served communities.
9	Chibanda et al. (2016)	Zimbabwe	Low Income	Clinical Outcome	Quantitative	Questionnaire	Significant improvement	Lay health worker-administered, primary care-based problem-solving therapy with education and support improved patient symptoms.
10	Church et al. (2010)	Canada	High Income	Attitude, Clinical Practice, Confidence, Satisfaction	Mixed	Questionnaire, Written Feedback, Interview/Focus group, Facilitator's Notes	Significant improvement	Training heightened awareness of and improved confidence in mental health issues and interventions, while increasing interprofessional collaborations.

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11	Cook et al. (2017)	USA	High Income	Attitude, Clinical Practice, Knowledge	Mixed	Questionnaire		Trainees' professional diversity increased over time. Health professionals had higher scores on some outcome variables than non-health professionals.
12	Ekers et al. (2013)	UK	High Income	Clinical Outcome and Satisfaction	Mixed	Questionnaire		Trainees found the training acceptable and useful.
13	Ferraz and Wellman (2009)	UK	High Income	Clinical Practice, Knowledge	Quantitative	Questionnaire	Significant improvement	Training increased participants' knowledge and understanding of solution-focused brief therapy and their use of the techniques in routine clinical practice.
14	Hofmann-Braussard et al. (2017)	India	Lower Middle Income	Attitude, Confidence, Knowledge	Mixed	Questionnaire, Vignette	Significant improvement	Training increased ability to recognize mental health disorders, decreased stigma and increased competence in working with people who have poor mental health.
15	Hossain et al. (2010)	Australia	High Income	Confidence, Knowledge, Satisfaction	Mixed	Interview/Focus Group		Training improved participants' confidence in and knowledge of mental health issues and increased their empathy toward persons with mental health problems.
16	Jenkins et al. (2013)	Kenya	Lower Middle Income	Clinical Outcome, Clinical Skills	Quantitative	Questionnaire, Clinical Notes	Significant improvement	Training showed no effect on recorded diagnostic rates of mental health disorders, but improved patient outcomes.
17	Jordans et al. (2012)	Nepal	Low Income	Knowledge	Quantitative	Questionnaire, Vignette	Significant improvement	Training improved mental health literacy for complex emergencies.
18	Kauye et al. (2014)	Malawi	Low Income	Clinical Skills	Quantitative	Questionnaire, Clinical Notes	Significant improvement	Training improved quality of detection and management of patients with mental health disorders.
19	Lam et al. (2016)	Hong Kong (China)	High Income	Attitude, Confidence, Clinical Practice	Mixed	Questionnaire	Significant improvement	Training improved confidence in the recognition, diagnosis and management of mental health issues.
20	Li et al. (2014)	China	Upper Middle Income	Attitude and Knowledge	Quantitative	Questionnaire, Vignette	Significant improvement	Training did not have an effect on knowledge, but improved attitude towards people with mental health problems.
21	MacCarthy et al. (2013)	Canada	High Income	Attitude, Confidence, Clinical Outcome, Clinical Practice, Satisfaction	Quantitative	Questionnaire	Significant improvement	Training had a positive impact on patient outcomes and decreased stigmatizing attitudes.

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22	Morawska et al. (2013)	Australia	High Income	Attitude, Clinical Skills	Mixed	Questionnaire, Vignette, Interview/Focus Group	Significant improvement	Training increased recognition of mental illnesses, confidence in providing help and treatment, and reduced stigmatizing attitudes with positive long-term effects.
23	Paudel et al. (2014)	India	Lower Middle Income	Attitude, Knowledge, Practice	Qualitative	Focus Group		Training improved the identification of symptoms and ability to suggest management options and increased empathetic attitudes towards patients.
24	Ravitz et al. (2013)	Canada	High Income	Attitude, Clinical Skills, Confidence, Knowledge,	Mixed	Questionnaire, Focus Group	Significant improvement	Training heightened knowledge in mental health issues, improved confidence, morale, practice behaviour changes.
25	Ruud et al. (2016)	Norway	High Income	Attitude, Clinical Skills, Practice, Satisfaction	Qualitative	Questionnaire, Interview		Training improved recruitment, satisfaction among participants and service managers, strengthened clinical competence, increased understanding and mutual respect between professional groups and service levels, and increased focus on user involvement and influence.
26	Sadik et al. (2011)	Iraq	Upper Middle Income	Attitude, Clinical Skills, Clinical Practice, Knowledge, Satisfaction	Quantitative	Questionnaire, Clinical Notes, Interview	Significant improvement	Training improved knowledge in mental health issues, and demonstration of practical skills in the workplace.
27	Siriwardhana et al. (2016)	Sri Lanka	Lower Middle Income	Knowledge, Satisfaction	Mixed	Questionnaire, Interview		Training improved overall knowledge in mental illnesses and mental health care.
28	Usher et al. (2014)	Pacific Island Small States	Aggregates	Attitude, Clinical Skills, Knowledge	Quantitative	Questionnaire	Significant improvement	Training improved the knowledge, skills, and attitudes of people who care for persons experiencing mental health problems.
29	Wright et al. (2014)	Malawi	Low Income	Confidence, Clinical Practice, Clinical Skills, Knowledge	Mixed	Questionnaire, Clinical Notes	Significant improvement	Training had positive effect on knowledge and confidence in providing care, and increased mental health promotion activity.

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Discussion

Short mental health training for generalised health workers improves knowledge, attitude, skill and confidence, leading to improved clinical practice and better patient outcome. Crucially, such courses are cost-effective in low-resource settings and well-accepted by trainees.

Based on our search criteria, 29 studies evaluated relevant training courses since 2008 across 16 countries globally, and across a range of economic status categories. Over a third of courses (34%) were run in three high-income countries: United Kingdom, Canada and Australia. Courses may be easier to run in high-income settings, especially considering the associated costs, and the fact that low-income settings may lack a comprehensive primary care system to allow integration of mental healthcare. Despite this, eight low- or lower-middle income countries set up 13 training courses; hence, perhaps a more important factor is the commitment of mental health researchers and stakeholders within these countries, which is supported by the fact that half of the countries involved set up more than one training course since 2008. Another factor may be international collaborations where high-income partners help deliver training in low- and middle-income settings. It is also important to note that this review only included studies which provided an evaluation of training; other 'unevaluated' courses may have contributed to a broader 'global' uptake. Evaluations done well are costly and time-consuming so it may be that funds have been focussed on training at the cost of evaluation.

Training courses varied enormously in size and trainee demographics, and included practice receptionists, police officers, disaster relief staff, educators and farm inspection officers. This is in line with WHO strategy to integrate mental healthcare into the community. Notably, new categories were required in our review for trainees who did not fit the current WHO classification of healthcare workers. This suggests that the classification may need updating to reflect the role of individuals without formal healthcare training who have unique access to remote or difficult-to-reach communities.

WHO did not define a suggested length for short mental health training courses, leading to varied interpretations, ranging from one day to two years. Training methods also varied. This flexibility is important for optimising each course to its particular cultural setting and available resources, and follows WHO's exemplary 'best practice' vignettes encouraging context-specific integration of mental health into primary care. Qualitative feedback from trainees suggest that culturally specific interventions, and flexibility of training, are key to course acceptability. These 'culturally and context specific' lessons are very useful for the design of future courses, as they often throw up idiosyncratic improvements for different situations, such as the success of yoga in India[25], seed planting in Uganda[26], or the Friendship Bench in Zimbabwe.

This systematic review found that data collection in the field was markedly inconsistent, a problem also noted by Liu et al.[15] Method, timing and outcomes for evaluation varied enormously, making it difficult to compare data across studies and draw out bigger trends, though this is perhaps a consequence of ensuring that courses remain 'culturally and context specific'. It is encouraging to see many courses measuring change in attitude amongst healthcare workers as stigma remains a key problem in access to good mental healthcare globally. However, it is not clear if an improvement in many of the outcomes measured (trainee knowledge, attitude, confidence etc.) actually correlates with an improved outcome for patients, and a disappointing number of studies focussed on outcomes for patients. This may be due to logistical and ethical difficulties, or possibly ongoing stigma. It represents a key area for future research.

Interestingly, though this review was designed to evaluate progress since 2008 when WHO policy recommended the integration of mental healthcare into primary care, only 16 studies identified works by the WHO as design aids for the training courses, and only 6 used mhGAP specifically. This may reflect an increased need for promotion of global policy change and the tools available, or a tendency by individual countries to base new schemes on past government-led initiatives. Nevertheless, progress in the field is promising. All 29 courses found at least some degree of improvement in outcome after training, suggesting that training non-specialist health workers is a cost-effective strategy in increasing global capacity for mental healthcare, and a field of increasing interest, with over half the studies taking place from 2014-2017. The recognition of mental health within global health and development priorities is also reflected by its incorporation into the United Nations Sustainable Development Agenda for 2030, and the launch of the WHO/World Bank 2016 event 'Out of the Shadows: Making Mental Health a Global Priority'.

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Limitations

This study has some limitations. First, it did not include studies which evaluated training for medical specialists (i.e. non- general practitioners) or students, or training targeting specific sub-populations (e.g. refugees), or single conditions (e.g. depression only). Second, publications on training without evaluation were not included; hence, there may be several more (effective) mental health training courses for non-specialist health workers globally. Third, on occasion it proved difficult to categorise outcomes according to the schema mentioned above; for instance, it is difficult to know whether to classify the ability to identify mental health disorders in vignettes as skill or knowledge. We consistently categorized this as skill, in line with the definition of skill used by Kirkpatrick et al.[20] as 'the ability to perform a task well, usually gained by training or experience'. We are aware that the interpretation of other researchers on this point may vary. Unfortunately, due to lack of resources and researcher unavailability, we were unable to re-run our search after 31st May 2017; more studies may well have been published since the end date of our search, which are not included in this review.

Conclusions

Training non-specialist health workers is an effective strategy to increase global capacity for mental healthcare, improving knowledge, attitude, skill and confidence, as well as clinical practice and patient outcome. Existing studies provide examples of many training and evaluation methods, but evidence to draw conclusions on the efficacy of different training techniques is insufficient. Areas for future focus include developing standardised evaluation methods and outcomes to allow cross-comparison between studies, and optimisation of course structure.

Authorship Contribution Statement

- Alexandra Caulfield* - literature search, figures, study design, data collection, data analysis, data interpretation, writing, critical revision

- Deniz Vatansever* - literature search, figures, study design, data collection, data analysis, data interpretation, writing, critical revision, referencing

- Gabriel Lambert - data analysis and data interpretation (methodological quality of studies only)

- Tine Van Bortel - literature search, data collection, data analysis, data interpretation, writing, critical revision

**These authors contributed equally to this work.*

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Declaration of Interests

The authors declare no conflicts of interest.

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Data Sharing Statement

No additional data available.

Figure Legends

Figure 1. Primary Search Strategy

Figure 2. Global Distribution of Training Courses for Included Studies

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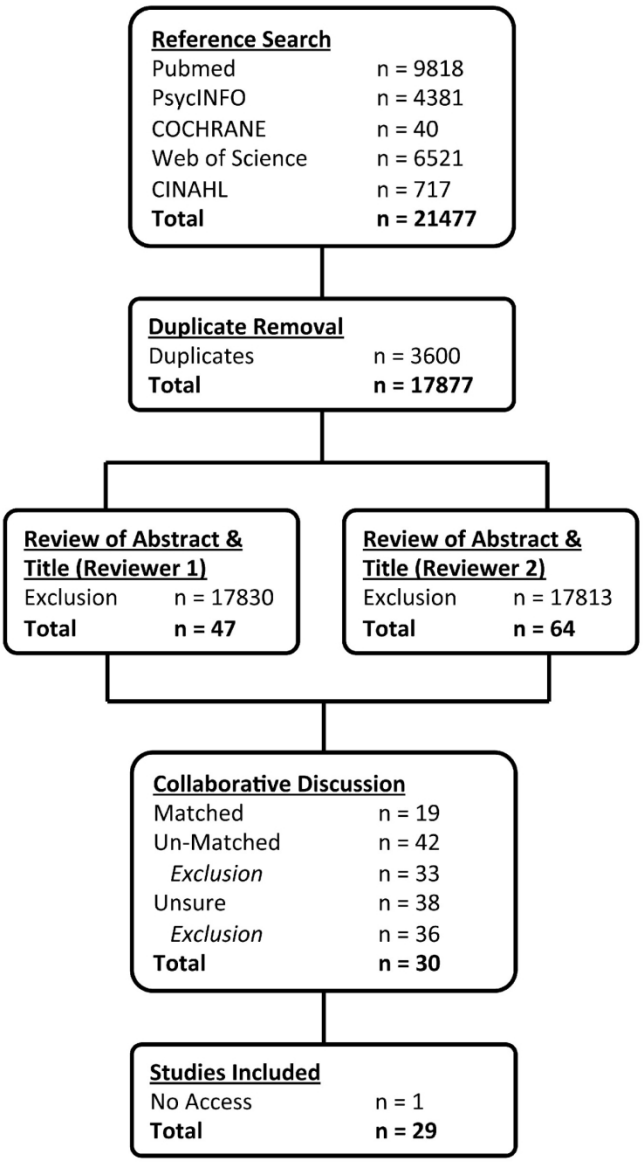

Figure 1. Prisma Search Strategy

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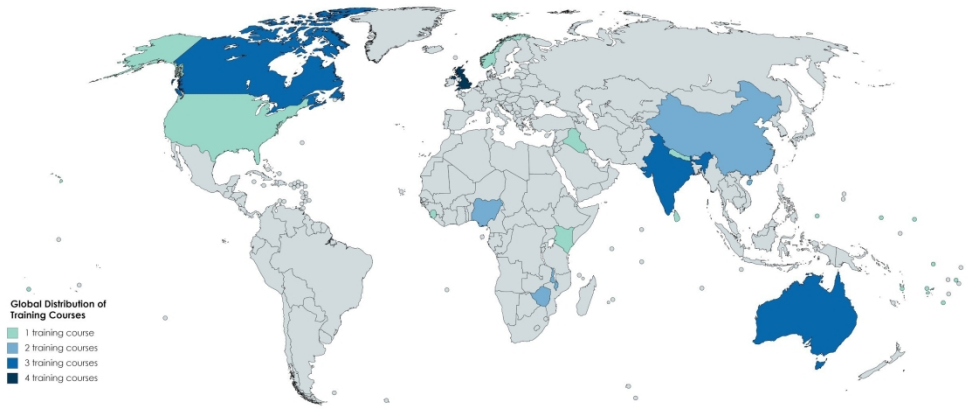

Figure 2. Global Distribution of Training Courses for Included Studies Methodological Quality (created with mapchart.net)

Supplementary Material: World Health Organisation Guidance on Mental Health Training: A Systematic Review of the Progress for Non-specialist Health Workers

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Supplementary Methods

We provide the full search strategy for the PubMed database including user query, the database specific translation, the final query translation and the associated PubMed MeSH terms.

PubMed Query

((((((mental health) OR mental illness) OR mental disorder)) AND ((((((((train) OR training) OR educate) OR education) OR educating) OR program) OR programme) OR toolkit) OR tool kit)) AND ((((((((primary care) OR primary healthcare) OR primary health care) OR community care) OR community healthcare) OR community health care) OR integration) OR integrated care) OR integrated healthcare) OR integrated health care)) AND ((((((((((((evaluate) OR evaluation) OR evaluating) OR outcome) OR detect) OR detection) OR detecting) OR diagnose) OR diagnosis) OR diagnosing) OR measure) OR measurement) OR measuring) OR attitude) OR stigma)

Table S1. PubMed Translation

mental health	"mental health"[MeSH Terms] OR ("mental"[All Fields] AND "health"[All Fields]) OR "mental health"[All Fields]
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mental disorder	"mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "disorder"[All Fields]) OR "mental disorder"[All Fields]
training	"education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields]
educate	"teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educate"[All Fields]
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educating	"teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educating"[All Fields]
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integration	"Integration"[Journal] OR "Integration (Amst)"[Journal] OR "integration"[All Fields]
integrated care	"Int J Integr Care"[Journal] OR ("integrated"[All Fields] AND "care"[All Fields]) OR

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	"integrated care"[All Fields]
healthcare	"delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR "healthcare"[All Fields]
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evaluation	"Evaluation"[Journal] OR "Evaluation (Lond)"[Journal] OR "evaluation"[All Fields]
diagnose	"diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnose"[All Fields]
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measure	"weights and measures"[MeSH Terms] OR ("weights"[All Fields] AND "measures"[All Fields]) OR "weights and measures"[All Fields] OR "measure"[All Fields]
measurement	"Measurement (Lond)"[Journal] OR "Measurement (Mahwah N J)"[Journal] OR "measurement"[All Fields]
attitude	"attitude"[MeSH Terms] OR "attitude"[All Fields]
stigma	"social stigma"[MeSH Terms] OR ("social"[All Fields] AND "stigma"[All Fields]) OR "social stigma"[All Fields] OR "stigma"[All Fields]

PubMed Query Translation

(((((("mental health"[MeSH Terms] OR ("mental"[All Fields] AND "health"[All Fields]) OR "mental health"[All Fields]) OR ("mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "illness"[All Fields]) OR "mental illness"[All Fields])) OR ("mental disorders"[MeSH Terms] OR ("mental"[All Fields] AND "disorders"[All Fields]) OR "mental disorders"[All Fields] OR ("mental"[All Fields] AND "disorder"[All Fields]) OR "mental disorder"[All Fields])) AND (((((((train[All Fields] OR ("education"[Subheading] OR "education"[All Fields] OR "training"[All Fields] OR "education"[MeSH Terms] OR "training"[All Fields])) OR ("teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educate"[All Fields])) OR ("education"[Subheading] OR "education"[All Fields] OR "educational status"[MeSH Terms] OR ("educational"[All Fields] AND "status"[All Fields]) OR "educational status"[All Fields] OR "education"[All Fields] OR "education"[MeSH Terms])) OR ("teaching"[MeSH Terms] OR "teaching"[All Fields] OR "educating"[All Fields])) OR program[All Fields]) OR programme[All Fields]) OR toolkit[All Fields]) OR (tool[All Fields] AND kit[All Fields]))) AND ((((((((("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "care"[All Fields]) OR "primary care"[All Fields]) OR ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields])) OR ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields])) OR (("residence characteristics"[MeSH Terms] OR ("residence"[All Fields] AND "characteristics"[All Fields]) OR "residence characteristics"[All Fields] OR "community"[All Fields]) AND care[All Fields])) OR ("community health services"[MeSH Terms] OR ("community"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "community health services"[All Fields] OR ("community"[All Fields] AND "healthcare"[All Fields]) OR "community healthcare"[All Fields])) OR ("community health services"[MeSH Terms] OR ("community"[All Fields] AND "health"[All Fields] AND "services"[All Fields]) OR "community health services"[All Fields] OR ("community"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "community health care"[All Fields])) OR ("Integration"[Journal] OR "Integration (Amst)"[Journal] OR "integration"[All Fields])) OR ("Int J Integr Care"[Journal] OR ("integrated"[All Fields] AND "care"[All Fields]) OR "integrated care"[All Fields])) OR (integrated[All Fields] AND ("delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR "healthcare"[All Fields]))) OR (integrated[All Fields] AND ("delivery of health care"[MeSH Terms] OR ("delivery"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "delivery of health care"[All Fields] OR ("health"[All Fields] AND "care"[All Fields]) OR "health care"[All Fields])))) AND ((((((((((((evaluate[All Fields] OR ("Evaluation"[Journal] OR "Evaluation (Lond)"[Journal] OR "evaluation"[All Fields])) OR evaluating[All Fields]) OR outcome[All Fields]) OR detect[All Fields]) OR

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detection[All Fields]) OR detecting[All Fields]) OR ("diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnose"[All Fields])) OR ("diagnosis"[Subheading] OR "diagnosis"[All Fields] OR "diagnosis"[MeSH Terms])) OR ("diagnosis"[MeSH Terms] OR "diagnosis"[All Fields] OR "diagnosing"[All Fields])) OR ("weights and measures"[MeSH Terms] OR ("weights"[All Fields] AND "measures"[All Fields]) OR "weights and measures"[All Fields] OR "measure"[All Fields])) OR ("Measurement (Lond)"[Journal] OR "Measurement (Mahwah N J)"[Journal] OR "measurement"[All Fields])) OR measuring[All Fields]) OR ("attitude"[MeSH Terms] OR "attitude"[All Fields])) OR ("social stigma"[MeSH Terms] OR ("social"[All Fields] AND "stigma"[All Fields]) OR "social stigma"[All Fields] OR "stigma"[All Fields]))

Table S2. PubMed MeSH Terms

Entry Term	MeSH Terms
mental health	• Health, Mental • Mental Hygiene • Hygiene, Mental
mental disorders	• Disorder, Mental • Disorders, Mental • Mental Disorder • Diagnosis, Psychiatric • Psychiatric Diagnosis • Behavior Disorders • Disorders, Behavior • Mental Disorders, Severe • Disorder, Severe Mental • Disorders, Severe Mental • Mental Disorder, Severe • Severe Mental Disorder • Severe Mental Disorders
education	• Workshops • Workshop • Training Programs • Program, Training • Programs, Training • Training Program • Educational Activities • Activities, Educational • Activity, Educational • Educational Activity • Literacy Programs • Literacy Program • Program, Literacy • Programs, Literacy
teaching	• Training Techniques • Technique, Training • Techniques, Training • Training Technique • Training Technics • Technic, Training • Technics, Training • Training Technic

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	• Pedagogy • Pedagogies • Teaching Methods • Method, Teaching • Methods, Teaching • Teaching Method • Academic Training • Training, Academic • Training Activities • Activities, Training • Training Activity • Techniques, Educational • Technics, Educational • Educational Technics • Educational Technic • Technic, Educational • Educational Techniques • Educational Technique • Technique, Educational
educational status	• Educational Achievement • Status, Educational • Achievement, Educational • Achievements, Educational • Educational Achievements • Educational Status, Maternal • Status, Maternal Educational • Maternal Educational Status • Educational Status, Paternal • Status, Paternal Educational • Paternal Educational Status
primary health care	• Care, Primary Health • Health Care, Primary • Primary Healthcare • Healthcare, Primary • Primary Care • Care, Primary
community	• Characteristic, Residence • Characteristics, Residence • Residence Characteristic • Domicile • Domiciles • Residential Selection • Residential Selections • Selection, Residential • Selections, Residential • Neighborhood • Neighborhoods • Place of Birth • Birth Place • Community • Communities

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	• Living Arrangements • Arrangement, Living • Arrangements, Living • Living Arrangement
community health services	• Health Services, Community • Community Health Service • Health Service, Community • Service, Community Health • Services, Community Health • Community Health Care • Care, Community Health • Health Care, Community • Community Healthcare • Community Healthcares • Healthcare, Community • Healthcares, Community
delivery of health care	• Healthcare Delivery • Deliveries, Healthcare • Delivery, Healthcare • Delivery of Healthcare • Healthcare Deliveries • Health Care Delivery • Delivery, Health Care • Contraceptive Distribution • Contraceptive Distributions • Distribution, Contraceptive • Distributions, Contraceptive • Delivery of Dental Care • Dental Care Delivery • Delivery, Dental Care • Health Care • Care, Health • Healthcare • Health Care Systems • Health Care System • System, Health Care • Systems, Health Care • Healthcare Systems • Healthcare System • System, Healthcare • Systems, Healthcare • Nonclinical Distribution • Distributions, Nonclinical • Nonclinical Distributions • Distribution, Nonclinical • Distribution, Non-Clinical • Distribution, Non Clinical • Distributions, Non-Clinical • Non-Clinical Distributions • Non-Clinical Distribution • Non Clinical Distribution • Community-Based Distribution • Community Based Distribution

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	• Community-Based Distributions • Distribution, Community-Based • Distributions, Community-Based • Distributional Activities • Activities, Distributional • Activity, Distributional • Distributional Activity
diagnosis	• Diagnoses • Diagnoses and Examinations • Examinations and Diagnoses • Postmortem Diagnosis • Diagnoses, Postmortem • Diagnosis, Postmortem • Postmortem Diagnoses • Antemortem Diagnosis • Antemortem Diagnoses • Diagnoses, Antemortem • Diagnosis, Antemortem
weights and measures	• Measures and Weights • Weights • Measures • Measure • Scales
attitude	• Attitudes • Opinions • Opinion
social stigma	• Social Stigmas • Stigmas, Social • Stigma, Social

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	4-5
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	4
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	4-5
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	4
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	4-5
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	5
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	5
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	4-6
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	5-6
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	5-6
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	5-6

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	5-6
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	5-6
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	9-16
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	8-10
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	9-10
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	11-12
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	11-12
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	11-12
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	17
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	17-18
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	18
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	18

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit: **www.prisma-statement.org**.

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