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ORIGINAL ARTICLE

Mobilizing Community Health Workers to Address Mental Health Disparities for Underserved Populations: A Systematic Review

Miya L. Barnett[1] · **Araceli Gonzalez**[2] · **Jeanne Miranda**[3] · **Denise A. Chavira**[4] · **Anna S. Lau**[4]

Abstract This systematic review evaluates efforts to date to involve community health workers (CHWs) in delivering evidence-based mental health interventions to underserved communities in the United States and in low- and middle-income countries. Forty-three articles (39 trials) were reviewed to characterize the background characteristics of CHW, their role in intervention delivery, the types of interventions they delivered, and the implementation supports they received. The majority of trials found that CHW-delivered interventions led to symptom reduction. Training CHWs to support the delivery of evidence-based practices may help to address mental health disparities. Areas for future research as well as clinical and policy implications are discussed.

Keywords Community health workers · Mental health disparities

Introduction

Globally and domestically, the gap between individuals who need mental health care and those who receive it is sizeable (Roll et al. 2013). In low- and middle-income countries (LMICs), over 75% of individuals who would benefit from care do not receive it (World Health Organization 2008, 2010). In the United States (US), ethnic and racial minorities are less likely to receive mental health treatment than non-Hispanic white individuals (Alegría et al. 2008; Coker et al. 2009; Wells et al. 2001). In both contexts, when treatment is available for underserved communities, it is rarely evidence-based or high quality (Alegría et al. 2008; Dua et al. 2011). Making evidence-based treatments (EBTs) or evidence-informed practices accessible for underserved communities has been a major focus of international and domestic policies as a strategy to reduce the global burden of mental disorders (Barry and Huskamp 2011; Becker and Kleinman 2013; World Health Organization 2010). The World Health Organization (WHO) launched the Mental Health Gap Action Programme to scale-up EBTs for individuals with mental health, neurological, and substance use disorders in LMICs (Dua et al. 2011; World Health Organization 2010). Domestically, the Patient Protection and Affordable Care Act emphasizes the provision of evidence-based care (Barry and Huskamp 2011). However, even with these policies in place, innovative solutions and a public health model of workforce development are needed to address existing mental health disparities. This systematic review consolidates literature for one recommended solution to address mental health disparities in the US and LMICs—the incorporation of community health workers (CHWs) into mental health service delivery (Acevedo-Polakovich et al. 2013; Chavira et al. 2015; Kazdin and Rabbitt 2013; van Ginneken et al. 2012).

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CHWs have been referred to by a variety of terms, including but not limited to, *promotores*, lay health workers, lay providers, indigenous paraprofessionals, peer support specialists, and natural helpers. In this review, we use the term CHW for interventionists without formal mental health training and who are members of the community they serve (Ayala et al. 2010; Viswanatha et al. 2010). CHW-delivered mental health interventions can increase the availability of care, given substantial workforce challenges to meet service needs. In the US, the number of interventionists that can provide linguistically and culturally appropriate care is insufficient to address the needs of vulnerable populations (Kakuma et al. 2011; McGuire and Miranda 2008). In LMICs, there is a substantial shortage of mental health professionals, with one study estimating that 239,000 additional providers are needed to address the needs of 58 countries (Bruckner et al. 2011). CHWs can provide cost-effective care in low-resourced communities and agencies (Buttorff et al. 2012, Kazdin and Rabbit 2013).

Even when services are available, a wide range of factors impact whether individuals access or seek care, including, structural barriers (e.g., lack of transportation), low mental health literacy, mental health stigma, and negative perceptions of mental health care providers (Alegría et al. 2010; Chow et al. 2003; Kilbourne et al. 2006; Nadeem et al. 2007). Furthermore, individuals from non-Western cultures may conceptualize their mental health symptomatology as being related to spiritual or metaphysical factors, and prefer to seek care from traditional healers or religious centers as opposed to mental health providers (Raguram et al. 2002; Saravanan et al. 2007). As members of the communities they serve, CHWs may be uniquely positioned to build trust and address barriers to seeking care among traditionally underserved communities (Katigbak et al. 2015). Relatedly, CHWs can reduce the stigma associated with receiving mental health care, which in turn has been shown to increase service engagement even for highly stigmatized conditions such as HIV and schizophrenia (Balaji et al. 2012; Morris et al. 2009).

Current Models of CHW-Involved Care

CHW models of care delivery have been used most frequently to address physical health disparities. For example, CHWs have been found to be effective for promoting the rates of childhood immunizations and improving outcomes for individuals with chronic health conditions such as diabetes, obesity, and asthma (Ayala et al. 2010; Lewin et al. 2010; Perry et al. 2014; Rhodes et al. 2007; Viswanathan et al. 2010). Given the growing evidence that CHWs are effective in improving physical health outcomes, increased attention has been focused on incorporating CHWs into mental health services (e.g., Stacciarini et al. 2012). Existing models for incorporating CHWs in mental health interventions can be classified into four categories: (1) CHWs can conduct outreach to facilitate entry into provider settings, a role that has been described as a "bridge" between the community and care providers (e.g., Ayala et al. 2010); (2) CHWs can provide auxiliary support of mental health treatment delivery through case management and promotion of patient adherence to treatment (e.g., Barnett et al. 2016); (3) within a stepped-care model, CHWs can provide lower levels of care to patients with less intensive needs while mental health professionals provide a higher level of care to patients with more severe symptomatology (e.g., Araya 2006; Patel et al. 2010); (4) finally, CHWs can be responsible for the delivery of mental health services as the sole treatment provider (e.g., Bolton et al. 2014a; Murray et al. 2015).

Although there have been successful examples employing CHWs in each of these functions, there remain multiple practical, implementation, and policy questions about the most appropriate roles for CHWs both domestically and globally. These questions are especially relevant to the provision of EBTs or evidence-informed practices, as individuals with advanced training in mental health (e.g., Master's or Doctorate degrees in Psychology or Social Work) typically deliver these interventions. In order to establish the extent to which CHWs can reduce population mental health burden, it will be useful to review the types of interventions they have delivered successfully. Beyond identifying the most appropriate interventions to deliver, it remains to be seen which CHWs functions may be most effective in increasing access to care and the effectiveness of services provided (van Ginneken et al. 2012). Given differences in the availability of mental health providers in the US and LMICs and local regulations in who can provide care, it is likely that the roles that CHWs can occupy will vary based on location. Regarding implementation, the level of training and support that CHW must receive to effectively carry out these various roles has not been established, though limited data suggests that ongoing supervision is needed (Rhodes et al. 2007).

Recently, a Cochrane review was conducted to investigate the effectiveness of mental health service delivery by "non-specialist health workers" in LMICs (van Ginneken et al. 2012). Non-specialist health workers included CHWs, along with other professional health workers (e.g., nurses, doctors), and teachers without formal mental health training. The objective of the Cochrane review was to identify whether non-specialized health workers were effective in reducing the global health burden of mental, neurological, and substance abuse disorders in developing countries. The review concluded that non-specialized health workers were effective in improving outcomes for depression,

post-traumatic stress disorder, and alcohol use disorder. The authors recommended that future systematic reviews focus on identifying strategies to integrate CHW programs in to mental health systems of care and identify if these programs impact disparities in care. Furthermore, the Cochrane review did not include efforts outside of LMICs; additional attention is needed on how CHWs may address mental health disparities in the US and other developed nations.

Purpose and Research Questions

Given the growing mobilization of CHWs in mental health care, and the vast variability of their roles in mental health care delivery, this systematic review sought to consolidate supporting literature for CHW mobilization in evidence-based mental health intervention delivery globally and domestically. The primary purpose of the review was to evaluate efforts to date to involve CHWs in the delivery of evidence-based mental health interventions and to identify areas for future research as well as clinical and policy implications. We described the backgrounds of the CHWs, the types of interventions they were involved in delivering, the roles occupied by CHWs, and the implementation supports they received in the delivery of these interventions. Based on recent efforts to increase access to EBTs for underserved communities (Barry and Huskamp 2011; Dua et al. 2011), we also characterized the level of evidence supporting the interventions delivered by CHWs. For the purposes of this review, we contrasted EBTs, evidence-informed practices, and novel, community developed interventions. EBTs were defined as specific protocols that have been previously tested in randomized-control trials (RCTs), such as Trauma Focused Cognitive Behavioral Therapy (Cohen et al. 2006), Interpersonal Therapy (Klerman et al. 1984), or Behavioral Activation (Dimidjian et al. 2008). Evidence-informed practices, included interventions that were described as being based on evidence-based practices (e.g., used components of cognitive behavioral therapy), but had not been previously evaluated in a controlled trial. Novel, community-informed interventions were those interventions that were developed through a community-participatory process or by community providers. In the second objective, we contrasted the nature of CHW involvement in the delivery of mental health interventions in LMICs and the US. No trials of CHW-involved care in other developed nations met the inclusion criteria, so this review only incudes trials conducted in the US. Based on the differences in resources available for mental health care, we expected there to be differences in the rigor of the research design, the roles of the CHWs, and the evidence-base of the interventions used in the US versus LMIC settings. Third, the review sought to describe the clinical outcomes of the subset of studies that were RCTs of CHW-involved mental health interventions, in order to provide a more comprehensive understanding of whether CHWs are effective in reducing mental health disparities. In this review, CHW-involved mental health interventions were considered effective if they performed significantly better than a comparison condition on the primary mental health outcome measured.

Method

Inclusion and Exclusion Criteria

This systematic review identified empirical research from 1990 to 2015 involving CHWs providing or supporting the delivery of a psychosocial intervention targeting a mental health outcome. To be included, studies had to meet criteria related to the study design, providers, participants, interventions, and outcome measures. (1) *Study designs* included in this review were: randomized control trials, quasi-experimental trials, and pre-post non-experimental trials. Single subject design studies were excluded from the review. (2) *Providers* needed to include CHWs, defined as community members without formalized mental health training. Studies that focused on task-shifting mental health care to other health professionals (e.g., medical professionals) were not included in this review, though this topic has been reviewed elsewhere (van Ginneken et al. 2012). (3) *Participants* either needed to reside in an LMIC or if the study was conducted in the US, the majority of the treated sample needed to be composed of racial/ethnic minorities. This inclusion criterion was set to maintain the focus on the potential of CHW mobilization to reduce disparities in mental health service delivery. (4) *Interventions* needed to have a primary focus on treating or preventing a mental health disorder or symptoms in children, adolescents, or adults. Studies of interventions that primarily focused on a physical health target (e.g., obesity prevention, infant health and development) that included measurement of mental health outcomes were excluded from this review. (5) *Outcome measures* needed to include patient-level mental health outcomes as a primary outcome. Secondary implementation outcomes (e.g., cost, fidelity) could be included, but studies with a focus on implementation outcomes as opposed to clinical effectiveness were excluded from the review.

Search Strategy

In order to target the literature on mental health services, we searched PsycINFO and PubMed using the EBSCO database host. The search strategy included a joint function of two concepts: (1) terms for CHW *and* (2) mental health

target areas (see Table 1 for specific search terms used). We reviewed all titles and abstracts to identify relevant articles. The full-text of remaining articles were reviewed, with specific attention to the methods section, to guarantee that articles met all inclusion criteria. Furthermore, we reviewed the articles that were included in the Cochrane review and included those that specifically involved CHWs in mental health care. We also completed searches of the reference lists of all articles identified in the search above that met inclusion criteria, along with searches for articles that cited theses articles, to guarantee comprehensiveness of the review.

Data Extraction and Coding Procedures

A codebook with definitions of each construct included in the review was created and used to train a team of four research assistants to code each article. At least two coders independently reviewed and extracted data from each article. Consensus meetings were held between the two coders for each article to determine final codes. Remaining questions concerning coding were discussed in biweekly meetings led by the first author, which led to code refinement and consensus.

Methods of Synthesis

Based on recommendations for narrative synthesis for systematic reviews, we primarily used tabulation, textual descriptions, and vote counting to summarize the included studies and answer the primary research questions (Popay et al. 2006). We used tabulation and textual descriptions to better understand the backgrounds of CHW, the roles CHW had in interventions, the interventions they delivered, and the implementation supports (e.g., supervision, fidelity monitoring) they received (see Table 2). Textual descriptions included writing brief descriptions of selection criteria for CHWs and implementation supports to begin to synthesize data on these topics. In order to evaluate differences between studies conducted in LMICs and the US, we used tabulation, in which characteristics of studies in both settings were compiled and compared (see Table 3). Finally, we used vote counting, in which we calculated the number of studies that achieved statistically significant results on mental health outcomes in comparisons to those that did not, to begin to identify patterns in studies that had positive outcomes (see Table 4).

Table 1 Search strategy

Search string
1. ("Community Health Worker" OR CHW OR "Lay Counselor" OR "Lay Health Worker" OR LHW OR Paraprofessional OR Task Shifting OR Promotor* OR "Natural Helper" or "Lay Health Advisor" OR "Family Support Specialist" OR "Peer Support Specialist") AND
2. ("Mental health" OR Depression OR Anxiety OR Trauma OR Disruptive behavior OR conduct OR Parent* OR Autism OR Psychosis "Substance Use" OR "Alcohol Use")

Results

Of the 95 articles assessed for eligibility, 43 articles (39 trials) met inclusion criteria for this review (Table 2). Figure 1 shows the flow of studies from identification using the search strategy to ultimate inclusion in the final sample for analysis. The majority of the studies were RCTs ($n=27$; 62.8%) and were conducted in LMICs ($n=26$; 66.7%). Even though the literature search extended from 1990 to May 2016, the majority of articles ($n=31$; 72.1%) that met inclusion criteria were published after 2010, indicating a rapid and recent increase in research on involving CHWs in the delivery of psychosocial interventions for mental health conditions. Studies varied dramatically in terms of their scope and sample size. For example, Patel et al. (2011) and Rahman et al. (2008) conducted large-scale cluster randomized trials; whereas Han et al. (2012) and Hovey et al. (2014) had fewer than 10 participants in their studies.

Objective 1: Characterize CHWs and Their Involvement in the Delivery of Mental Health Interventions Within the Treatment Outcome Literature

Background Characteristics of CHWs

Twenty-eight trials reported the number of CHWs involved in interventions. In these 28 trials, 477 individual CHWs provided services. A variety of terms were used for CHW providers, with the most frequent terms being *promotora/es*, paraprofessionals, and lay counselors. Of the 38 trials that reported the race/ethnicity of the CHWs, 31.6% included CHWs of African descent (i.e., African, African-American, Afro-Caribbean), 28.9% of Asian/Pacific Islander descent, 18.4% of Latino descent, 7.9% of Middle Eastern descent, and 7.9% were Native American.

Regarding the preparation and education backgrounds of CHWs in these studies, 51.3% of trials ($n=20$) reported the CHWs' educational level. Of the 20 studies that described education levels of the CHWs, the majority ($n=12$; 60.0%) reported that CHWs had a minimum of a high school degree or equivalent. In two studies, CHWs had less than a high school degree, and in six studies CHWs had either an Associate's or Bachelor's degrees or some college. Though it was not consistently described in the studies, CHWs

Table 2 Characteristics of studies

Trial	Study design	Location	Client demographics			CHW demographics			Intervention				Implementation supports described		
			N (intervention)	Age group	Race/ethnicity	N	Race/ethnicity	Minimum education level	Setting	CHW primary role	Target problem	Practice Type	Training	Supervision	Fidelity monitoring
1. Ali et al. (2003)* Gul and Ali (2004)*	RCT	LMIC	366 (216)	Adult	Asian	21	Asian	N/R	Home	Sole provider	Depression anxiety	Evidence-informed	Yes	N/R	N/R
2. Ayón et al. (2014)*	Pre/post	US	71	Child/family	Latino	36	Latino	BA	Schools, community	Sole provider	Substance Use	Novel	Yes	N/R	N/R
3.Barlow et al. (2013)* Barlow et al. (2015)*	RCT	US	322 (159)	Child/family	Native American	N/R	Native American	N/R	Home	Sole provider	Parenting	Novel	Yes	N/R	Yes
4. Bolton et al. (2003)* Bass (2006)*	RCT	LMIC	284 (139)	Adult	African	N/R	African	High school	N/R	Sole provider	Depression	EBT	Yes	N/R	N/R
5. Bolton et al. (2014a)*	RCT	LMIC	281 (215)	Adult	Middle Eastern	20	Middle Eastern	High school	Medical	Sole provider	Depression	EBT	Yes	Yes	N/R
6. Bolton et al. (2014b)*	RCT	LMIC	347 (182)	Adult	Asian	20	Asian	High school	Home, community	Sole provider	Anxiety depression trauma	Evidence-informed	Yes	Yes	Yes
7. Edelblute et al. (2014)	Pre/post	LMIC	60	Adult	Latino	7	Latino	N/R	Community	Stepped care	Anxiety depression	Evidence-informed	N/R	Yes	N/R
8. Ernst et al. (1999)*	RCT	US	96 (65)	Child/family	African American, Native American, Asian, Latino	N/R	N/R	N/R	Home	Case management	Substance use	Novel	N/R	N/R	N/R
9. Ertl (2011)	RCT	LMIC	85 (29)	Child/family	African	14	African	N/R	Community	Sole provider	Depression	EBT	Yes	Yes	Yes

Table 2 (continued)

Trial	Study design	Location	Client demographics			CHW demographics			Intervention				Implementation supports described		
			N (intervention)	Age group	Race/ethnicity	N	Race/ethnicity	Minimum education level	Setting	CHW primary role	Target problem	Practice Type	Training	Supervision	Fidelity monitoring
10. Fayyaad et al. (2010)*	Pre/post	LMIC	87	Child/family	Middle Eastern	20	Middle Eastern	BA	Community	Sole provider	Trauma	Evidence-informed	Yes	Yes	N/R
11. Ginsburg et al. (2012)*	RCT	US	47 (22)	Child/family	Native American	47	Native American	AA	Home, mental health clinic	Sole provider	Parenting	Evidence-informed	Yes	Yes	Yes
12. Han et al. (2012)*	Pre/post	US	9	Adult	Asian	1	Asian	N/R	Mental health clinic	Co-Therapy	Prenatal depression	Novel	Yes	N/R	N/R
13. Hirani et al. (2010)	RCT	LMIC	24 (7)	Adult	Asian	N/R	Asian	N/R	Community	Sole provider	Depression	Evidence-informed	Yes	N/R	N/R
14. Hovey et al. (2014)*	Pre/post	US	6	Adult	Latino	1	Latino	N/R	Community	Co-Therapy	Anxiety depression	Evidence-informed	N/R	Yes	N/R
15. Jordans et al. (2010)*	RCT	LMIC	324 (164)	Child/family	Asian	N/R	Asian	N/R	Schools	Sole provider	Trauma	Evidence-informed	Yes	Yes	N/R
16. Kaufman et al. (2013)*	Pre/post	LMIC	36	Child/family	Asian	8	Asian	Some college	Community	Sole provider	Anxiety depression	Evidence-informed	Yes	Yes	Yes
17. Magaña et al. (2015)	Pre/post	US	19	Child/family	Latino	3	Latino	N/R	Home	Sole provider	Autism	Novel	Yes	N/R	N/R
18. Moore et al. (2016)*	RCT	US	29 (14)	Adult	Latino	4	Latino	N/R	Community	Sole provider	Substance use	Evidence-informed	Yes	Yes	Yes
19. Murray et al. (2015)*	RCT	LMIC	157 (131)	Child/family	African	20	African	High school	Home, medical, schools, community	Sole provider	Trauma	EBT	Yes	Yes	Yes
20. Murray et al. (2013)*	Pre/post	LMIC	94	Child/family	African	18	African	N/R	Community	Sole provider	Trauma	EBT	Yes	Yes	Yes
21. Nadkarni et al. (2015)*	RCT	LMIC	53 (27)	Adult	Asian	12	Asian	10th grade	Medical	Sole provider	Substance use	Evidence-informed	N/R	Yes	N/R

Table 2 (continued)

Trial	Study design	Location	Client demographics			CHW demographics			Intervention				Implementation supports described		
			N (intervention)	Age group	Race/ethnicity	N	Race/ethnicity	Minimum education level	Setting	CHW primary role	Target problem	Practice Type	Training	Supervision	Fidelity monitoring
22. Neuner et al. (2008)*	RCT	LMIC	277 (111)	Adult	African	9	African	Primary school	Community	Sole provider	Trauma	EBT	Yes	Yes	Yes
23. Nimgaonkar and Menon (2015)*	Pre/post	LMIC	268	Adult	Asian	114	Asian	N/R	Medical	Stepped care	Psychiatric illnesses	Novel	Yes	Yes	N/R
24. O'Donnell et al. (2014)*	Pre/post	LMIC	64	Child/family	African	4	African	Some college	Community	Sole provider	Trauma	EBT	Yes	Yes	Yes
25. Papas et al. (2011)*	RCT	LMIC	75 (42)	Adult	African	2	African	High school	Medical	Sole provider	Substance use	Evidence-informed	N/R	Yes	Yes
26. Papas et al. (2010)*	Pre/Post	LMIC	27	Adult	African	2	African	High school	Medical	Sole provider	Substance Use	Evidence-informed	Yes	Yes	Yes
27. Patel et al. (2010)*	RCT	LMIC	2796 (1,360)	Adult	Asian	N/R	Asian	N/R	Medical	Stepped care	Anxiety/depression	Evidence-informed	Yes	N/R	N/R
28. Peterson et al. (2012)*	Quasi-experimental	LMIC	60 (30)	Adult	African	30	African	N/R	Mental health clinic	Sole provider	Depression	EBT	Yes	N/R	N/R
29. Puffer et al. (2015)*	RCT	LMIC	270 (135)	Child/family	African	2	African	N/R	Community	Sole provider	Parenting	Evidence-informed	N/R	N/R	N/R
30. Rahman (2008)*	RCT	LMIC	903 (463)	Child/family	Asian	40	Asian	High school	Home	Sole provider	Depression	Evidence-informed	N/R	Yes	N/R
31. Roman et al. (2007)*, (2009)*	RCT	US	613 (266)	Child/family	Latino, African American, Caucasian	N/R	N/A	High school or GED	Home	Co-therapy	Depression	Novel	Yes	Yes	N/R
32. Rosenburg et al. (2002)*	RCT	US	159 (88)	Child/family	Hispanic, African American	3	N/A	N/R	Home	Sole provider	Parenting	Novel	Yes	N/R	N/R

Table 2 (continued)

Trial	Study design	Location	Client demographics			CHW demographics			Intervention				Implementation supports described		
			N (intervention)	Age group	Race/ethnicity	N	Race/ethnicity	Minimum education level	Setting	CHW primary role	Target problem	Practice Type	Training	Supervision	Fidelity monitoring
33. Sorsdahl (2015)*	RCT	LMIC	335 (225)	Adult	African	5	African	BA	Medical	Sole provider	Substance use	EBT & evidence-informed	Yes	Yes	Yes
34. Tol et al. (2008)*	RCT	LMIC	403 (182)	Child/family	Asian	N/R	Asian	High school	Schools	Sole provider	Trauma	Evidence-informed	Yes	N/R	N/R
35. Tol et al. (2014)*	RCT	LMIC	329 (153)	Child / Family	African	N/R	African	High school	Schools	Sole provider	Trauma	Evidence-informed	Yes	Yes	N/R
36. Waitzikin (2011)*	RCT	US	120 (N/R)	Adult	Latino	2	Latino	High school	Medical	Case management	Depression	Novel	Yes	N/R	N/R
37. Walkup et al. (2009)*	RCT	US	167 (81)	Child/family	Native American	N/R	Native American	High school	Home	Sole provider	Parenting	Novel	Yes	Yes	Yes
38. Weiss et al. (2015)*	RCT	LMIC	342 (228)	Adult	Middle Eastern	29	Middle Eastern	N/R	Home, medical	Sole provider	Trauma, anxiety, depression	EBT & Evidence-informed	Yes	Yes	Yes
39. Williamson et al. (2014)*	RCT	US	194 (113)	Child/family	Latino	N/R	Latino	N/R	Home	Sole provider	Parenting	Evidence-informed	Yes	Yes	N/R

N/R not reported

*Original study in a trial

Table 3 Differences between trials in LMICs and US settings

	LMICS n (%)	US n (%)	χ^2	*p*
Trial design			0.00	1.00
RCT	18 (73.1%)	9 (69.2%)	–	–
Quasi-experiment or pre/post	7 (26.9%)	4 (30.8%)	–	–
Age served			2.51	0.113
Child/Family	11 (42.3%)	9 (69.2%)	–	–
Adult	15 (57.7%)	4 (30.8%)	–	–
Intervention			14.09	0.001
EBT	10 (38.5%)	0 (0%)	6.76	0.009
Evidence-informed	15 (57.7%)	4 (30.8%)	1.10	0.271
Novel, community-driven	1 (3.9%)	9 (69.2%)	16.00	>0.001
CHW primary role			12.29	0.002
Sole provider	23 (88.5%)	8 (61.5%)	4.00	0.194
Stepped care	3 (11.5%)	0 (0%)	1.69	0.230
Auxiliary	0 (0%)	5 (38.5%)	11.56	>0.001
Implementation support described				
Training	21 (80.8%)	10 (76.9%)	0.09	0.768
Ongoing supervision	19 (73.1%)	6 (46.2%)	2.73	0.098
Fidelity monitoring	11 (42.3%)	4 (30.8%)	0.48	0.485

LMICs = 26 trials, US = 13 trials

often were selected because they had similar backgrounds and life experiences as the populations they were recruited to serve. For example, CHWs included Latina mothers of children with an Autism Spectrum Disorder diagnosis (Magaña et al. 2015), Burmese refugees (Bolton et al. 2014b), or past or present migrant farm workers (Hoveyet al. 2014). Other studies selected CHWs who were already employed in this role and had previously provided other health promotion services (e.g., Peterson et al. 2012; Williamson et al. 2014).

Interventions

The interventions targeted a range of clinical problems, including depression ($n = 16$), psychological trauma ($n = 10$), anxiety ($n = 7$), substance use ($n = 7$), and childhood disruptive behavior disorders ($n = 6$), and autism spectrum disorders ($n = 1$). Multiple studies targeted more than one problem area. Interventions were delivered in community (e.g., churches, refugee settlements, literacy centers), medical, mental health, school, and home settings. Nineteen of the trials included interventions that targeted adults (48.7%) and 20 trials (51.3%) targeted children or families. Interventions were classified as being for children/families if the study included measurement of child mental health outcomes, a focus on parenting, or targeted maternal mental health with the purpose of ultimately improving child or family outcomes.

Regarding the delivered interventions, ten trials tested EBT protocols (e.g., Trauma-Focused Cognitive Behavioral Therapy, Cohen et al. 2006), 22 trials tested interventions that were informed by evidence-based practices (e.g., cognitive-behavioral principles), and ten trials tested novel, community-informed interventions. The total number of interventions tested is greater than the number of trials because two of the trials that tested an EBT also included an intervention arm that included an evidence-informed practice (Sorsdahl et al. 2015; Weiss et al. 2015) and another trial included two arms with two different EBT (Bolton et al. 2014a).

CHW Roles

In the majority of trials ($n = 31$; 79.5%), the CHWs served as the sole provider of the intervention. CHWs also were involved in stepped-care interventions ($n = 3$; 7.7%), where they provided a lower level of care for clients with low-severity mental health concerns (e.g., psychoeducation about depression) and professionals provided higher intensity services for individuals with more severe symptomatology (e.g., medication management; Patel et al. 2010). Apart from sole provider and stepped care models, CHWs provided other auxiliary roles, including co-therapy alongside a professional mental health provider or nurse practitioner ($n = 3$; Han et al. 2012; Hovey et al. 2014; Roman et al. 2007, 2009), and providing case management as their primary roles ($n = 2$; Ernst et al. 1999; Waitzikin et al. 2011). CHWs were described as conducting outreach in multiple studies, but this was never described as their primary role.

Implementation Supports

Thirty-two of the trials (82.1%) included descriptions of the CHW training protocol, with varying level of detail. Trainings ranged from 2 days to 3 months of training. Reported training activities included didactic, role-playing, and proficiency testing. Twenty-five of the articles (64.1%) described ongoing supervision for the CHWs during the course of the intervention. Group and individual supervision models were used, with supervision provided locally (e.g. Murray et al. 2015; Williamson et al. 2014) or through conference calls or Skype sessions (e.g. Papas et al. 2011; Walkup et al. 2009). Supervision activities included case discussions, role-plays, adherence ratings, and live or video observation. Fifteen articles (38.46%) described procedures for fidelity monitoring of CHW-delivered interventions. Fidelity monitoring included review of case notes, CHWs completing fidelity checklists, behavior observations of

Table 4 Effectiveness of CHW-involved interventions in RCTs

Trial	Intervention type	Comparison group	N (intervention)	Sig. group differences
1. Ali et al. (2003)*	Evidence-informed	WLC	366 (216)	Yes
Gul and Ali (2004)*				Yes
2.Barlow et al. (2013)*	Novel	Enhanced UC	322 (159)	Yes
Barlow et al. (2015)*				Yes
3. Bolton et al. (2003)*	EBT	UC	284 (139)	Yes
Bass (2006)*				Yes
4. Bolton et al. (2014a)*	EBT	WLC	281 (215)	Yes
5. Bolton et al. (2014b)*	Evidence-informed	WLC	347 (182)	Yes
6. Ernst et al. (1999)*	Novel	No treatment	96 (65)	No
7. Ertl (2011)	EBT	WLC, active control	85 (29)	Yes
8. Ginsburg et al. (2012)*	Evidence-informed	Active control	47 (22)	No
9. Hirani et al. (2010)	Evidence-informed	No treatment, active Control	24 (7)	No
10. Jordans et al. (2010)*	Evidence-informed	WLC	325 (164)	No
11. Moore et al. (2016)*	Evidence-informed	Active control	29 (14)	No
12. Murray et al. (2015)*	EBT	UC	257 (131)	Yes
13. Nadkarni et al. (2015)*	Evidence-informed	Enhanced UC	53 (27)	No
14. Neuner et al. (2008)*	EBT	UC, no treatment	277 (11)	No
15. Papas et al. (2011)*	Evidence-informed	UC	75 (42)	Yes
17. Patel et al. (2010)*	Evidence-informed	Enhanced UC	2796 (1360)	Yes
18. Puffer et al. (2015)*	Evidence-informed	WLC	270 (135)	Yes
19. Rahman (2008)*	Evidence-informed	UC	903 (463)	Yes
20. Roman et al. (2007)*, (2009)*	Novel	UC	613 (307)	Yes
				Yes
21. Rosenburg et al. (2002)*	Novel	UC	159 (88)	Yes
22. Sorsdahl (2015)*	EBT & evidence-informed	Bibliotherapy	335 (225)	Yes
23. Tol et al. (2008)*	Evidence-informed	WLC	403 (182)	Yes
24. Tol et al. (2014)*	Evidence-informed	WLC	329 (153)	No
25. Waitzikin (2011)*	Novel	Enhanced UC	120 (N/R)	No
26. Walkup et al. (2009)*	Novel	Active control	167 (81)	Yes
27. Weiss et al. (2015)*	EBT & evidence-informed	WLC	342 (228)	Yes
28. Williamson et al. (2014)*	Evidence-informed	WLC	194 (113)	Yes

N/R not reported

*Original study in a trial

sessions, and review of session materials (e.g., review of trauma narratives; Neuner et al. 2008).

Objective 2: Contrast Characteristics of LMIC and US Studies of CHW-Involved Mental Health Interventions

Chi square analyses were conducted to examine potential differences between trials conducted in LMICs and the US for the following characteristics (1) evidence-base for the intervention used, (2) the primary role of the CHWs, (3) the study design, (4) clients served and (5) descriptions provided for implementation support. For the evidence-base and primary role analyses, which had more than two categories, post-hoc analyses were conducted to determine which categories were significantly different across settings. Based on recommendation for protecting against Type 1 error, a cell-wise adjusted residual method was used, with the Bonferroni correction made (MacDonald and Gardner 2000). Based on this correction, alpha levels were set at 0.017 to determine if there were significant differences in the categories between trials in LMICs and the US.

Omnibus tests revealed significant differences between settings for the evidence-base for the interventions delivered, χ^2 (2) = 18.13, $p < .001$. Post-hoc analyses indicated trials in LMICs were significantly more likely to test an EBT ($n = 10$; 38.46%) than US trials ($n = 0$, 0%), χ^2 (1) = 6.76, $p = .009$; though there were no differences

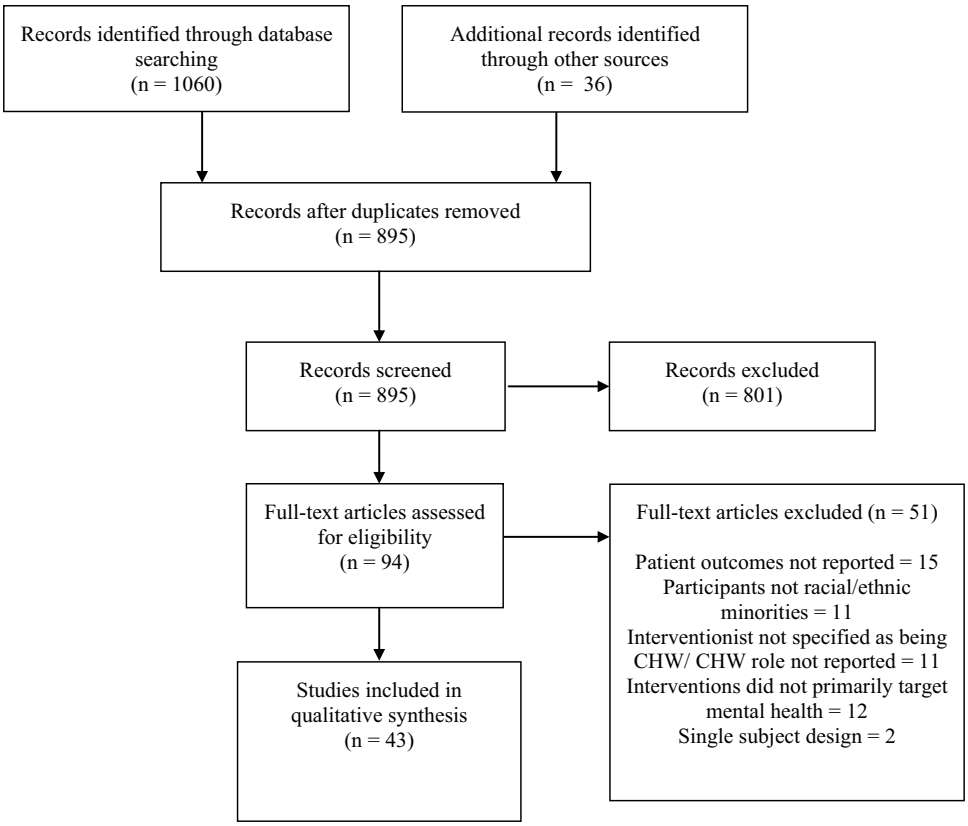

Fig. 1 Prisma flow diagram

between settings in evidence-informed interventions (e.g., treatments based on cognitive-behavioral therapy without a previously tested protocol), χ^2 (1) = 1.10, p = .271. Trials in the US were significantly more likely to test novel interventions (n = 9; 69.2%) than LMICS (n = 1, 3.9%), χ^2 (1) = 19.43, p > .001. Overall, the role of the CHW also significantly differed between studies carried out in LMICs and the US, χ^2 (2) = 12.29, p = .002, with significant differences in the use of auxiliary roles between the US and LMICs, χ^2 (1) = 11.56, p > .001. CHW in trials in the US performed auxiliary roles, such as co-therapy or case management (n = 5; 38.5%), but these roles were never described in trials in LMICs. CHWs in LMICs were involved in stepped-care (n = 3; 11.5%), whereas this role was never reported in trials in the US, but differences were not significant, χ^2 (1) = 1.69, p = .230. In both LMICs and the US, CHWs were most frequently the sole providers of interventions (LMICs: n = 23; 88.5%; US: n = 23; 61.5%), with no significant differences between groups, χ^2 (1) = 4.00, p = .194. There were no significant differences between settings in the use of RCT as the study design, χ^2 (1) = 0.00, p = 1.00. Similarly, the age group served (child/family or adult) did not differ between settings, χ^2 (1) = 2.51, p = .113. Regarding implementation supports, there were no significant differences between the studies that provided descriptions of training, χ^2 (1) = 0.09, p = .768, supervision, χ^2 (1) = 2.73, p = .098, or fidelity monitoring, χ^2 (1) = 0.48, p = .485.

Objective 3: Outcomes from RCTs of CHW-Involved Mental Health Interventions

Among the 27 RCTs of CHW-involved mental health interventions, the majority (n = 18; 69.2%) found that the CHW-involved interventions performed significantly better than a comparison condition on the primary mental health outcome measured. Comparing studies conducted in different settings, 72.2% of trials in LMICs (n = 13) found that the intervention groups outperformed the comparison group, whereas 55.6% (n = 5) of trials in the US demonstrated these positive, significant findings. However, these differences in positive outcomes between settings were not significant, χ^2 (1) = 0.75, p = .386. Of the four trials reporting on the sustainment of effects at a follow-up assessment, the intervention groups continued to outperform the comparison groups. Regarding the nine trials without significant findings, three were underpowered with fewer than 30 participants in the intervention conditions. Three trials showed significant improvement from baseline to post-intervention clinical scores for the target intervention and active comparison condition (Ginsburg et al. 2012; Moore et al. 2016; Neuner et al. 2008). One of these trials included

a no treatment control arm, which did not show similar improvement. The two trials in which CHW primary role was case management did not demonstrate significant findings (Ernst et al. 1999; Waitzkin et al. 2011). Finally, two trials tested the same school-based intervention and found that it did not lead to significant differences from the waitlist control condition in either trial (Jordans et al. 2010; Tol et al. 2014), even though a previous trial of this intervention showed significant improvements in symptomatology (Tol et al. 2008). Control conditions ranged from a waitlist control or no treatment comparison arm ($n=10$; 37.0%), to inclusion of a usual care or enhanced usual care services arm ($n=10$; 37.0%), to some other active or attention control condition (e.g., educational support; $n=4$; 14.8%), to bibliotherapy ($n=1$; 3.7%). Bibliotherapy includes the use of written-materials (e.g., books or brochures) as a mode of psychoeducation or treatment.

Discussion

This systematic review revealed a rapid and recent increase in research being conducted on CHW-involved mental health care. In line with the first objective of this review, we identified that CHWs have been involved in delivering mental health interventions to address a range of clinical disorders, including depression, anxiety, psychological trauma, and disruptive behavior disorders. In the majority of trials, CHWs were the sole treatment providers, and delivered or supported EBTs or interventions informed by evidence-based practices. Significant differences existed between settings, with trials in LMICs testing EBTs more frequently than the in US, whereas the studies in the US were more likely to test novel, community developed interventions. Based on this review, evidence suggests that CHW models of mental health service delivery can be effective in addressing global and domestic disparities in care for underserved populations, as two-thirds of the randomized controlled trials demonstrated positive mental health outcomes for traditionally underserved communities over a comparison condition. However, this review also revealed inconsistencies in reporting methods among published studies involving CHWs, which need to be addressed to further our knowledge about how to best replicate efforts to leverage CHWs to address disparities.

More research with CHW-delivered mental health interventions has been conducted in LMICs than in the US, which is likely related to differences in workforce and resources in these two settings (Bruckner et al. 2011; Saraceno et al. 2007; van Ginneken et al. 2012). Not only were more CHW-involved mental health interventions studied in LMICs, the interventions were more likely to be EBTs than the interventions provided in the US. This finding is likely related to a number of factors. In 2008, the WHO launched two initiatives that were dedicated scaling up of EBTs for mental health, neurological, and substance use disorders, especially in LMICs (Barbui et al. 2010; Dua et al. 2011; World Health Organization 2008). These initiatives explicitly recommended using EBTs such as cognitive-behavioral or interpersonal therapy for depression, and parent management training for childhood behavior disorders. Furthermore, a number of domestic regulations regarding who can provide mental health services likely impact the roles that CHWs may occupy in evidence-based intervention delivery. These regulations include insurance requirements about who is allowed to bill for services, along with requirements from the organizations that oversee the implementation of different EBT protocols. For example, Trauma Focused-Cognitive Behavioral Therapy has been tested with CHW as the sole treatment provider in LMICs (Murray et al. 2013, 2015), but in the US providers are required to have a Master's degree in a mental health discipline and professional licensure (https://tfcbt.org/tf-cbt-certification-criteria/).

Given the differences between the US and LMICs in available workforce and regulations governing mental health care delivery, CHWs may fulfill different roles in the delivery of evidence-based mental health interventions in these different settings. Interestingly, studies in LMICs and the US have predominately investigated CHW models where they were the sole providers of the intervention. Differences did exist between settings, with CHW providing auxiliary support more frequently in the US. However, there are very few trials investigated auxiliary or stepped-care models, making it challenging to determine the most effective roles for CHWs, especially in the US where there are barriers to them being the primary providers of evidence-based interventions. Given the disparities that exist in the quality of mental health care for ethnic and racial minorities in the US, findings from LMICs could have important implications for efforts in the US to address mental health disparities. For example, given evidence that CHWs can effectively deliver EBTs, it is possible that their roles and responsibilities domestically could be expanded to meet the needs of communities with access and utilization disparities. Potentially, CHWs may be mobilized to step into the role of primary providers of EBTs in settings with severe workforce shortages, but even in higher resourced settings they may be involved in EBT delivery for individuals with lower levels of need, such as those who would benefit from prevention services. CHW-delivered prevention and early intervention services would allow trained mental health professionals to focus their expertise on individuals who require more intensive services (Acevedo-Polakovich et al. 2013; Patel et al. 2010). However, based on this review, this stepped-care model of mental

health care delivery with CHWs has yet to be evaluated in the US. Similarly, CHWs could be incorporated within evidence-based interventions that are delivered by mental health professional, with roles focused on promoting access and engagement (Barnett et al. 2016). Further investigation of CHW-supported delivery of evidence-based interventions is warranted in the US and other developed nations with mental health service disparities.

In order for CHW-delivered evidence-based interventions to be scaled up effectively, it is critical to understand the implementation strategies that are needed to train and support them. Lessons can be drawn from the field of implementation science, which has predominately focused on training Master's-level clinicians to deliver mental health EBTs in community settings. CHWs are likely to require a high level of support through ongoing supervision and consultation, as this is also required for mental health professionals to deliver EBTs with competence (Beidas and Kendall 2010; Herschell et al. 2010). Future research should evaluate the costs of training and supporting CHWs in comparison to mental health professionals. If CHWs require substantially more time and resources than Master's-level clinicians, the benefits of training them to deliver or support EBTs may not be necessary in locations with an adequate professional mental health workforce to meet the needs of local communities. However, in settings with limited professional workforce, it is critical to identify what the minimal versus optimal level of implementation supports are needed to mobilize CHWs to provide evidence-based care. Though high intensity implementation support (e.g., frequent consultation with treatment developers) may aid the effectiveness of services, this is unlikely to lead to long-term sustainability of CHW-delivered interventions (Murray and Jordans 2016).

Several limitations of this review need to be considered. First, the diverse range of clinical interventions, settings, CHW roles, and outcomes evaluated makes it challenging to establish the effectiveness of CHW-involved mental health interventions. The "vote counting" method of synthesis limits the conclusions that can be drawn, in that it gives equal weight to studies regardless of their sample size and effect sizes, but it provides a useful overview of patterns in the literature, which can inform future research (Popay et al. 2006). Though the focus of this review was on outcome studies that included measures of effectiveness for patient-level outcomes, questions related to implementation outcomes also need to be addressed. This review provided a summary of how implementation supports (i.e., training, supervision, and fidelity monitoring) were described in trials, but no conclusions can be drawn from about the amount of training or support the CHW need to deliver or support delivery of mental health care because these descriptions often provided limited details. Finally, as no trials in this review compared CHW to professional mental health interventionists, it cannot be stated whether CHW are as effective as specialized providers.

Importantly, the present review identified several methodological limitations and inconsistencies in reporting of methods in published studies involving CHWs in mental health care delivery, and future research on CHW-involved mental health interventions must continue to address gaps in the current literature. Based on results of this review, we offer several recommendations to improve reporting of methods and CHW characteristics in future publications. First, important characteristics of CHW were not specified in many of the published trials, which may limit the ability of other researchers and systems to replicate and scale-up these efforts. We recommend that trials explicitly describe the educational background, detailed training and supervision procedures of CHW providers for the roles they occupy in mental health intervention delivery, and the criteria used to select them for these roles. Regarding implementation, it is important not only to better specify the training and support that CHW receive, additional research should examine the implementation strategies, such as supervision procedures, that are most effective for CHW delivery of care. In addition, we recommend that future studies report information regarding intervention adherence and fidelity to evaluate the internal validity of the study. With improved reporting on CHW and implementation characteristics, a meta-analysis could help illuminate factors that lead to effective CHW-delivered interventions. Finally, though increasing evidence suggests that CHW-delivered evidence-based interventions can be effective and feasible, the ability to scale-up and sustain these efforts has yet to be established (Murray and Jordans 2016).

As the first systematic review to consolidate literature on CHW-involved mental health care in LMICs and the US, this review provides important insights into how CHW can address global and domestic mental health disparities. Given accumulating evidence that CHW can effectively deliver evidence-based and informed practices, training and supporting CHW to address mental health disparities seems like a promising approach to improve care for underserved communities. As this review also included studies that investigated novel, community informed interventions, it would also be valuable to how these interventions compare in effectiveness to EBTs, which is an important area for future research. However, it is worth noting that studies that tested EBTs or evidence-informed interventions frequently would use community-partnered approaches, such as community-based participatory research, to adapt the treatments to fit with the local cultures and contexts (e.g., Ginsburg et al. 2012; Murray et al. 2013; Papas et al. 2010), and therefore community involvement was present across different types of interventions. Finally, this review

also indicates that additional research is needed to understand how to sustain efforts to incorporate CHW into evidence-based interventions both domestically and globally, in order to maximize an enduring impact on mental health disparities.

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Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

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