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Review Article

Universal school-based mental health programmes in low- and middle-income countries: A systematic review and narrative synthesis

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ABSTRACT

Depression and anxiety pose a significant burden during adolescence, which may have consequences for adulthood and future generations. The mental health needs of children and adolescents in low- and middle-income countries are not adequately addressed due to a lack of availability and access to services, and limited intervention research in these contexts. Universal school-based interventions provide a unique and potentially scalable opportunity to prevent and address mental health concerns amongst children and adolescents in low- and middle-income countries. This systematic review aimed to identify and provide a narrative synthesis of universal school-based programmes delivered to children (aged 6–18 years) in low- and middle-income countries reporting on anxiety and/or depression outcomes. We searched Academic Search Premier, ERIC, PsycINFO, PubMed, Scopus, Web of Science, and ProQuest Dissertations using a pre-specified search strategy. Of the 12,478 articles identified, 12 studies met our inclusion criteria and were included in this review. The included studies report on a variety of interventions differing in approach, format and content. Given the small number of studies and concerns with study quality, we are unable to conclude that universal school-based interventions may reduce symptoms of anxiety and depression in children in low- and middle-income countries.

1. Introduction

Anxiety and depression are amongst the most prevalent mental health disorders (Steel et al., 2014) with a global prevalence amongst children and adolescents of 13.4% (Polanczyk et al., 2015). The onset of these disorders typically occurs during childhood and adolescence (Costello et al., 2003; Kessler et al., 2005) and may persist into adulthood if left untreated (Costello et al., 2006; Woodward and Fergusson, 2001). Moreover, children and adolescents exposed to social disadvantages, such as living in poverty, a lack of adequate health or social services, found in many low- and middle-income countries (LMICs), are at increased risk of developing mental health disorders (Kieling et al., 2011; Lund et al., 2011; Patel et al., 2010).

Efforts to address the mental health needs of children and adolescents remain a neglected issue, especially in LMICs (Morris et al., 2011; Patel et al., 2007). Although approximately 90% of children and adolescents live in these countries, less than 10% of all mental health

randomized controlled trials (RCTs) are conducted in LMICs. Of these, the vast majority are psycho-pharmacological interventions (Kieling et al., 2011). In terms of universally provided psychosocial preventive interventions, which have proven effective in high-income countries (HICs), less than 10% of RCTs have been conducted in LMICs (Skeen et al., 2019). Whilst the academic literature may not reflect the strategic development and implementation of national child mental health programmes in LMICs, it nonetheless highlights the limited evidence of effectiveness in these countries.

Schools offer a convenient location to deliver interventions to improve mental health (Fazel et al., 2014b; Kern et al., 2017; Patel et al., 2013). The majority of children and adolescents attend school and spend a large portion of their time in school settings where key social, cognitive, and emotional development takes place. Moreover, schools are often able to facilitate access to additional social or health services. Schools have been utilized as intervention sites and the available evidence from LMICs, although limited, has shown positive outcomes in the

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promotion of mental health (Barry et al., 2013; Fazel et al., 2014b; Murphy et al., 2017). These promising results have been reported for both universally delivered interventions, aimed at all children and adolescents, as well as targeted interventions, focusing on children and adolescents at high risk for the development of mental health problems (Kieling et al., 2011). However, targeted interventions are resource-intensive and in LMICs may be challenging to deliver at scale (Kieling et al., 2011). In HICs, universally delivered interventions have been found to offer a feasible, practical, scalable and effective approach to promoting mental health (Fazel et al., 2014a; Paulus et al., 2016; Sanchez et al., 2018; Werner-Seidler et al., 2017). However, research in LMICs is limited and the applicability of research conducted in HICs to LMIC contexts is unclear.

A previous review of the effectiveness of universal mental health promotion programmes for 6 to 18-year olds in LMICs identified 13 school-based interventions (Barry et al., 2013), six of which were delivered universally, irrespective of current symptoms or the presence of risk factors. The review concluded that universal school-based programmes can have a significant positive effect on the well-being of children and adolescents in LMICs (Barry et al., 2013). Similarly, Fazel et al. (2014b), identifying 22 studies implemented in LMIC school settings, concluded that schools provide an important location to promote mental health.

Whilst these existing reviews focused on LMICs are encouraging, they have a number of limitations. Firstly, most of the programmes included were implemented in contexts impacted by armed conflict or natural disaster. Little is known about the impact of universal interventions on the mental health of children in LMICs where they are exposed to general ongoing, chronic risk factors e.g. chronic poverty, domestic violence, social exclusion (Fazel et al., 2014b). Secondly, there is a need for further understanding of cultural adaptation and its influence on the success of these interventions (Barry et al., 2013). Thirdly, there is little evidence documenting the specific effect of universal school-based mental health programmes in LMICs on depression and/or anxiety (Fazel et al., 2014b).

In this systematic review, we aim to summarize what is known about universal school-based mental health programmes for school-aged children and adolescents in LMICs, reporting on anxiety and/or depression outcomes. We describe these programmes, their delivery, underpinning theory, their content, and adaptation for culture and context. We also determine whether the programmes were successful in addressing depression and/or anxiety.

2. Method

We conducted a systematic review, which followed the PRISMA reporting guidelines for systematic reviews and meta-syntheses. The systematic review protocol was prospectively registered on PROSPERO (<https://www.crd.york.ac.uk/prospero/>) (CRD42019140978).

2.1. Search strategy and selection criteria

Included studies were randomized or quasi-randomized controlled trials published from 2000 to 2019 in English. We determined there may be a small number of RCTs conducted in LMICs, and including quasi-randomized studies would allow for a broader identification of relevant interventions. Studies were selected in line with the predefined PICO:

Population: Children and adolescents (not specific to either boys or girls) of school age (between 6 and 18 years) in schools in LMICs (as classified by the World Bank, <https://datahelpdesk.worldbank.org/>).

Intervention: Universal school-based mental health intervention i.e. delivered to all of a defined population irrespective of risk or existing symptomatology in a school setting. This intervention could be provided school-wide or to whole year groups or classes, and delivered to whole classes, groups or individually. Studies focusing on targeted groups, e.g.

screening positive for some psychopathology, or who experienced specific traumas, such as exposure to conflict or natural disasters, were excluded.

Comparator: Any, including standard care or education as usual.

Outcomes: Depression and/or anxiety outcomes as either a primary or secondary outcome.

Search terms and strategies were developed in consultation with librarians from Stellenbosch University and the University of Bath. Academic Search Premier, ERIC, PubMed, Scopus, Web of Science, PsycINFO, and ProQuest Dissertations (for grey literature) were searched in July 2019. Searches on all databases were rerun in February 2020 to ensure inclusion of relevant articles published since July 2019.

The search was tailored for the individual databases as necessary (see Supplementary Material 1). We also followed the references of relevant reviews and used Google scholar to 'hand search' for articles. Once database searches were conducted, the search results were exported and uploaded into Rayyan (Ouzzani et al., 2016). Duplicates were removed, and the remaining titles and abstracts were independently assessed by two authors (MB and HG). Full-text articles were then screened independently by two authors (MB and HG) for eligibility. Conflicts were resolved by discussion between the two authors, with the input of additional authors (BJC and ML) when needed.

2.2. Data extraction and analysis

Data were extracted from the final set of included articles by one author (HG) by using a standardized extraction form. Another author (MB) quality checked the data extraction. Corresponding authors were contacted by email for missing information, and we consulted associated manuscripts where necessary for additional information. Study quality was assessed using the Quality Assessment Tool for Quantitative Studies and the Cochrane Risk of Bias tool. Two authors (MB and HG) assessed the study quality and risk of bias independently, and discrepancies were resolved through discussion.

Whilst we considered conducting a meta-analysis, the heterogeneity of measures used across our included studies precluded this, and this approach seemed overly reductionist and potentially misleading. Therefore, whilst we present calculated effect sizes to enable some comparison, we did not formally pool the data. Cohen's *d* was used as a measure of effect.

3. Results

We identified 12,478 articles (see Fig. 1). After removing duplicates, the remaining 9537 articles were screened by title and abstract, of which 77 articles were screened for full-text eligibility, and 11 were included. When rerunning the searches in February 2020, two additional articles were identified published between after July 2019. Twelve studies ($n = 13$ articles) met our inclusion criteria (see Table 1). Studies were conducted across eleven different LMICs (see Fig. 2).

3.1. Quality assessment

Ten studies received a quality rating of "weak" (see Table 1) due to, in most cases, failure to report blinding, as well as failure to describe the randomization techniques. The remaining two studies, received a "strong" quality rating (Ghaffar et al., 2019; Shinde et al., 2018). Generally, the risk of bias was unclear, with most studies providing little or no information as to selection bias, performance bias and detection bias, and other potential sources of bias (see Supplementary Material 2 for details). Risk of bias was generally low for incomplete outcome data (attrition bias) and selective outcomes reporting (reporting bias).

3.2. Summary of included studies

Table 1 provides an overview of the 12 included studies. Whilst we

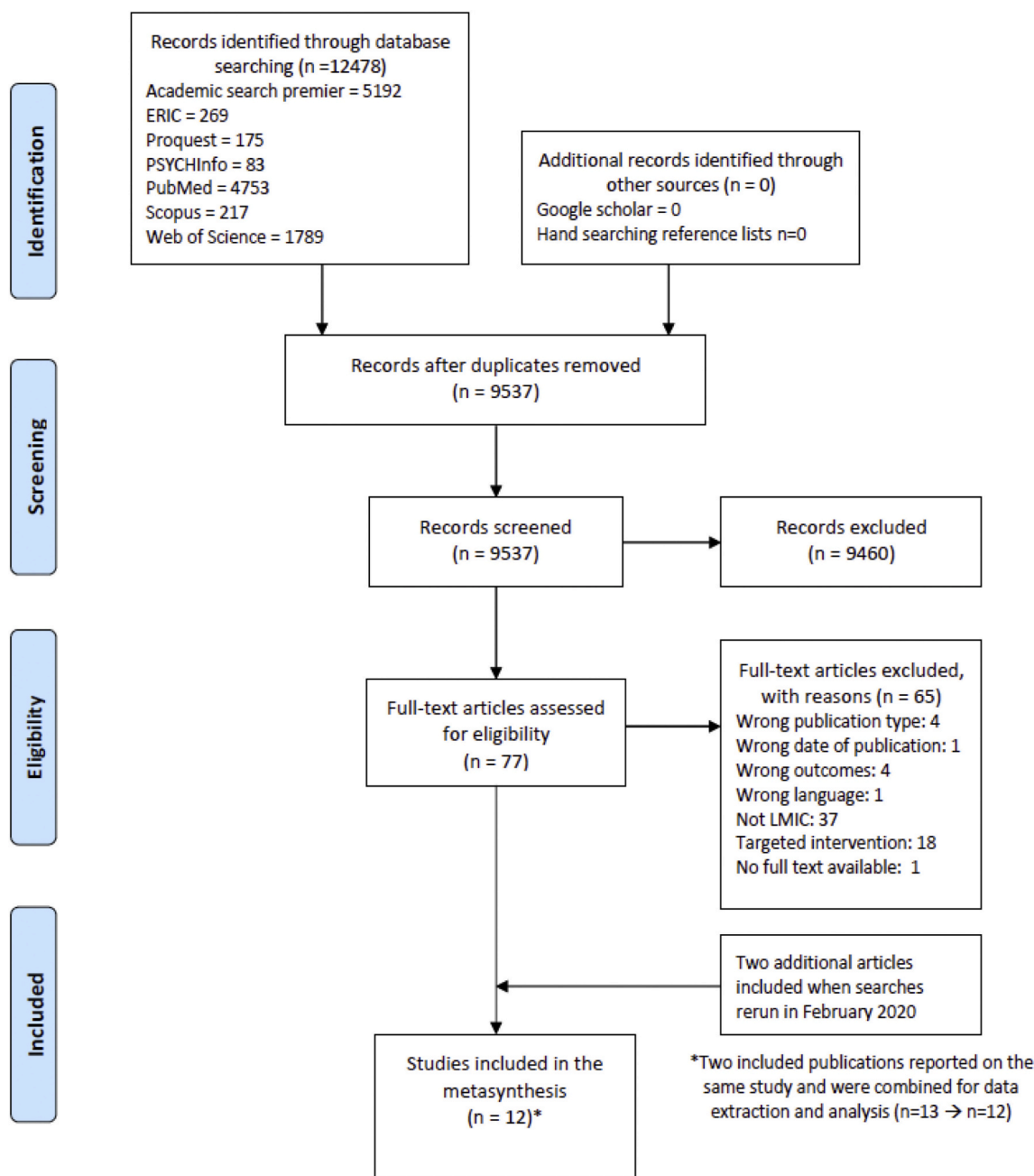


Fig. 1. PRISMA diagram.

identified studies from 11 different LMICs only one, India, reported more than one study. Studies often recruited from a single school with only one study including children under the age of 10 and none including children under the age of 8. This severely limits any generalisations that can be drawn from the findings of these studies.

Four were cluster randomized controlled trials (cRCTs), with a further four using quasi-experimental research designs. The studies involved a total of 15,893 young people aged 8 to 19 years (weighted mean age of 13.6 years; SD = 0.83) (see Table 1 for age ranges). All studies included both male and female participants (see Table 1 for % of female participants), with an average of 48.0% female participants, and 52.0% male participants across studies. The predominant comparison group was a wait-list control (n = 6), followed by treatment as usual (n = 3) with the provision of the standard educational curriculum. Only one study had an active control condition (Anttila et al., 2019).

3.3. Types of interventions

Half of the studies were based in secondary/high schools, with the majority of interventions conducted during school hours (see Table 2). Eleven interventions were delivered to groups (see Table 2), five of which delivered the intervention to entire classes. Two studies used both individual and group delivery formats (Anttila et al., 2019; Shinde et al., 2018), with Shinde et al. (2018) delivering the SEHER intervention school-wide, as well as in group and individual formats.

Eight interventions identified an underpinning theoretical psychological model, of which four were based on Cognitive Behaviour Therapy (CBT) (see Table 2). A further two interventions were based on positive psychology (Khanna and Singh, 2019; Zhao et al., 2019), and two interventions focused on health promotion (McMullen and McMullen, 2018; Shinde et al., 2018). Intervention content is detailed in Table 2.

Table 1
Summary of included studies.

Study, author	Country	Study design	Comparator	Sample characteristics			Quality assessment
				n	Age range	% female	
<i>Rational Emotive Behaviour Therapy (REBT)</i> , Adomeh, 2006	Nigeria	Post-test-only control group design	n/s	50	n/s	n/s	Weak
<i>DepsiNet-Thai</i> , Anttila et al. (2019)	Thailand	Parallel quasi-experimental cluster design	Active control: Use of DepsiNet-Thai independently Passive control: No intervention	167	15–19	68.3	Weak
<i>Health promotion education</i> , Bektas and Ozturk (2008)	Turkey	Pre- and post-test unmatched group model	Wait-list control	120	n/s	51.7	Weak
<i>Assertiveness training</i> , Fuspita et al. (2018)	Indonesia	Quasi-experimental pre- and post-test design	Wait-list control	80	15–18	56.2	Weak
<i>AMISTAD para siempre</i> , Gallegos et al. (2013) Gallegos (2008)	Mexico	Quasi-experimental nonequivalent comparison group design	Standard curriculum education	1030	8–13	52.6	Weak
<i>IMB-based programme</i> , Ghaffar et al. (2019)	Malaysia	cRCT	Wait-list control, offered standard co-curriculum classes	461	10–11	56.0	Strong
<i>Positive psychology intervention</i> , Khanna and Singh (2019)	India	cRCT	Placebo control	372	11–13	44.0	Weak
<i>Living Well</i> , McMullen and McMullen (2018)	Uganda	cRCT	Wait-list control	170	13–18	49.4	Weak
<i>The Resourceful Adolescent Program (Adolescent version) (RAP-A)</i> , Rivet-Duval et al. (2011)	Mauritius	RCT	Wait-list control	160	12–16	50.0	Weak
<i>SEHER (Strengthening Evidence base on schOOl-based intErventions for pRomoting adolescent health programme)</i> , Shinde et al. (2018)	India	cRCT	Standard curriculum education	13,035	13–18	47.0	Strong
<i>Yoga intervention</i> , Velásquez et al., 2015	Colombia	RCT	Wait-list control	125	Grade 5–9	44.0	Weak
<i>Positive education intervention</i> , Zhao et al. (2019)	China	Pseudo-random experiment design	Standard curriculum education	173	n/s	53.2	Weak

Note: cRCT (cluster randomized controlled trial); RCT (randomized controlled trial); n/s (not specified).

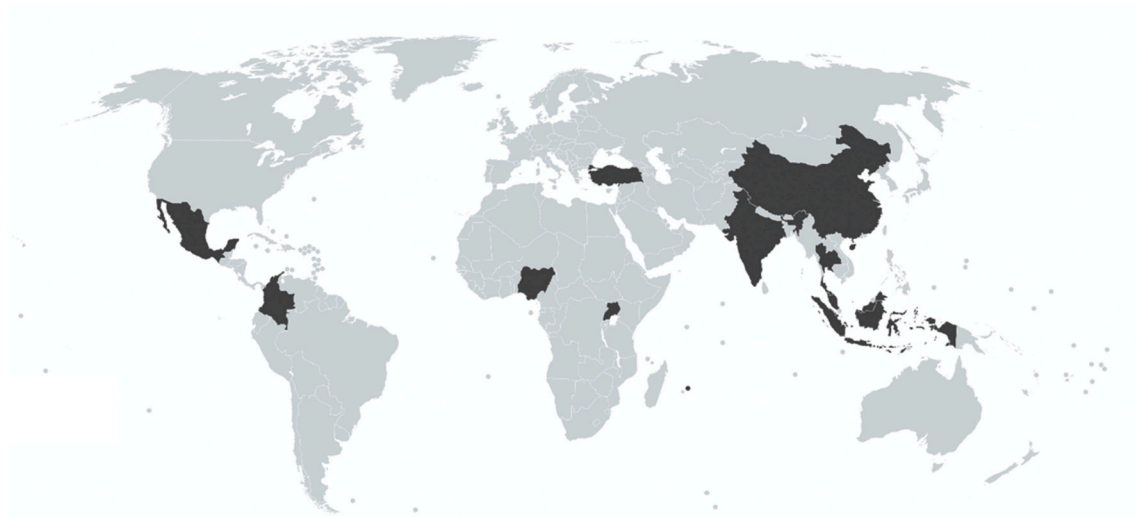


Fig. 2. Map of included studies.

3.3.1. Development and adaptation

Ten interventions were locally developed or adapted (Anttila et al., 2019; Bektas and Ozturk, 2008; Fuspita et al., 2018; Gallegos, 2008; Gallegos et al., 2013; Ghaffar et al., 2019; Khanna and Singh, 2019; McMullen and McMullen, 2018; Rivet-Duval et al., 2011; Shinde et al., 2017, 2018; Zhao et al., 2019). Four studies explicitly reported adaptation and development for context addressing cultural considerations (Anttila et al., 2019; Gallegos, 2008; Gallegos et al., 2013; Rivet-Duval et al., 2011), and delivery format (Khanna and Singh, 2019). AMISTAD

para siempre intervention (Gallegos, 2008; Gallegos et al., 2013) is a Spanish, culturally adapted version of FRIENDS for Life program (Barret and Turner, 2001). The positive psychology exercises used by Khanna and Singh (Khanna and Singh, 2019) were changed from web-based, individual activities (see Seligman et al., 2005) to face-to-face, group-based activities. In adapting the RAP-A program, Rivet-Duval et al. (2011) reported discussing the cultural relevance of the program with implementing teachers. The content of DepsiNet-Thai (Anttila et al., 2019) was developed based on discussions with adolescents in the area.

Table 2

Intervention characteristics.

Study, author	Intervention	Original programme	Underpinning theoretical model	Intervention content	Setting	Format	Number of sessions	Session length	Implementer	Manualised
<i>REBT</i> , Adomeh, 2006	REBT to foster emotional adjustment, and reduce anxiety, stress and depression, amongst adolescents	REBT, Ellis, 1962	CBT	Rational problem solving	Secondary school	n/s	12	60 min	n/s	n/s
<i>DepisNet-Thai</i> , Anttila et al. (2019)	Internet-based intervention to support adolescent well-being		Adolescent coping, Garcia, 2010	Psychological stress, physical wellbeing, relationships, self-reflection skills, self-management skills	High school	Intervention: Group (11–14 per group) Active control: individual	5	50 min	Teacher	Yes
<i>Health promotion education</i> , Bektas and Ozturk (2008)	Health promotion education intervention targeting healthy behaviours, self-concept and anxiety in primary school-aged children		Health promotion	The importance of exercise, nutrition, anxiety and stress, habits, accident prevention	Primary school, during school hours	Group (entire classroom)	10	45 min	n/s	Yes
<i>Assertiveness training</i> , Fuspita et al. (2018)	Assertiveness training to reduce depression amongst adolescents in high school		Assertiveness training, CBT	Assertiveness, social skills	High school, after school hours	Group (40 per group)	6	60 min	Researcher and mental health nurse	Yes
<i>AMISTAD para siempre</i> , Gallegos et al. (2013) Gallegos (2008)	Social and emotional programme that uses cognitive-behavioural techniques to prevent anxiety and depression amongst primary school-aged children	FRIENDS for life program	CBT	Physiological, cognitive, and behavioural strategies to assist in coping with stress and worry	Primary school, during school hours	Group (entire classroom)	10	75 min	Teacher	Yes
<i>IMB-based programme</i> , Ghaffar et al. (2019)	Information motivation and behavioural skills (IMB) based anxiety prevention intervention for primary school aged children		IMB-model, stimulus response theory	Anxiety, emotions and their intensity, triggers, and effects, emotional regulation, empathy skills, self-esteem	Primary school	Group (entire classroom)	4	60 min	Research assistant	Yes
<i>Positive psychology intervention</i> , Khanna and Singh (2019)	Positive psychology exercise to improve mental health and well-being amongst adolescents	Positive psychology exercises developed by Seligman et al. (2005)	Positive psychology	Positive and strength based activities	During school hours	Group (entire classroom)	n/a (1 week)	n/a	Researcher	Yes
<i>Living Well</i> , McMullen and McMullen (2018)	Life skills-focused intervention to increase self-efficacy, reduce internalising problems, promote prosocial behaviour, and develop a sense of connectedness amongst adolescents		Health promotion	Mental health and resilience, communication skills, life skills, supporting good choices	Secondary school, during school hours	Group (entire classroom)	24	45–60 min	Teacher	Yes
<i>RAP-A</i> , Rivet-Duval et al. (2011)	Group-based programme incorporating CBT and interpersonal approaches to reduce adolescent depressive symptoms	Resourceful Adolescent Program developed by Shochet et al. (1997)	CBT, interpersonal therapy	Building self-esteem, keeping calm, problem solving, self-talk, thinking resourcefully, identifying and accessing support, consideration of others, keeping peace	Secondary school, during school hours	Group (8–12 per group)	11	60 min	Teacher	Yes
<i>SEHER</i> , Shinde et al. (2018)	A multi-component, school-wide health promotion intervention to improve school climate and outcomes in secondary schools	WHO Health Promoting Schools framework and previous work using this framework; Sangath's School Health Promotion and Empowerment (SHAPE)	Health Promotion	Mental health, bullying, hygiene, substance use, gender and violence, reproductive and sexual health, rights and responsibilities, study skills	Secondary and higher secondary schools, during school hours	School-wide, group, individual	n/a	n/a	Lay counsellor, teacher	Yes
<i>Yoga intervention</i> , Velásquez et al., 2015	Yoga programme to prevent anxiety, depression, and aggression amongst adolescents			Yoga poses, meditation techniques, breathing exercises, relaxation	Elementary school, during school hours	Group	24	120 min	Yoga instructor	Yes
<i>Positive education intervention</i> , Zhao et al. (2019)	Positive education intervention to improve academic performance, well-being and character strengths amongst adolescents		Broaden-and-Build theory (Fredrickson, 2001)	Meditation, emotions, positive thinking, gratitude, savouring, serenity, anxiety, anger	Middle school, during school hours	Group (entire classroom)	10	45 min	Teacher	Yes

Further, ten studies reported using the local or official language (Anttila et al., 2019; Bektas and Ozturk, 2008; Fuspita et al., 2018; Gallegos, 2008; Gallegos et al., 2013; Ghaffar et al., 2019; Khanna and Singh, 2019; McMullen and McMullen, 2018; Rivet-Duval et al., 2011; Shinde et al., 2018; Zhao et al., 2019).

3.4. Intervention characteristics

3.4.1. Implementer

Half of the studies were implemented by teachers (see Table 2). The SEHER intervention (Shinde et al., 2018) compared implementation by different leaders, and found lay counsellors were more effective than teachers on depression outcomes. Implementer training ranged between half a day (Ghaffar et al., 2019) and one week (Shinde et al., 2018). Five studies reported provision of supervision during the course of the intervention.

3.4.2. Parental involvement

None of the studies reported directly involved parents/guardians in the intervention. Four studies reported providing parents/guardians with information, either informational sessions (Gallegos, 2008; Gallegos et al., 2013; Shinde et al., 2018) or an information sheet (Anttila et al., 2019; Ghaffar et al., 2019).

Table 3

Study outcomes and effect sizes.

Study, author	Outcome measure	Outcomes		Effect size (Cohen's <i>d</i>)	
		Depression related outcomes	Anxiety related outcomes	Depression related outcomes	Anxiety related outcomes
REBT, Adomeh, 2006	Levels of anxiety and depression Odebunmi anxiety, depression and stress scales	No significant reduction in depression levels	Significant reduction in anxiety levels	0.06 (post-test)	0.33 (post-test)
DepisNet-Thai, Anttila et al. (2019)	Depression PHQ-9	No significant changes in depression	n/a	0.17 intervention vs active control; 0.17 intervention vs passive control (post-test)	n/a
Health promotion education, Bektas and Ozturk (2008)	State and trait anxiety C-STAI	n/a	Significant decrease in state-trait anxiety scores	n/a	3.44 (state anxiety); 5.89 (trait anxiety) (post-test)
Assertiveness training, Fuspita et al. (2018)	Depression Not specified	Significant reduction of depression	n/a	1.57 (post-test)	n/a
AMISTAD para siempre, Gallegos et al. (2013) Gallegos (2008)	Anxiety SCAS Depression CDI	Significant difference in depression scores between groups, not maintained at follow-up	No significant difference between groups anxiety scores	0.28 (post-test) 0.10 (6mo follow-up)	0.09 (post-test) 0.10 (6mo follow-up)
IMB-based programme, Ghaffar et al. (2019)	Anxiety RCADS 25	n/a	Significant difference in anxiety scores between groups	n/a	0.16 (post-test) 0.13 (3mo follow-up)
Positive psychology intervention, Khanna and Singh (2019)	Depression CES-D	No perceived gains in scores of depressive symptoms	n/a	2.88 (post-test)	n/a
Living Well, McMullen and McMullen (2018)	Internalising symptoms AYPA	Significant reduction internalising problems		0.26 (post-test)	
RAP-A, Rivet-Duval et al. (2011)	Depression RADS-2	Decreased depressive symptoms, not maintained at follow-up	n/a	0.32 (post-test) 0.02 (6 m follow-up)	n/a
SEHER, Shinde et al. (2018)	Depression PHQ-9	Significant improvements in depression	n/a	0.27 (SM vs control); 0.01 (TSM vs control); 0.27 (SM vs TSM) (post-test)	n/a
Yoga intervention, Velásquez et al., 2015	Depression and anxiety Selected and adapted items from SDQ	No significant effect on depression	Significant decrease in anxiety	0.00 (post-test)	0.16 (post-test)
Positive education intervention, Zhao et al. (2019)	Depression PROMIS	No significant difference between groups	n/a	Could not be calculated	n/a

Note: PHQ-9 (Patient Health Questionnaire-9); C-STAI (State-Trait Anxiety Inventory for Children); SCAS (Spence Children's Anxiety Scale, Escala de Ansiedad para Niños de Spence); CDI (Children's Depression Inventory, Cuestionario de Depresión Infantil); RCADS 25 (Short version of the Revised Child Anxiety and Depression Scale); CES-D (Centre for Epidemiological Studies – Depression Scale); AYPA (The African Youth Psychosocial Assessment Instrument); RADS-2 (The Reynolds Adolescent Depression Scale-2); SDQ (Strengths and Difficulties Questionnaire); PROMIS (Patient-Reported Outcome Measurement Information System).

3.4.3. Intervention materials and duration

Eleven interventions were manualized (see Table 2). On average, the interventions were delivered over a period of 17 weeks (range of one week to one year). An average of 13 sessions (range of 6–24 sessions) were delivered, with an average length of 63.5 min (range 45 min to 2 h).

3.4.4. Intervention effectiveness

A variety of self-report measures were used to assess symptoms of anxiety and/or depression amongst participants (see Table 3 for outcome measures and effect sizes). Five studies reported an improvement in depression-related outcomes post-test (see Table 3). Post-test effect sizes were typically small and ranged from ($d = 0.01$) to large ($d = 1.57$). Two studies that conducted six-month follow-ups reported reduction in depression scores at post-test, but these effects were not maintained at follow-up (Gallegos, 2008; Gallegos et al., 2013; Rivet-Duval et al., 2011).

Five interventions reported improvement in anxiety-related outcomes post-test (see Table 3). Post-test effect sizes varied between none, small ($d = 0.13$), and large ($d = 5.89$). Most studies showed small effect sizes, with one study showing large effect sizes (Bektas and Ozturk, 2008) ($d = 3.44$ for state anxiety; $d = 5.89$ trait anxiety). One study reported follow-up data, which found that the effects of the IMB-based

intervention (Ghaffar et al., 2019) were maintained at 3-months post-intervention ($d = 0.16$ at post-test; $d = 0.13$ at 3-month follow-up).

4. Discussion

Universal school-based interventions may offer a low-cost, direct, and scalable way of accessing children and adolescents and improving their mental health in LMICs. Standardized universal programmes may be particularly helpful when mental health expertise and specialist resources are limited. However, despite their potential importance, research is scant, with the previous review only identifying 6 universal school-based interventions (Barry et al., 2013). This review therefore provides a timely update and the first synthesis of universal, school-based mental health interventions in LMICs specifically addressing depression- and/or anxiety-related outcomes. Twelve studies were identified. Outcome data were limited, effect sizes were variable, and the studies were methodologically weak. Many studies were small, lacked statistical power and were poorly described, leading to an overall weak quality assessment and unclear risk of bias. Consequently, there is a lack of evidence for the effectiveness of universal, school-based mental health interventions in LMICs.

4.1. Intervention effectiveness

Our review highlights significant issues that limit any interpretations that can be made. Importantly there was considerable heterogeneity regarding measures used to assess depression and anxiety, so we were unable to determine the pooled efficacy of these interventions (Deeks et al., 2019). This is consistent with other reviews which were unable to report on the effectiveness of these programmes in LMICs via a meta-analysis (Barry et al., 2013; Fazel et al., 2014b).

4.2. Age of participants

Studies in this review focused predominantly on participants aged 11–18 years. It is unclear whether school-based universal mental health interventions for younger children in LMICs might result in positive outcomes. This is important considering that the median age of onset for anxiety is 11 years of age (Kessler et al., 2005) and early intervention is integral to effective prevention strategies (Herrman et al., 2005; Kieling et al., 2011).

4.3. Intervention delivery

With universal, school-based approaches group-based implementation appears the most common mode of intervention delivery. This approach has proven to be effective in other adolescent mental health interventions (Das et al., 2016), and is particularly suited to intervention delivery in schools, as this enables intervention delivery to the classroom as a whole, as was done in six included studies. Group-based approaches may be particularly useful in low-resource LMIC settings, as these may prove more cost-effective and less resource intensive (Hod-dinott et al., 2010; Tucker and Oei, 2007).

All but one study relied on face-to-face intervention delivery (Anttila et al., 2019). DepisNet-Thai (Anttila et al., 2019) used a web-based moodle platform to support adolescent well-being. The use of technology to deliver mental health interventions could have advantages including reduced cost, greater convenience and increased accessibility. Whilst the acceptability and effectiveness of online interventions for mental health has been established in HICs (Arjadi et al., 2015), there is a need to evaluate their use, impact and feasibility in LMICs, taking into consideration possibly limited infrastructure and a lack of access to necessary resources.

Whilst the included studies differed widely in intervention characteristics and implementation, half of the included interventions reported teacher-delivered interventions. In HICs, there is mixed evidence

pertaining to the effectiveness of interventions delivered by teachers (Franklin et al., 2012; Stallard et al., 2014). In LMICs, task-shifting to teachers may prove more feasible, scalable and sustainable, although teachers will need to be consulted about their willingness and availability, and will need adequate training and supervision to ensure intervention fidelity (Han and Weiss, 2005). Interestingly, only two studies included parental/guardian involvement in the form of informational sessions. Whilst parental involvement may be beneficial in targeted mental health interventions (Shucksmith et al., 2010), it is unclear whether this effect would be the same in universal interventions. Moreover, substantive parent involvement may not prove feasible in LMIC settings, as this may involve additional costs or resources.

4.4. Cultural adaptation

Research emphasizes the need to ensure that mental health interventions need to be culturally relevant and accessible to participants (Castro-Olivo, 2017; Connor and Grote, 2008). Our review highlighted that, whilst the majority reported that the interventions had been locally developed or adapted, only four studies provided explicit examples of how this had been done. Further examples of how interventions are adapted for LMICs which recognise their specific culture, language, relevant examples, and practical constraints on delivery such as class size and lesson length would be welcomed. Locally developed interventions addressing the cultural, educational, and social context of the communities in which they are implemented (Bernal and Sáez-Santiago, 2006) may increase the likelihood of positive mental health outcomes.

5. Strengths and limitations

This systematic review used a clear and rigorous search strategy in line with clear inclusion and exclusion criteria. Whilst it provides the first synthesis of the effects of universal, school-based mental health interventions in LMICs on symptoms of depression and/or anxiety, this systematic review does have a number of limitations. Firstly, this review only included studies published in English. Secondly, we only included studies reporting anxiety and/or depression-related outcomes. Thirdly, qualitative studies were not included as part of this review, and as such we may have excluded studies reporting on feasibility or acceptability outcomes.

6. Conclusion

This systematic review provides a summary of universal school-based mental health interventions for children and adolescents in LMICs. Due to limited evidence and considerable methodological limitations it is not possible to conclude that these programmes are effective in LMICs. Future research should examine the suitability and possible adaptation of these interventions for younger children in LMICs, taking care to use valid and reliable heterogeneous measures of mental health outcomes to allow for a more robust assessment of the evidence. Moreover, the capacity for implementing and evaluating interventions in these contexts needs to be improved, with comprehensive reporting of research methods and intervention protocols, enabling the development of a stronger evidence base.

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Conflict of interest

We declare no competing interests.

CRedit authorship contribution statement

Melissa Bradshaw: Methodology, Project administration, Investigation, Writing - original draft, Formal analysis. **Hermine Gericke:** Methodology, Investigation, Writing - original draft, Formal analysis. **Bronwynè J. Coetzee:** Conceptualization, Methodology, Funding acquisition, Supervision, Writing - review & editing. **Paul Stallard:** Writing - review & editing, Supervision. **Suzanne Human:** Methodology, Writing - review & editing. **Maria Loades:** Conceptualization, Methodology, Writing - review & editing, Supervision.

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Appendix A. Supplementary data

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