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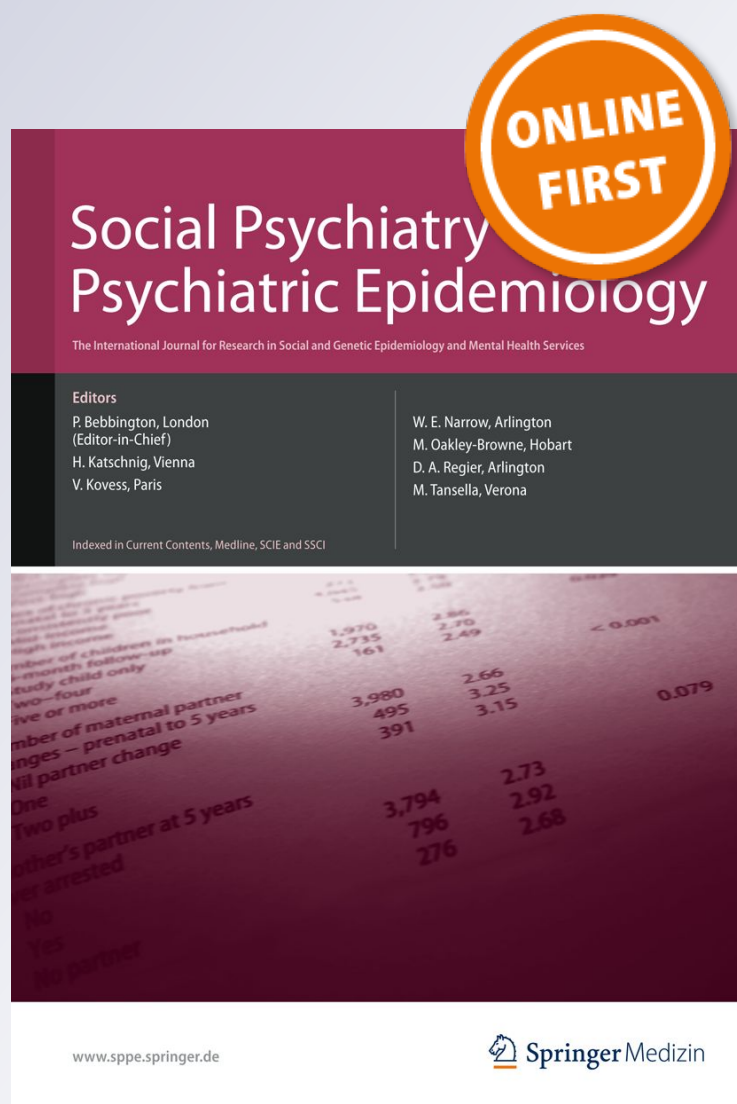
Henrikje Klasen & Anne-Claire Crombag

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What works where? A systematic review of child and adolescent mental health interventions for low and middle income countries

Henrikje Klasen · Anne-Claire Crombag

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Abstract

Purpose Child and adolescent mental health (CAMH) problems are common and serious all over the world and are linked to pre-mature deaths and serious dysfunction in adult life. Effective interventions have been developed in high income countries (HIC), but evidence from low income settings is scarce and scattered. The aim of this paper is to identify the most promising interventions in the area of global CAMH.

Method A systematic review of all randomised controlled trials in CAMH in low and middle income countries (LAMIC) was carried out and supplemented by 1a level evidence from HIC as well as suitable information from child programme evaluations and adult studies in LAMIC.

Results In behavioural disorders parent training is a highly promising intervention, which can successfully improve children's compliance and bring down rates of conduct problems significantly. In young children cognitive, emotional and behavioural development can be enhanced through nutritional supplements and by stimulation through play, praise and reading. Trauma treatments can bring positive results even in severely traumatised children, who remain in unstable living conditions. In developmental disorders, there are successful prevention strategies as well as programmes that bring children out of isolation and improve their independence. Some classroom-based interventions for adolescents have reduced symptoms of common mental disorders as well as risk taking behaviours.

Conclusions While many results are still tentative the evidence suggests that it is possible to develop affordable and feasible interventions that significantly improve the lives of affected children, their families and their communities around the world.

Keywords Child and adolescent mental health · Low and middle income countries · Systematic review · Interventions · Prevention

Introduction

Background

Child and adolescent mental health (CAMH) problems are common, they are serious and they are treatable. Globally 20 % of children and adolescents suffer from a disabling mental illness; suicide is the third leading cause of death among adolescents and up to 50 % of adult mental disorders have their origin in childhood [1–4]. Common childhood psychiatric problems such as behavioural disorders, attention deficit hyperactivity disorder (ADHD), anxiety and depression have been linked to school failure, criminality, drug and alcohol dependence, accidents, self-harm, (sexual) risk taking behaviour and serious dysfunction in adult life, thus placing a burden on children, families and communities. Much CAMH research in high income countries (HIC) in the past decades has focused on developing and evaluating interventions and there is now robust evidence for effective treatments for most child psychiatric problems. Unrecognized, however, affected children often experience harsh physical punishment, abuse, stigmatisation, exclusion from education and in some parts of the world not uncommonly long-lasting physical restraint through locking

H. Klasen (✉) · A.-C. Crombag
Stichting De Jutters, Postbus 61452,
2506 AL Den Haag, The Netherlands
e-mail: h.klasen@dejutters.com

or chaining them. In addition, because many adult mental health problems begin in youngsters the point has been made that reducing the duration of untreated serious mental illness by focussing resources on childhood and adolescence could revolutionize treatment and outcome of these disorders [5]. It is therefore not surprising that in a recent initiative on “Grand challenges in global mental health” published in “Nature” in July 2011, children emerge as requiring particular attention for prevention and care [6].

Resources and research are scarce in low and middle income countries (LAMIC) and the gap between need and actual provision in CAMH is even higher than in general psychiatry. Research is a good example. Of all mental health trials carried out worldwide by 2007 only about a tenth (1,521 studies) was carried out in LAMICs and of these less than 1 % specifically addressed child mental health problems [7]. This means that less than 0.1 % of the global trials in mental health specifically address the needs of children and adolescents in LAMIC, even though children and adolescents form about 1/3 to 1/2 of the population in most parts of the world. Reasons for this neglect and possible ways to address this have been widely discussed in recent years [1, 7]. One of the difficulties seems to be the focus on disability adjusted life years (DALYs) in identifying the burden of disease for society. While this focus has actually been quite helpful in raising the profile of adult mental health, children are disadvantaged in this system. Thus a year of disability of a 2-year old child only counts 20 % of that of a 25-year old adult, supposedly reflecting their “value” to a society [8], but totally neglecting any future impact on the child’s health.

While there is general agreement that more research is needed, service provision cannot and in reality does not wait for this evidence to become available. Many LAMICs are beginning to implement child mental health policies, humanitarian agencies increasingly carry out psychosocial care programmes for children and Patel stated “the need for more research must not be used as an excuse to delay scaling up of mental health systems” [7]. As it is unethical to waste resources by implementing treatments that do not work, it is equally not feasible to wait, leaving a huge unmet need with unforeseeable consequences for untreated children as they grow into adulthood.

The challenge at this point of time is to identify the most promising interventions for child and adolescent mental health problems using the evidence we do have. It might be tempting to translate the large body of evidence regarding effective interventions for CAMH problems from HIC directly to LAMIC settings. However, differences in socioeconomic factors and health systems probably limit the generalisability of many of these findings. Furthermore, many of the interventions require large input of highly trained staff, thus making them not feasible for LAMIC as

these human resources are simply not available in the majority of settings. Despite this, some of the most robust evidence from HIC (multiple RCTs in various cultural settings and meta-analyses) is likely to be of use for LAMICs too, especially in the case of more biological disorders. More importantly, however, a growing body of increasingly well-designed intervention studies, including some RCTs from LAMIC is emerging. While the diversity of problems treated and of interventions used do not yet allow for quantitative analysis of this evidence, a systematic review of the available studies can help to identify the most promising approaches as well as the most urgent research gaps in this hugely important and neglected area.

Objective

The aim of this paper is to identify the most promising interventions as well as most urgent research gaps in the area of global CAMH interventions.

This is done foremost through a systematic structured review of the evidence gathered through randomized controlled trials (RCTs) in LAMIC on treatment and prevention of child and adolescent mental health problems including childhood disability. RCTs are generally seen to provide the best test of the efficacy of preventive or therapeutic interventions because they can separate the effects of the intervention from those of external factors such as natural recovery and statistical regression. They do, however, require rigorously controlled circumstances, which in real life settings, particularly in LAMIC, cannot always be guaranteed, which might mean that in these circumstances RCTs are not always the most appropriate research methodology. Although we are aware of the potential shortcomings of RCTs on psycho-social interventions carried out in LAMIC, we chose this focus as an initial step, to gain an overview of the field, on which so far no other reviews have been carried out.

Where data from child- and adolescent RCTs in LAMIC are not available, we have also drawn on 1a level evidence (meta-analyses) from HIC; programme evaluations from LAMIC (e.g. community rehabilitation programmes) and lessons learned from adult RCTs in LAMIC (e.g. for treatment of anxiety and depression). This additional evidence is clearly marked in the text and in the tables. To make this paper useful for non-child-psychiatrist we also give a short introduction to each area of disorder about nature and scope of the problem.

Methods

We systematically searched for RCTs, cluster RCTs and quasi RCTs carried out with children and adolescents in

LAMIC. We searched the following databases: Embase, PsychInfo, Medline, Pub. Med. as well as the Cochrane database of trials up to August 2011 limiting results to English language, children and adolescent, and controlled studies. We used the following search terms (MESH with subheadings if possible): child psychiatry or adolescent psychiatry or mental disorders diagnosed in childhood or mental retardation or ADHD or anxiety disorder or post-traumatic stress disorder (PTSD) or depression or anxiety or mood disorder or HIV or Child abuse or substance-related disorder or child orphaned or war or violence. In this manner, we identified 9,274 trials. We limited our search to studies including populations from low and middle income countries as defined by the World Bank [9] or from poverty areas arriving at 514 studies. We screened the abstracts of all these papers and again excluded all studies that were not directly mental health related (i.e. HIV transmission), were not RCTs, did not include populations from LAMIC or did not include children and adolescents. 134 papers were identified at which we took a closer look: 60 addressed somatic interventions promoting healthy child development through nutritional enhancement, de-worming etc., and 17 addressed HIV prevention. Although we briefly mention the main results of these studies as far as they concern mental health, they are not the focus of this paper. We enhanced our search strategy by checking the identified papers for any cited material we had previously missed and by keyword instead of MESH term searching. All in all we thus identified 54 trials of child and adolescent mental health RCTs, cluster RCTs and quasi RCTs in LAMIC. (Further details on all studies and keywords used are available from the authors).

Results

Behavioural disorders

Introduction

“Behavioural disorders” is used by the World Health Organisation’s (WHO) mental health gap action programme (mhGAP) as an umbrella term including more specific disorders such as oppositional defiant disorder (ODD), conduct disorder (CD) and also ADHD. Affected children are characterized by varying combinations of impulsiveness, inattentiveness, antisocial, aggressive or defiant behaviours; sometimes resulting in CD with more serious problems such as cruelty to people and animals, fighting, stealing, lying, running away from home or school and general destructiveness. The worldwide prevalence of ADHD has been well documented with a meta-regression analysis of worldwide studies on ADHD among youngsters

of age 18 and younger revealing a pooled prevalence of 5.29 % [10]. Accidental injury [11], abuse through severe corporal punishment [12, 13] and (sexual) risk taking behaviour [14] are major hazards especially for LAMIC. Left untreated outcome in adulthood is often poor with low academic achievement, poor employment prospects and sometimes drift into criminality.

Evidence from LAMIC

As the term chosen by WHO is quite broad, there is great variation in the studies reported here: some are preventive while others treat manifest problems; some focus on training parents, while others are school-based addressing children and/or teachers and others again test pharmacotherapies. Problems treated included general behaviour problems, ODD, school drop-out, ADHD and tic disorders. (Table 1).

The *parent interventions* varied in intensity and severity of problems treated, ranging from RCTs of two 2 h sessions of preventative parent management skills training to mothers visiting health centres in Iran [16] to comprehensive treatments by US-accredited therapists for Puerto Rican families of children with manifest ADHD and behaviour problems working with mothers and children together [24]. Fayyad et al. [13] took an intermediate approach in a non-controlled trial using a manual developed by the World Psychiatric Association (WPA) Presidential Global Programme on child mental health in collaboration with WHO and the International Association for Child and Adolescent Psychiatry and Allied Disciplines (ICAPAP) adapted to 8 sessions for parents, delivered by non-specialized general health and social workers, who were trained over four half day sessions. Eighty-seven mothers of children with manifest behaviour problems participated, the SDQs of their children in the abnormal range decreased from 54.4 to 19.7 %, severe corporal punishment decreased from 40.2 to 6.1 and 75 % of mothers found the programme helpful.

There is also great variation in *school-based programmes*. The Jamaica pilot study of the “Incredible Years Teacher Training” programme involved 7 whole days of teacher training (by professionals fully accredited by the programme developers from the USA) and 14 child lessons [17, 18]. Significant benefits included increases in the extend to which teachers promoted children’s social and emotional skills with improved child behaviour, interest and enthusiasm. A Brazilian case-control study to reduce school drop-out used a mixed intervention package which included two workshops with teachers, five letters to parents, three meetings with parents and school, a telephone helpline, 1 day cognitive intervention and a mental health assessment with possible referral to resources available in

Table 1 Randomised controlled trials (RCTs) for behavioural and ADHD and tic disorders plus 1 quasi RCT

	Setting	Study design	Sample	Intervention	Comparison group	Main results
Behavioural	Elementary school in China [15]	RCT	417 children out of 6 class rooms	School-based prevention curriculum of 13-sessions	No intervention	Behavioural problems were significantly lower in the intervention group posttest -3.53 ($p = .023$) and at 6-month follow up, -5.22 ($p = .001$)
	Primary care clinic in Iran [16]	RCT	224 mothers of young children who visit health centers	Preventative parenting programme based on “SOS! Help for Parents”	No intervention	Significant improvements on measures of Parenting Scales (PS) total scores ($p = .001$) and parent–child conflict tactics scale-modified (CTSPCm) total scores ($p = .001$). This improvement was maintained at 8-week follow up
	5 pre-schools in Kingston, Jamaica [17]	RCT	135 children with behaviour problems out of 17 class rooms	School-based workshops based on “Incredible Years” teacher training	No intervention	The effect sizes for the intervention were 0.26 for conduct problems, 0.36 for hyperactivity and 0.71 for peer problems. The intervention also resulted in increases in the number of positive teacher-parent contacts ($p < .0001$)
	5 pre-schools in Kingston, Jamaica [18]	Pilot RCT	135 children with behaviour problems out of 17 class rooms	School-based workshops based on “Incredible Years” teacher training	No intervention	Significant intervention benefits were seen in teachers’ increased positive behaviour ($b = 7.9$), reduced negative behaviour ($b = -3.5$) and children’s social and emotional skills ($b = 46.4$). Intervention also improved children’s appropriate behaviour ($b = 5.7$), interest and enthusiasm ($b = 7.2$) and classroom atmosphere ($b = 1.3$)
	2 public schools in urban Brazil [19]	quasi RCT	1,268 children of which 40 at-risk for school dropout	School-based intensive dropout prevention programme	No intervention	Significant differences between the two schools in rates of both dropout ($p < .001$) and absenteeism in the last trimester ($p < .05$). In the intervention school 45 % returned to school
	Low-income district primary school in Turkey [20]	RCT, follow-up	226 school aged children	Zinc supplementation for 10 weeks	Placebo	Zinc supplementation decreased the prevalence of children with clinically significant scores for attention deficit ($p = .01$) and hyperactivity ($p = .004$) on the Conner’s Rating Scales for Teachers and Parents. The effect on behaviour was more evident in the children of low educated mothers ($p < .0001$)
ADHD and TIC disorders	Hospital in South India [21]	RCT	50 children with ADHD age 4–12 years	Pharmacotherapy with second line drug Clonidine	Carbamazepine	Clonidine is effective in improving the hyperactivity ($p < .0001$) and impulsivity ($p = .0006$) symptoms in children with ADHD as compared to carbamazepine. Clonidine can be a safer and cheaper alternative in treatment of children with ADHD
	Brazil [22]	RCT	36 children and adolescents with ADHD	Pharmacotherapy with Methylphenidate during 4 days	Placebo	Significantly greater decrease in ABRS scores and a significantly higher increase in CGAS scores than the placebo group ($p < .01$). The Methylphenidate effect size for the ABRS was 1.05 (95 % CI = 0.73–1.37)
	China [23]	RCT	437 children with a tic disorder aged 6–18 years	Pharmacotherapy with clonidine adhesive patch	Placebo	Larger decrease in YGTSS tic score ($p = .03$) and significantly better therapeutic response ($p = .003$) than control group. The response rate was 68.85 % compared to 46.85 % in the clinical control group ($p = .0001$)

ABRS conners abbreviated rating scale

CGAS children’s global assessment scale

YGTSS yale global tic severity scale

the community for kids absent more than 10 days [19]. Significant differences were found favouring the intervention school both in drop-out ($p < .001$) and absenteeism ($p < .05$) with an effect size of 0.64. Finally Hong carried out a 13 session universal prevention programme for behavioural problems in China working directly with children and achieving decreased behaviour problems at home post treatment and at 6-month follow-up [15].

ADHD studies focussed on pharmacotherapy with one small RCT ($n = 36$) on short-term effects of methylphenidate (MPH) carried out in Brazil with the intervention group showing significantly better Conner's scores and significantly better children's global assessment scale scores (.001, effect size 1.05) four-day post-treatment begin [22]. As stimulants are not readily available and sometimes banned in LAMICs Nair tested two second line drugs clonidine and carbamazepine for use in children with ADHD, finding clonidine but not carbamazepine to reduce symptoms of hyperactivity and impulsivity but not inattention [21]. Du et al. [23] also found clonidine helpful in the treatment of tic disorder and Tourette syndrome.

Most robust evidence from HIC

For young children with behavioural disorders there is no 1a level evidence for interventions focussing on children directly, but parenting approaches are well-established interventions supported by several RCTs, replications and meta-analyses [25, 26] (1a level of evidence). Several manualised treatment packages both for individuals as well as for groups of parents are effective, but often require extensive training and supervision to avoid programme drift. Sometimes teacher training as well as child social skills groups complement parent training. Effect sizes are moderate to large (0.5–0.8) with enduring effects at up to six-year post-treatment [27]. In older children often more resource intense multi-modal interventions are needed and a Cochrane review with meta-analysis performed on CD and delinquency in youngsters aged 10–17 (749 children) showed that parenting and family interventions help reduce arrests and time spent in institutions [28].

A Cochrane review of 26 studies looked at the effects that parenting programmes had on participating mothers and found that the intervention group had statistically better scores for depression, anxiety/stress, self-esteem and relationship with spouse/marital adjustment [29].

For ADHD numerous well-conducted trials have demonstrated that stimulants are effective in the treatment of the core symptoms of ADHD (inattention, hyperactivity and impulsivity) as well as benefitting some secondary symptoms such as academic underperformance, difficulties in peer and family interactions [25, 26]. There is also 1a level evidence for the non-stimulant atomoxetine and for

tricyclic-antidepressants, although stimulants are seen to have the best risk/benefit ratio. In terms of psycho-social treatments behavioural parent training, behavioural classroom management and intensive peer-focused behavioural interventions (e.g. summer camps) are also well-established treatments [30] while there is less evidence for individual child focused approaches.

Implications for practice in LAMIC

In HIC, manualised parent training in groups is effective, as well as cost-efficient interventions, for oppositional and conduct disordered children, especially in the under ten age group. There is now some evidence that simplified manuals, where training and expertise needed are moderate have been successfully modified to work in LAMI settings, even though follow-up periods have so far been quite short, and maintaining programme fidelity can be a big problem. Another difficulty remains the frequent lack of diagnostic capacity in LAMIC. As disruptive behaviours are not always oppositional, but can be related to many other causes such as ADHD, trauma, emotional problems, learning difficulties or mild autistic spectrum disorders interventions such as parent management training might not be helpful to all children displaying disruptive behaviour.

For the treatment of ADHD, it is likely that the benefits of stimulant medication generalise to LAMIC as well. The exclusion of these substances on the WHO list of essential medications and their ban in many societies might need to be reconsidered. In fact the potential importance of these and other psychotropic medications for children has already been noted on the "WHO Model List of Essential Medicines for Children". A remaining difficulty is that even if the drugs are available in certain countries, they are often not free, even for poor families, as they are frequently not included in the public health systems lists of basic medications. General recommendations are that stimulant medication should only be prescribed by suitably trained professionals. In their absence psycho-education and parent training groups can be administered by community staff and are likely to bring some improvement in less affected cases or when a specific diagnosis is not available.

Trauma

Introduction

Severe traumatic experiences through war, migration, natural disasters, chronic poverty or loss of a close relative are much more common in LAMIC than in HIC.

While not all trauma-exposed children develop a psychiatric disorder and reported incidences vary widely, the risk to develop sometimes chronic symptoms of anxiety, depression or the more specifically trauma-related symptoms of PTSD is significantly increased with incidence of up to 30–60 % in war-exposed children [31]. We include trauma under a separate heading even though it overlaps with other disorders, as many interventions focus specifically on the treatment and prevention of trauma-related problems in exposed populations. While these interventions might use evidence based elements of trauma therapy used in HIC, their mode of delivery and the psycho-social circumstance in which they are delivered warrant specific attention.

Evidence from LAMIC

We found altogether ten RCTs [32–41] and four quasi randomised controlled studies [42–45] focusing on post-traumatic symptomatology benefitting children in LAMIC (see Table 2) with an additional three studies from Israel which does not fall under the LAMIC countries [46–48]. While some studies focused on PTSD alone, more recent studies included symptoms of anxiety, depression and other aspects of wellbeing (e.g. a sense of hope, pro-social behaviour) in their analyses.

The classroom-based intervention (CBI) used by Jordans in Nepal and Tol in Indonesia involves community interventionists being trained during a 15-day skill-based course and being supervised by an experienced counselor [33, 34]. In a cluster RCT of 325 children with elevated psychosocial distress in conflict affected Nepal the intervention reduced psycho-social difficulties and aggression among boys and increased pro-social behaviours in girls, but did not result in a reduction of psychiatric symptoms of PTSD, anxiety and depression [34]. They concluded that this type of intervention should be implemented in conjunction with more targeted specialist services for affected children.

This is exactly what Layne et al. [39] did in their three tier school-based programme in Bosnia: 127 children with severe symptoms of PTSD, depression or maladaptive grief and significant impairment were included. Their tier 1 intervention included school-based psycho-education and skills training and was effective in significantly reducing PTSD and depressive symptoms. Tier 2 intervention included both classroom intervention as well as a 17-session manual-based group therapy and found higher improvements of PTSD and depressive symptoms as well as improvement in maladaptive grief. A small number of very distressed students with acute risk of self harm were referred to community specialist services (tier 3). The three tier approach made efficient use of a variety of skill levels.

The study takes place in a middle income country where specialist CAMHS are available.

Interestingly while almost all published RCTs found some reduction in symptomatology usually maintained at least at 3-month follow-up, their treatment approaches differed quite considerably. Some harnessed culture-specific coping mechanisms and focussed strongly on mind–body skills (incl. meditation, breathing techniques, spiritual-hypnosis assisted therapy and also self-expression through art and genograms) [40, 42]. Others adapted effective treatments based on techniques such as cognitive behaviour therapy (CBT) [38, 43], interpersonal therapy (IPT) [35, 41] or narrative exposure therapy (NET) [32, 35, 37] to be delivered by lay councilors in low-resource environments either in group, classroom or individual settings. Others again worked with mothers to affect both their own as well as their young children's psychological functioning [45] while in some cases, such as the CBI mentioned above, used an eclectic mix of various techniques including narrative, creative, social and cognitive approaches.

It is also of note that the settings and the sort of trauma the affected children had been directly or indirectly exposed to varied widely. Ertl et al. [32] for instance worked with former Ugandan child soldiers exposed to extreme violence often involving torture, forced participation in atrocities, sexual violence and the loss of loved ones while children still lived in unstable conditions, being met with suspicion and distrust in their communities. Some studies took place in communities relatively settled after natural disasters or once war had subsided [39, 42], while others worked in refugee camps [41] or in communities with on-going conflict or insecurity [34].

Evidence from HIC

Evidence from HIC might be of limited use as it often focuses on single traumatic events (such a car accident or rape) or on individuals having been exposed to more chronic trauma (such as child abuse). There has, however, been some work on more comparable larger traumatic events such as natural disasters, or man-made disasters such as terrorist attacks or amok shootings. The therapeutic modalities mentioned above such as CBT, IPT, NET as well as relaxation techniques and in recent times eye movement desensitization (EMDR) have all been used with positive effects, but none of them have sufficient evidence in use in children to warrant a 1a rating of their evidence level [31]. An important lesson to be learned, however, is that universal prevention or debriefing of all affected individuals immediately after a traumatic event actually does more harm than good [31].

Table 2 Randomised controlled trials (RCTs) for trauma related disorders plus 2 quasi RCTs

Setting	Study design	Sample	Intervention	Comparison group	Main results
IDP camp in northern Uganda [32]	RCT follow-up 1 year	85 former child soldiers with PTSD aged 12–25 years	NET in 8 sessions by trained local lay therapists or academic programme	Waitlist	NET produced a larger within-treatment effect size (Cohen $d = 1.80$) than academic catch-up ($d = 0.83$) and waitlisting ($d = 0.81$)
Central Sulawesi, Indonesia [33]	Cluster RCT, follow-up (f/u)	403 children aged 8–13 with PTSD and anxiety symptoms	School-based psychosocial intervention combining CTG and creative expressive techniques	Waitlist	Intervention showed maintained hope ($p = .001$), increased positive coping ($p = .015$), maintained peer social support ($p < .001$), and increased play social support ($p < .001$). Girls showed larger treatment benefits on PTSD symptoms ($p \leq .004$)
Rural Nepal [34]	Cluster RCT	325 children aged 11–14 with elevated psychosocial distress	School-based psychosocial intervention	No intervention	After correcting no evidence for treatment effects was found on any outcome variable. Additional analyses showed gender effects for treatment on prosocial behaviour (2.70), psychological difficulties (−2.19), and aggression (−4.42)
Rwanda [35]	RCT, follow-up 6 months	26 genocide orphans who presented with PTSD	Individual narrative exposure therapy (NET)	Group interpersonal psychotherapy (IPT)	At post-test, there were no significant group differences between NET and IPT. Both approaches improved PTSD ($p < .05$) and depression symptoms ($p = .05$). At 6-month follow-up, NET participants were significantly more improved than IPT (25 % fulfill PTSD criteria vs. 71 %) with respect to both the severity of symptoms of PTSD and depression
Southwestern Uganda [36]	Cluster RCT, 10 week f/u	326 AIDS orphans aged 10–15 years	School-based peer-group support intervention	No intervention	The intervention showed significant improvement in depression ($p < .001$), anger ($p < .0001$), and anxiety ($p = .003$), but not for self-concept $p = .24$) as supposed to the control group
A refugee camp in north-east Sri Lanka [37]	RCT, 6 month follow-up	31 children with Tsunami induced PTSD	Narrative Exposure Therapy for children (KIDNET) in six sessions	Meditation-relaxation (MED-RELAX) sessions	At 6-month follow-up, recovery rates were 81 % for the children in the KIDNET group and 71 % for those in the MED-RELAX group. There was no significant difference between the two therapy groups in any outcome measure
Conflict affected communities in Poso, Indonesia [38]	Cluster RCT	495 children aged 8–13 with PTSD and anxiety symptoms	School-based psychosocial intervention combining CTG and creative expressive techniques	No intervention	Significantly more improvement in post-traumatic stress disorder symptoms (2.78) and maintained hope (−2.21) in the treatment group than control group. No group difference was seen in changes in stress-related physical symptoms (0.50), depressive symptoms (0.70), anxiety (0.12), or functioning (0.52)
10 schools in central Bosnia [39]	RCT, 4-month follow-up	127 children with severe symptoms of PTSD, depression or maladaptive grief	A three-tiered program with psycho-education (tier 1), classroom/community based interventions (tier 2) and CAMHS referral (tier 3)	Psycho-education (tier 1) only	Significant ($p < .05$) reductions in PTSD symptoms (58 % at posttreatment, 81 % at follow-up), depression symptoms (23 % at posttreatment, 61 % at follow-up) and maladaptive grief reactions were found in the treatment condition. Lower percentages of significant symptom reduction were found in the comparison condition

Table 2 continued

Setting	Study design	Sample	Intervention	Comparison group	Main results
Kosovar [40]	RCT, 3-month follow-up	82 adolescents meeting criteria for PTSD	12-session mind-body group program by high school teachers	Waitlist	Significantly lower PTSD scores following the intervention than control group ($p < .001$). The decreased scores were maintained at follow-up. After the wait-list control group received the intervention, there was a significant decrease ($p < .001$) in PTSD scores compared to preintervention
2 IDP camps in northern Uganda [41]	RCT	314 adolescents aged 14–17 years from IDP camps	Group interpersonal psychotherapy intervention or creative play intervention during 16 weeks	Waitlist	Group IPT reduced depression symptoms with a mean difference in change of 9.79 (girls 12.61, boys not significant 5.72) in survivors of war and displacement in Uganda, while creative workshops showed no effect (-2.51)
Bali in Indonesia [42]	quasi RCT, 2 year f/u	226 children aged 6–12 years with PTSD	Group spiritual-hypnosis assisted therapy	No intervention	Higher improvement rates of PTSD symptoms (77.1 % compared to 24 % in the control group)
Sri Lanka [43]	quasi RCT	166 elementary school children aged 9–15 with PTSD symptoms	Classroom-based CGT programme 'ERASE Stress Sri Lanka'	Waitlist	Significant improvement on PTSD severity, functional problems, somatic complaints, depression and hope score
5 refugee camps in Gaza Strip, Palestine [44]	quasi RCT	Children aged 9–15 years with moderate to severe PTSD	Group crisis interventions: creative therapy or psycho-education	No intervention	No effect on PTSD symptoms or depressive symptoms.
Bosnia and Herzegovina [45]	quasi RCT	87 IDP camp mother–child dyads	Psychosocial group intervention program consisting of weekly meetings for mothers during 5 months	Medical care only	The intervention had a positive effect on mothers' wellbeing ($p < .05$), children's weight gain ($p < .05$), and children's psychosocial functioning and mental health compared to the control group ($p < .01$)

IDP* internally displaced persons

Table 3 Randomised controlled trials (RCTs) for childhood disability and developmental disorders plus a review of rehabilitation

Setting	Study Design	Sample	Intervention	Comparison group	Main results
Kampala City, Uganda [49]	Pilot RCT	61 children aged 5–12 years with severe malaria	Computerized cognitive rehabilitation training (CCRT) using “Captain’s Log” software during 8 weeks	No intervention	Effects were observed in the intervention group for learning mean score ($p = .04$), but for working memory the intervention group performed poorly ($p = .04$). No effect was observed in the other cognitive outcomes or in any of the academic or behavioural measures
South Africa [50]	RCT	122 children infected with HIV aged less than 2 years 6 months	Home-based intervention programme including activities to promote development	No intervention	Children in the experimental group showed significantly greater improvement in cognitive ($p = .010$) and motor ($p = .020$) development over time than children in the comparison group
Uganda [51]	Pilot RCT	60 children with HIV	CCRT using “Captain’s Log” software during 10 sessions	No intervention	CCRT improved maze learning ($p < .001$) and attention on a detection task ($p = .02$)
Vietnam [52]	RCT	37 children aged 3–6 with intellectual disabilities (ID)	Home-based 1-year intervention based on Portage Curriculum consisting of training and coaching of parents	No intervention	Intervention group improved significantly in most domains of the Vineland Adaptive Behaviour Scales ($p < .05$), and also performed significantly better than the control group in the areas of personal care ($p < .05$) and motor skills ($p < .05$)
Red cross center in Thailand [53]	RCT	60 autistic children between the ages of 3 and 10	Thai traditional massage (TTM) in addition to sensory integration	Treatment as usual (sensory integration)	The Conners’ Parent Questionnaire detected only improvement for anxiety ($p = .04$) in the massage group, whereas when both groups were compared, a significant improvement in conduct problem ($p = .03$) and anxiety ($p = .01$) was found
Uganda [54]	RCT	65 children admitted 45 months earlier with cerebral malaria	CCRT using “Captain’s Log” software during 8 weeks	No intervention	Effects were seen on visuospatial processing speed ($p < .001$), on a working memory and learning task ($p < .001$), psychomotor speed ($p = .04$), and on internalizing problems ($p = .02$)
Turkey [55]	quasi RCT	41 children with cerebral palsy	Sensory-perceptual-motor (SPM) training in individual or group format	Treatment as usual with only home programme	Individualized and group SPM groups had much higher effect size than controls (Physical Activity Test resp. 7.05 and 2.57 against 1.38). There was no significant difference between pre- and posttest sensory-perceptual motor functions in the control group
Bangladesh [56]	RCT	58 children with cerebral palsy aged 1.5 to 5 years	Rural and urban outreach program for young children with cerebral palsy	An urban center-based treatment as usual and rural “minimal intervention” control group	Positive effects of intervention included increased maternal knowledge (rural $p < .02$) and perceived helpfulness of support from formal sources (rural $p < .02$, both urban groups showed improvement, but not significantly). However, maternal adaptation increased most in the health advice group with minimal intervention ($p < .02$)
Southern India [57]	RCT	57 parents of intellectually disabled children	Family psychoeducation in 10 weeks	Treatment as usual	Increase in parental attitude score ($p = .001$), orientation towards child-rearing skills ($p = .005$) knowledge towards intellectual disability ($p = .01$) and attitude towards management of intellectual disability ($p = .003$), but no change in attitude towards the intellectual disability subscale ($p = .06$)

Table 3 continued

Setting	Study Design	Sample	Intervention	Comparison group	Main results
India [58]	RCT	40 children with ID and 19 with ID and epilepsy	Herbal remedy (Mentat)	Placebo	Effective reduction in rating score on the Children's Behavioural Inventory test in children with mental retardation with and without epilepsy ($p < .001$)
22 countries in Asia, Africa, and Central America [59]	Review	Children with a wide range of disabilities	Diverse community interventions		Programmes were effective in increasing independence, mobility and communication of disabled people, increased school attendance and helped parents of disabled children to cope

Implications for practice in LAMIC

It is encouraging to see increasing evidence that children exposed to war, disaster and other traumas can be effectively treated in low resource settings, even if they are still living in insecure circumstances or camps and even if the exposure has been extreme, as in the case of the Ugandan child soldiers. All RCTs have used programmes specifically adapted to be cost effective and feasible in low income environments, being frequently group or classroom based, addressing mothers or children directly and using minimally trained local staff. Given the frequent lack of exact diagnoses, the diversity of the interventions which often include elements of trauma exposure (narrative, creative or in writing), CBT, IPT and (culturally appropriate) relaxation techniques as well as the diversity of settings and traumas experienced by children as well as the generally short-term follow-up, it is too early to say what exactly works for whom and when. Qualitative studies done prior to the interventions could help to identify culturally appropriate and acceptable interventions able to strengthen effective coping strategies and available local support systems. Offering a multi-tiered approach makes sense as it uses scarce resources well, ensuring that children receive the right level of care appropriate to their needs.

Managing childhood disability and developmental disorders

Introduction

“Developmental disorders” is the umbrella term used by mhGAP to describe a variety of problems including mental retardation, intellectual disability as well as pervasive developmental disorders including autism. Accurate diagnosis is often missing in LAMIC. These disorders are chronic, usually have childhood onset and persist in a steady course into adulthood. In LAMIC disabilities can also be the consequence of malnutrition or diseases (most notably cerebral malaria and HIV/AIDS). Interventions are usually aimed to either prevention or managing the problem by increasing independence and access to community resources rather than at cure. Left untreated and with no services available in LAMI settings, these children are often isolated and if they are prone to dangerous behaviours, families sometimes see no choice but to lock or chain them up.

Evidence from LAMIC

We found ten (quasi) RCTs [49–58] and a larger number of non-controlled interventions addressing the needs of children with disabilities (Table 3).

Some interventions used specific packages from HIC such as in Vietnam, where the Portage curriculum was tested on 30 children aged 3–6 showing significant improvement in the intervention group in most domains of adaptive behaviours, personal care and motor skills [52]. Others focused more on family interventions aimed at changing parental attitudes and skills of rearing a disabled child [57]. A placebo controlled RCT from India found that an herbal remedy (Mentat) was effective in reducing behavioural and cognitive deficits in children with mental retardation with and without epilepsy [58].

Most of the RCTs have relatively small numbers, use diverse methods or are directed to particular at risk groups with infectious disease such as malaria or HIV. Much more evidence (though no RCTs) is available from evaluations of WHO community rehabilitation programme (CBR). These interventions include home visits by trained community workers, who teach disabled persons (children and adults) skills to carry out activities of daily living, help children to get to school and adults to find income generating activities. They often also include community-level interventions to decrease stigma and raise awareness. These programmes seem to be highly effective with an evaluation from the Philippines and Zimbabwe showing a general gain in ability scores of 78 and 93 % in the two countries, respectively, together with encouraging rates of taking up school or an occupation [60]. A review of 29 reports (not RCTs) from 22 countries in Asia, Africa, and Central America reporting on diverse community interventions for a wide range of disabilities (mainly non controlled evaluations) reports that the programmes were effective in increasing independence, mobility and communication of disabled people, helped parents of disabled children to cope and increased the number of disabled children attending schools [59]. Some also improved community attitudes towards disabled persons.

Evidence from HIC

There is no cure for autism or other pervasive developmental disorders. A number of behavioural interventions mainly mediated by parents, psychopharmacological interventions and educational programmes have been used and show some level of effectiveness, but none reach the 1a level of evidence. Some of the associated features of autism spectrum disorders can be effectively managed with medication, such as antipsychotics (esp. risperidone and aripiprazol) for aggression and stimulants for hyperactivity.

Implications for practice in LAMIC

Even though rigorous RCTs are scarce many reports show the WHO CBR approach to be highly effective in

increasing independence of disabled people, in improving access to school and work and improving attitudes towards disability among parents and communities. Unfortunately only a tiny minority of people living in LAMIC have access to these programmes. It is uncertain at this stage whether children would benefit from a more specific approach and to what extent early intervention and stimulation might improve long-term outcomes further (see also under prevention below).

Depressive and/or anxiety symptoms
(including somatisation and OCD)

Introduction

The prevalence of depression and anxiety disorders rises sharply in adolescence particularly in girls, who are 1.5–3 times more likely to develop depression than boys of the same age. Both major disorders as well as subclinical symptoms of depression and anxiety occur worldwide and have great public health implications. Suicide is a major cause of death particularly in young women in India and China with one study reporting that suicide accounts for 1/4 of deaths in boys and between 1/2 and 3/4 of deaths in girls aged 10–19 [61]. Internalizing problems have also been connected to HIV/AIDS, both as a cause of infection (because of greater vulnerability and lower assertiveness to negotiate safe sex practices) and as effects, with a rate of depression of 44 % of American adolescents 1 year after diagnosis of HIV [62].

Evidence from LAMIC

We did not find any RCTs for the treatment of major depressive or anxiety or obsessive compulsive disorders (other than in the context of trauma) exclusively for children and adolescents but two trials specifically targeted school children with subclinical depression or at high risk for the development of depression. A quasi experimental study from Chile found that a programme increasing regular physical activity in adolescents of low socioeconomic status improved anxiety scores and self esteem, but did not decrease depressive symptoms [63] while a Chinese RCT using the PennOptimism programme, based on CBT principles, on 220 sub-clinically depressed school children showed a significant reduction of the depressive symptoms in the intervention group post treatment and at the 3- and 6-month follow-up [64].

A number of RCTs assessed the efficacy of psychological treatments of depression in LAMIC in adults, whereby samples sometimes included young people from the age of about 16. The most effective approaches for group interventions were community group treatments using group

interpersonal therapy techniques in Uganda [65, 66] or multi-component stepped care approaches ranging from psycho-education for the least affected to pharmacotherapy for the most severely affected cases from Chile [67]. Individual counselling using minimally trained counsellors in Pakistan was also effective in an RCT with 366 lower middle class women with anxiety and depression [68].

Most robust evidence from HIC

In contrast to adults, meta-analyses have shown tricyclic-antidepressants to be no better than placebo in depressed children and adolescents [69]. Of the SSRI's fluoxetine has the safest risk/benefit balance and produced significant improvement in clinical symptoms and improved likelihood of remission. Among the psychological therapies, CBT and IPT have the most robust record of effectiveness for depression with no significant difference between the two methods in direct comparison [70]. For anxiety disorders and OCD CBT has the best evidence base. It can be delivered individually, as a group or family. Especially in the under 11 age group involvement of parents is helpful. SSRI's and clomipramine are more effective than placebo in the treatment of OCD. For other anxiety disorders and other medications such as benzodiazepines, 5-HT agonists and tricyclics there is insufficient evidence for usefulness in anxious children and adolescents [69, 70].

Implications for practice in LAMIC

A number of low-cost feasible interventions (both group and individual) building on the principles of the most effective psychological treatments developed in HIC (IPT and CBT) have been developed for LAMIC and show very promising results in reducing symptoms of anxiety and depression in youths of LAMIC. Further dissemination and testing on larger samples and clinically affected groups are required.

Tricyclics, which are often used in depressed adults in LAMIC because of their cost effectiveness should be avoided in adolescents as they do not work in this age group.

Preventive interventions

Optimising childhood development

Evidence from LAMIC

A quite large number of studies have been carried out to test interventions in the 0–3 age group with the aim to help neuro-cognitive functioning throughout life. These included nutritional supplements as well as cognitive stimulation programmes.

We found almost 60 RCTs showing that various nutritional supplements especially iodine, iron, fatty acids and some micronutrients have led to cognitive function gains. (details available from the authors).

In a review of 53 studies using low-cost but resource-intensive child stimulation programmes carried out by mothers of young children, Maulik and Darmstadt found 16 studies from LAMIC [71]. Typically mothers are taught to play with their children, to read to them, to praise them and give them positive reinforcement. Sometimes toys and picture books are provided, sometimes specific methods such as baby massage or music are used. Stimulation through play and reading were effective interventions with more research needed to judge the effectiveness of music and massage. In one such study from Jamaica, which combined dietary supplements with early stimulation, benefits were maintained into adolescence with the intervention group showing fewer symptoms of depression and anxiety, less suspension from school, better attention span, reductions in problem and violent behaviour and better self esteem [72–74]. Early stimulation combined with nutritional supplements worked better than supplements alone. Kangaroo Mother Care is a specific programme for low birth weight and pre-term babies, which has successfully been adapted to low resource settings [71, 75, 76]. Further evidence for the effectiveness of early stimulation comes from a longitudinal epidemiological study from Brazil, where all 3869 children born in Pelotas in 2004 were followed up and detailed information was taken on their socio-economic position, maternal schooling and stimulation [77]. Child development was highly associated with all three of these markers, but the effect of stimulation was particularly strong among mothers with low schooling. One additional point added on the stimulation scale produced 1.7 extra points on the development scale, whereas only 0.6 points were added for children of highly schooled mothers.

Most robust evidence from HIC

Many of the programmes used in LAMIC have previously been developed in HIC especially for use in public health of disadvantaged groups. Some like “Head Start” have been scaled up to be used as national programmes. Effect sizes were usually clearly higher in initial small scale RCTs compared to interventions delivered to whole populations and maintaining programme fidelity is an issue to be considered in wide scale dissemination [78].

Implications for Practice in LAMIC

Even though interventions are quite diverse, numbers sometimes small and research designs not always rigorous, there is quite strong evidence that early stimulation

especially through play and reading can significantly improve cognitive development and decrease behavioural problems. Epidemiological data suggest that effects are particularly high in mothers with low schooling.

Preventing risk taking behaviours in adolescence

Evidence from LAMIC

Several, some of them large-scale studies were carried out to reduce risk taking behaviour in adolescence. This included prevention of drug and alcohol abuse as well as sexual risk taking behaviours to prevent HIV infection. Usually studies found large increases in knowledge, improved attitudes and educational planning within the intervention groups, but often follow-up periods were too short to find actual reductions in HIV infection rates and other biological markers [79–81]. These data have recently been confirmed by two rigorous RCTs in a community program for 4684 adolescents in rural Zimbabwe [82], and in a school-based program for 13,814 adolescents in rural Tanzania [83]. The challenge remains to find effective HIV prevention approaches for young people, particularly women, in the face of continued high HIV incidence.

Implications for LAMIC

Despite the fact that not all research has been rigorous or shown significant results a review by the Joint United Nations Programme on HIV/AIDS Inter-agency Task Team on Young People of the WHO concluded that reductions of risk and rates of HIV infections can be achieved through behavioural, biomedical and social strategies [84]. Possibly more information is needed, including those from qualitative research, to understand better which adolescents respond to which approach and why.

Discussion

Limitations of this review

First, the very notion of speaking of LAMIC as if it was one entity does not do justice to the great variety of economic, cultural and social environments we are talking about. There is great doubt as to whether interventions that work in European or Arab communities can be transferred unaltered to African tribal societies, to Brazilian favelas or to Asian refugee camps. We suggest that prior to implementing any intervention anywhere, a thorough assessment is done of the society one wants to work in. Much good research done in LAMIC (for instance Patel [85]) includes a qualitative research phase prior to starting any intervention or

quantitative study and we highly recommend this practice. Through qualitative research one can get a better understanding of local explanatory models of disease [86, 87], of local terms used to describe mental distress, societal strengths such as existing support systems, beneficial child rearing practices, locally available resources and general acceptability as well as barriers to treatment.

Second, very few, of even the best of the studies we report on, would meet the high standards of trials expected for example, by groups such as Cochrane. The follow-up period in the reported studies is often short or non-existent. Through lack of diagnostic capacity we are not always sure of the exact nature of the disorders treated in the various programmes. The use of lay-therapists might work well with close supervision, but can lead to lack of therapeutic fidelity which can be a major problem in evaluating programmes. We considered applying the GRADE (Grading of Recommendations, Assessment, Development and Evaluation) software [88] to some of the RCTs cited, but soon found that so far only a handful of studies on child and adolescent mental health carried out in LAMIC actually gave the necessary information required on blinding, concealment of randomisation etc., so in the end we refrained from the exercise.

Third, there is much information available, which we did not include in our review, but which might nonetheless be helpful to those trying to set up interventions in low-resourced areas. Locally published case reports and series, simple pre-post evaluations, studies published in languages other than English, (unpublished) studies with negative outcomes can all contribute to the development of effective interventions. Finding them all and reporting on them in one general article would have exceeded the scope of this paper. For some specific disorders and regions, however, much more detailed information is available and we can only hope for more reports, may be focusing on disorders, on interventions or on particular areas of the world, which include this more varied but yet valuable source of information.

Fourth, the way we sorted and presented the information can seem somewhat arbitrary. We were led by the studies already available. Where possible we sorted them into the classification system used by WHO's mhGAP. In other cases such as "trauma" we felt it was advisable to create a new category that corresponds to practical needs as well as the relatively large body of evidence already available in the field. Other systems of ordering the data might be equally valid and feasible.

Conclusions

Despite these limitations, we believe there are some important lessons to be learned from the presented

evidence. The most important one is that many of the basic treatment principles that have been developed and tested in HIC in recent years can be and have been successfully adapted to low resource settings, where they have brought real benefits to troubled children and their families. As a result of these interventions children have experienced less stigmatisation and punishment, they have gone to school more frequently to get on with their education, they were able to build up hope and self esteem in the face of disaster and in the case of the Ugandan child soldiers were even able to rebuild their lives after being exposed to some of the most severe and traumatic violence imaginable. Unfortunately these treatments are available to only a tiny minority of affected children.

It seems possible to strip some of the often complex and expensive interventions developed in HIC down to basic principles and to successfully train lay community members to deliver them. We must not forget that in a lot of communities there are many highly socially skilled intelligent potential workers, who have never had the chance to receive a formal education. We also, however, know of the danger of watering down interventions too much, programme drift can become a huge problem especially if interventionists do not receive regular supervision. The developers of some of the most successful of these programmes might be in the best position to identify the most effective components of their treatments and training programmes and to make them widely available to children and families around the world.

As to specific interventions it seems that small children all over the world benefit cognitively, emotionally and behaviourally when adults stimulate them through regular positive attention and play, focussing on sensitively responding to their needs; when they are praised more for what they do right than criticised for what they do wrong and when they are set firm boundaries, which are consistently and non-violently re-enforced by those around them. While child rearing practices in most societies might already include elements of these principles, parents and teachers all over the world seem to be able to learn to apply them better and more consistently. The mode of delivery and the emphasis put on the various elements of the training might need careful adaptation to cultural needs and sensitivities, but research suggests that not only the children, but also their parents can benefit from the interventions.

Many severely traumatized children will go on to develop mental health problems, but they can be helped. Even simple school-based psycho-education and skills training can bring significant improvement to some while others might need much more specific treatments and coping strategies. Again emphasis should be put on what is already available in communities (e.g. yoga or meditation practices, physical games and sports) and one package

might not suit all. Specialist services are needed to back-up community-based treatments to cater for the most severely affected youngsters.

Adolescence, although an unknown concept in many societies, is a particularly vulnerable time in terms of mental health. Many adult mental health problems become established during this period, while children with untreated behavioural problems of childhood can engage in much more serious risk taking or anti-social behaviours once they become more independent. Again treatment principles derived from CBT and IPT as well as some risk prevention strategies seem to work some of the time, but much more work is needed to develop affordable and feasible interventions for a range of settings. It is hoped that early intervention in this age group can radically reduce future burden to individuals and communities.

Finally, we can only hope that this patchy and flawed report on what works where in child mental health in LAMIC will soon be superseded by much better and more rigorous research evidence from many more and diverse cultures. In the meantime this might be what we have to build on.

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