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The effectiveness of school-based interventions addressing adolescent mental health in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis

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ALBCLE002

Submitted in partial fulfilment of the requirements for the degree

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DECLARATION

I, Cleo Alyssa Albertus, hereby declare that the work on which this dissertation is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, or is to be submitted for another degree in this or any other university.

I empower the university to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

SIGNATURE: Signed by candidate

DATE: January 2020

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DISSERTATION CONTENTS

PART A: PROTOCOL

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Abbreviations and Acronyms

AMHI- Adolescent mental health interventions

AMH- Adolescent mental health

CAMHS- Child and adolescent mental health services

LMICs- Low-middle income countries

SMD- Standard mean Deviation

WHO- World Health Organization

SECTION ONE: INTRODUCTION & BACKGROUND

1.1 Description of Mental Health

Mental health is fundamental to a person's wellbeing and quality of life, as well as, influences social and economic outcomes across an individual's lifespan (Barry, Clarke, Jenkins, & Patel, 2013). The World Health Organization (WHO) defines mental health as a "state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community" (WHO, 2018). Mental health is considered integral to a person's overall wellbeing and can be determined by a variety of factors such as socioeconomic, environmental and biological (WHO, 2018). Mental health disorders are considered one of the most common causes of disability worldwide, thus resulting in the disease burden of mental illness being an important public health concern (ODPHP, 2019). Mental illness refers to all diagnoseable mental disorders and conditions, which result in significant emotional, social and behavioural changes that cause distress and hamper the individual's ability to function in everyday life (Pareketh, 2018).

According to WHO, the majority of mental disorders begin at the age of 14 and often go untreated due to a variety of reasons such as not being diagnosed, stigma, shame and lack of mental health care facilities (Erskine et al., 2016). Attaining accurate prevalence data is difficult as it relies on self-reporting of which many individuals are afraid to disclose because of fear of judgment (Rice-Oxley, 2019). According to the statistics, over 200 million individuals suffer with anxiety, about 160 million are living with major depressive disorder and a 100 million with various other disorders (Rice-Oxley, 2019). Thus, the global prevalence of mental health disorders has been estimated to be between "12.2% and 48.6%" with more than 13% of the global burden of disease for mental disorders being neuropsychiatric disorders (Tomlinson & Lund, 2012; Rice-Oxley, 2019). A significant proportion of over 70%, of the burden of mental health disorders occur in individuals living in low- and middle- income countries (LMICs), where access to mental health services are limited (Tomlinson & Lund, 2012; (Erkine et al., 2016). The burden of mental disorders and their adverse consequences are also inequitably distributed, as people living in poverty and other forms of social

disadvantage have little to no access to treatment (Barry et al., 2013). Given these socio-economic conditions, children and adolescents are made further vulnerable and require special attention in order to address their needs.

1.2 Purpose and justification for this review

This study arose from the mental health challenges faced globally, and the impact it is having on society, especially on those affected and their families. Many individuals suffer from mental health issues, which is overlooked and never diagnosed. In South Africa, mental illness is a growing burden of disease and is often neglected in both adults and children. However, it has gained prominence after the Life Esidimeni tragedy in 2015-2016, in which 114 patients died and over a 1418 were subjected to torture, trauma and neglect because of inadequate mental health care treatment (Durojaye, & Agaba, 2018). This resulted in a widespread public outcry and brought the importance of mental health into the spotlight. Furthermore, schools play an essential role in the lives of children, their development, and future choices, which is the reason for focusing on school-based AMH. The gap in knowledge regarding AMH in school-based settings, especially in LMICs provided the impetus for this study, namely to review the available evidence for what the appropriate mental health interventions might be for CAMH in LMICs. As well as, to explore the effectiveness of School-based interventions, and to provide some knowledge regarding school-based or -linked CAMH services, by drawing on the findings discovered from the systematic review.

The original focus of this review was to do a qualitative systematic review, however, after reviewing the literature, the articles found were of a quantitative nature. Thus, the study adopted a quantitative approach, because we are using numerical data to assess our findings. Quantitative research can help contribute to the assessment and effectiveness of school-based programmes/interventions in addressing AMH. From the initial reviewing of the literature, several published studies that address this aspect have been identified. We believe that one way to draw useful lessons from this literature is by synthesising the findings of various studies identified. A synthesis of relevant quantitative studies of AMH and the implementation of school-based mental health services in LMICs, will contribute

to the current and available school-based interventions and its effectiveness in dealing with AHM. In addition, allow the identification of gaps in existing research.

1.3 Aims, objectives and research Questions

Review Aim

The aim of this systematic review was, therefore, to identify and synthesise existing literature on addressing adolescent mental health (AMH) in and through schools in LMICs, and to assess the effectiveness of school-based interventions in addressing adolescent mental health.

Research Question

This systematic review of quantitative studies asks the following question: How effective are school-based interventions in addressing adolescent mental health in and through school-based settings in LMICs?

Review objectives

The objectives of the study include:

- To identify what kinds of mental health services/interventions are currently available in a school-based setting
- To explore/examine the effectiveness of school-based AMH interventions on mental disorders

SECTION TWO: BRIEF LITERATURE REVIEW

2.1 Definition of adolescent mental health

Adolescence is considered a fluid concept, traditionally age bound (10 -19 years) and is influenced by social, environmental and cultural factors (Patel, Flisher, Hetrick, & McGorry, 2007). It is a period of significant physical, social and emotional changes and is considered a vulnerable period for adolescents, as they have a high risk of developing mental illness (Paruk & Karim, 2016). Child and adolescent mental health (CAMH) can be defined as "how one feels, thinks and acts," it has to do with a child's capacity to achieve and maintain optimal psychological and social functioning in their day to day living(WHO, 2005; Hunt et al., 2019, p. 131). Child and adolescent mental ill-health, on the other hand, can be defined as the "inability of a child to reach the optimum level of competence and functioning reflected in disorders, such as depression, anxiety and learning disabilities" (Patel, Flisher, Nikapota, & Malhotra, 2008).

2.2 Types of adolescent mental health problems

There are various adolescent mental disorders which fall in a specific spectrum and can range from acute to severe. Duration, persistence, and impact of the symptoms are the criteria to be able to distinguish normal behaviour from mental disorders (Hunt et al., 2019). Some of the characteristics of AMH problems include feeling overwhelmed, having a lack of interest in usual activities, somatic complaints such as headaches, stomachaches, and insomnia, self-harming behaviours, aggression, as well as isolation and loneliness (Michaud & Fombonne, 2005). The common disorders often diagnosed include anxiety disorders, depression, substance misuse, and are associated with biological, psychological and sociological morbidity and mortality (Belfer, 2008). As well as emotional disorders which can be disabling to an adolescent's functioning, because it affects school performance and attendance. Other problems include hyperactivity and inattention disorder or destructive or challenging behaviours, such as conduct disorder that results in children not being able to concentrate and listen to instructions being given (Patel et al., 2007; WHO, 2018). Furthermore, depression which according to Michaud & Fombonne (2005) states that it is normal for young people to feel depressed at times, as well as for adolescents to experiment with drugs

or “delinquent” behaviours when trying to find their own identity. However, if left untreated or carries on for a lengthy period of time can be detrimental (Elia, 2019). As seen there are a variety of adolescent mental health problems and illnesses that can affect an adolescent in all aspects emotionally, psychologically and physically. Thus, the need to correctly identify mental illness and provide the correct treatment is important (Elia, 2019).

2.3 The epidemiology of adolescent mental health in schools in LMIC

Childhood behavioural disorders are the sixth leading cause of disease burden amongst adolescents and involve rules, limits and boundaries being tested (WHO, 2018). Approximately 20% of children have a mental health disorder, but the majority of disorders are not detected and treated (Morris et al., 2011). Epidemiological studies in high, middle and low-income countries indicate that approximately one in five children and adolescents live with a mental disorder” (Flisher et al., 2012). The risk of mental disorders is further exacerbated in vulnerable environments with poor social support and socioeconomic inequalities, such as developing countries (Paruk & Karim, 2016). The provision of mental health services has often been neglected and studies have shown that the risk factors for the development of mental illness amongst adolescents include, “genetic vulnerability, neurobiological factors and psychosocial stressors” (Morris et al., 2011; Paruk & Karim, 2016).

There is limited evidence-based research regarding the burden of child and adolescent mental disorders in African countries, especially in low- and middle-income countries (LMICs) (Mokitimi, Schneider, & de Vries, 2018). However, despite the evidence on the burden of CAMH problems, the rate of unmet needs in CAMH is still high especially in LMICs (Mokitimi et al., 2018). CAMH services have important roles in the prevention of mental disorders, in the promotion of mental health and wellbeing of children and adolescents, in the reduction of risk factors associated with mental illness, and in the provision of curative services using evidence-based strategies for those who require treatment (Mokitimi et al., 2018).

2.4 General overview of adolescent mental health services

There is a wide variety in the provision of mental health care between countries, as more LMICs have become more aware of the burden of mental illnesses, and the distribution of resources for the development of mental health services (Rathod et al., 2017). The comparison between high- and low-income countries show a significant difference in the availability of a mental health workforce of psychiatrists, nurses, psychologists, and social workers, as well as mental health services (Rathod et al., 2017). Multiple interventions have been assessed which include group-based interventions, cognitive behavioural therapy that helps in dealing with depression and anxiety, as well as school-based suicide prevention and community-based activities such as family-based intervention (Das, Salam, Arshad, Finkelstein, & Bhutta, 2016). Other mental health service models include the medical home model that can be used to assist in improving communication in schools and access to mental health services and support (Atkins, Hoagwood, Kutash, & Seidman, 2010). School-supported mental health models, community connection models and comprehensive, integrated models were included and assessed to assist with mental health services (Atkins et al., 2010). The reason for the variety of model and interventions is the acknowledgement that a one size fits all approach does not work, hence the importance of early child development and family counselling is necessary to ensure a child is raised with emotional stability (Das et al., 2016).

2.5 Mental Health Services and intervention treatments

Over the past few years, more attention has been given to the mental healthcare services to ensure better treatment outcomes for individuals with mental illness. The inadequate provision of mental health services for children and adolescents, as well as the unsuccessful attempts to develop, implement and restructure the system of care for individual services, child-family planning and various other forms of social delivery, has become compelling (Farmer, Burns, Phillips, Angold, & Costello, 2003). Most services provided for children and adolescents have included inpatient and outpatient mental health settings, a family-centred intervention approach which addresses peer dynamics, school setting, and diverse services of mental health because family plays an integral role in the "social and emotional development of children and adolescents (Farmer et al., 2003; Hoagwood, Burns, Kiser, Ringeisen, & Schoenwald, 2001). Other different interventions include group-based interventions, cognitive behavioural

therapy, which can help with depression and anxiety, as well as school-based suicide prevention and community-based treatment (Das et al., 2016; Hoagwood et al., 2001). Regarding school-based interventions, which include classroom-based contingency management necessary to reduce aggression and behavioural challenges, which will enable teachers to deal with challenging students. This can be facilitated through school-based preventive interventions to assist adolescents who have emotional and behavioural problems (Hoagwood et al., 2001).

Therefore, to ensure the successfulness of mental health services multiple approaches need to be taken, especially when working with children and adolescents because it is not a one size fits all approach. There are numerous benefits associated with the implementation of school-based mental health interventions as they are seen as a "continuum of integrative care that improves both mental health and educational attainment for children" (Barry et al., 2013; Fazel, Patel, Thomas, & Tol, 2014). Through these interventions, adolescents will do better academically, and they will feel better both psychologically and emotionally, which helps in creating a more productive schooling life and home life (Barry et al., 2013; Fazel et al., 2014). Irrespective of the various school-based programmes/interventions suggested of late, there is still confusion as to what works, and what intervention/s are most effective.

2.6 Problems associated with mental healthcare services

Mental health interventions and programmes need to incorporate life skills, especially when addressing emotional and behavioural problems (Barry et al., 2013). School-based prevention, intervention initiatives and mental health centres are increasingly common methods for integrating mental health and education (Cappella, Frazier, Atkins, Schoenwald, & Glisson, 2008). The potential for a partnership between education and the mental health field is unfolding slowly in the absence of clear and unifying frameworks to guide research and practice in this emerging field (Cappella et al., 2008). Studies have indicated that prevention and intervention of mental healthcare programs are difficult to implement, integrate and sustain in schools and impoverished communities as mental health programs remain marginalised from school routines and structures (Cappella et al., 2008). Financially disadvantaged schools do not have adequate physical, resourceful and social-emotional environments to protect children from potential risks of hardship (Cappella et al., 2008).

The complexity of the world places a lot of pressure on adolescents and can be overwhelming for adolescents, resulting in adolescent substance abuse, suicide or self-harm, and/or unwanted teen pregnancies (Mason-Jones et al., 2012). Thus, resulting in many children having emotional and behavioural issues that impact on their ability to get the best out of their schooling years or the mental health services provided (Tate et al., 2020). Despite the need for mental health attention and focus, it is a field that is often neglected (Mason-Jones et al., 2012). One of the mental healthcare models adopted is a school-based healthcare model. However, there is limited information on the effectiveness of school-based healthcare services and interventions (Mason-Jones et al., 2012). According to the various searches conducted, little research has been done on school and community-based mental health promotion interventions for young people in LMIC settings (Barry et al., 2013). There are quite a few gaps in the literature and more access to mental health services in schools are needed to address issues and barriers being faced since there is a link between adolescent mental health and school achievements (Mason-Jones et al., 2012).

2.7 The Ecological Framework of Mental Health

The ecological framework is not a theory, but rather a multidirectional complex and dynamic approach (Stormshak & Dishion, 2002). It shows a variety of dimensions that can affect children and what they have to do, to manage mental health (Stormshak & Dishion, 2002). An ecological framework is based on the evidence that no single factor can explain why some people or groups are at higher risk of interpersonal problems and others are protected from it (WHO, 2019). Urie Bronfenbrenner was the founder of the ecological model and suggested a multilevel framework, which has now been revised and applied to different problems and interventions (Stormshak & Dishion, 2002). For example, the community influences the school and the school has an impact on the child. This framework views adolescent mental health, as a result of other interacting factors at different levels (WHO, 2019). The various levels can be seen in Figure 1.1 below and explained in further detail:

Figure 1.1 The ecological framework of determinants of child and adolescent mental health (Golden & Earp, 2012).

1. **Individual**- includes knowledge, attitudes, behaviour, self-efficacy, developmental history, gender, age, values, goals, expectations, and educational level.

2. **Relationships** - This includes social and supportive networks that include adults, supervisors, peers, extended family, siblings, religious networks and customs or traditions.

3. **Behaviour settings-** This is the main level of focus of the review as we look at one of the major influences on children and adolescents which includes schools, home, neighbourhood, school classroom, school park and activity organisations.

4. **Societal/Community context-** Cultural rituals and traditions, school policies, social media, economic and family resources and ethnic minority status.

5. **Political Context** - Local, state, national and global laws and policies, including policies regarding child adolescent mental health, restrictive policies or lack of policies and government influences.

The framework suggests that culture is more than the environment in which an individual was raised. However, it is redefining psychological construct that can help to explain behaviour (Stormshak & Dishion, 2002). It focuses on promoting health, especially mental health and focuses on lifestyle changes and contextual influences and forces (S. D. Golden & Earp, 2012). The social-ecological framework acknowledges that the individual, in this case, the adolescent is embedded within larger social systems (S. D. Golden & Earp, 2012). It suggests that multiple levels of influence exist, as well as interact and reinforce larger social systems to describe the interactive characteristics of individuals and environments that contribute to health outcomes (S. D. Golden & Earp, 2012). For example, counselling interventions help to strengthen the bond between parent and child to know how to provide support. Thus, as mentioned earlier, this review will be focusing on the third level, "behaviour settings" because of the complexities of school dynamics and the influence it has on children and adolescents.

2.8 South African legislation/policy framework for child and adolescent mental health

Children and adolescents are generally silenced with no voice, no political or economic influence, and their rights are often overlooked (Shatkin & Belfer, 2004). The WHO suggested that every country throughout the world should have a national plan for CAMH (Shatkin & Belfer, 2004). Thus, in 1992 the International Association for Child and Adolescent Psychiatry and Allied Professions confirmed the right of every child to achieve their full physical, emotional, and educational potential (Shatkin & Belfer, 2004). Without a policy, there is no guidance for programme development, non-contractible commitment from government authorities, no governance, an absence of funding, and a lack of accountability for CAMH services (Shatkin & Belfer, 2004). Thus, the necessity for CAMH policies has been acknowledged in developing and developed countries to assist in the development of systems of care for children (Shatkin & Belfer, 2004).

In post-apartheid South Africa (SA), there has been a clear awareness of the severity of mental health neglect and attention required in the transition to democracy (Stein, 2014). The Mental Health Act of 2002 at a national level has emphasised the human rights of those with mental illness, such as their right to access care (Stein, 2014). South Africa is one of the countries recognised by the United Nations to have a detailed

National Child and Adolescent Mental Health Policy (Shatkin & Belfer, 2004). In South Africa, legislation and policy development is developed at a national level by the Minister of Health in consultation with a range of stakeholders (Shatkin & Belfer, 2004). Many children and adolescents in South Africa are exposed to violence and face maltreatment in communities, schools and the home (Flisher et al., 2012). South African studies indicate that exposure to violence and unstable living environments are associated with the development of psychological disorders in children and adolescents (Flisher et al., 2012). Despite the absence of representative epidemiological data on the burden of child and adolescent mental disorders in South Africa, a dearth of research has been conducted which reflects that prevalence estimates are essential for service planning (Flisher et al., 2012).

Over the past few years, the South African government has taken steps to establish the legal and policy framework for providing quality mental health services for children, adolescents and adults (Flisher et al., 2012). The South African Department of Health in 2002 and 2003 released a set of policy guidelines for improved mental health care, which identifies services for children and adolescents as a priority area for intervention (Flisher et al., 2012). The proposed guidelines published included: "A promotion of a culturally sensitive; safe and supportive environment; provision of information; skills development; provision of counselling and ensuring access to health services" (Flisher et al., 2012). The guidelines for CAMH spoke to the need to transform and make mental health services more accessible to the population through the implementation of a community-based model, which highlights the different levels of care (Flisher et al., 2012). However, despite the guidelines being approved by the national and provincial governments, the document was neither formally published nor extensively distributed and given effect (Flisher et al., 2012).

2.9 The role of Schools in adolescent mental health

Adolescents spend the majority of their time in a school-based setting, interacting with peers and teachers, as well as at home with their parents (Fazel et al., 2014; Stormshak & Dishion, 2002). Schools are crucial in providing an important context to consider the needs and development of children worldwide (Fazel et al., 2014). In LMICs, schools use different educational approaches, however, all children and adolescents have similar basic needs, which include the nurturing, and development of their academic, physical, emotional, social, and moral aspects (Fazel et al., 2014). A systematic review looking at mental health interventions for adolescents indicated that the onset of mental health issues is due to the environmental and parental influence experienced by adolescents (Das et al., 2016). Thus, highlighting the need to address mental health issues, as well as to identify and address barriers affecting access to mental healthcare, especially for adolescents. Furthermore, interventions to promote mental health aim to strengthen protective factors and enhance alternatives to risk-taking behaviours (WHO, 2018). The intervention also enables adolescents in building resilience, so that they can cope in difficult situations or adversities in a healthy manner (WHO, 2018).

Schools provide a potential location to address the mental health needs of children and adolescents because they have access to the adolescent and form part of their development (Fazel et al., 2014). Through the working of health services and in conjunction with the educational system schools can offer opportunities and classes within the school structure to improve and promote mental health to prevent the development of more serious mental disorders (Fazel et al., 2014). Schools are one of the most important community environments for promoting the mental health of children and adolescents (Barry et al., 2013). School provides a forum for promoting emotional and social competence, academic learning and can reach the wide youth population who are dealing with mental health problems (Barry et al., 2013). Studies have shown that educational opportunities for children and adolescents are associated with improved mental health outcomes (Barry et al., 2013; Fazel et al., 2014). Thus, looking at the state of CAMH in South African schools where the prevalence rate of mental illness continues to grow, there is a need to pay more considerable attention not only to the provision of CAMH services but to CAMH in general.

SECTION THREE: METHOD

This particular study has chosen to address AMH, with a particular focus on the effectiveness of school-based interventions in dealing with AMH. The study design of choice is a quantitative systematic review, examining school-based mental health interventions for adolescents between the ages of 10-19 years. Studies for inclusion would be interventional studies, from low- and middle-income countries.

A Systematic review uses a "transparent and systematic process to define a research question, search for studies, assess their quality and synthesize findings qualitatively or quantitatively" (Armstrong, Hall, Doyle, & Waters, 2011). It involves the summarising of results from the selected articles chosen from the reviewed literature and consists of formulating a search strategy that will include all keywords and mesh terms to allow the search to run. Therefore, it requires a thorough understanding of existing literature, which includes clarification of definitions related to the research question, gaps and uncertainties of the topic and an understanding of how definitions and information of the topic are conceptualized within existing literature (Armstrong et al., 2011). Once the articles have been selected, they will be thoroughly read and subjected to a data extraction process. The data will be subjected further to a quantitative approach known as meta-analysis. A meta-analysis is a research process that merges the findings of independent studies, using a statistical approach, and presented graphically on a forest plot (Shorten & Shorten, 2013). The benefit is that it generates new insight and strengthens commentary on recommendations and effectiveness of interventions (Shorten & Shorten, 2013).

3.1. Criteria used in considering studies for this review

Types of study designs

All interventional studies using school-based interventions for adolescents in schools, in Low-Middle Income Countries (LMICS).

Types of participants

Adolescents (10-19 years) who are currently in school.

Types of interventions

Intervention: School-based programme

Waitlist control/ Control: No intervention or management as usual.

Types of outcomes

To identify what effect school-based programmes have on depression,

To identify what effect school-based programmes have on anxiety,

To identify what effect school-based programmes have on sense of self-worth (self-esteem and self-efficacy);

As well as to identify what effect school-based programmes have on social behaviour.

3.2. Search strategy for identification of studies

We intend to carry out a detailed literature search for data on school-based interventions dealing with AMH and well-being. Relevant studies, irrespective of publication status and language, will be obtained. An advanced and complex search will be conducted with guidance from a librarian.

The team will be made up of four main contributors:

- Cleo Alyssa Albertus (CAA), who will be the primary investigator and will take responsibility for all aspects of the project.
- Ameer Hohlfeld (AH) who will be responsible for independently extracting the data, and verifying data generated and collected, analysing, and general guidance.
- Maylene Shung-King (MSK) who is the primary supervisor and Mark Engel (ME), who is the co-supervisor, will be responsible for oversight of analyses and general guidance in conducting the review. ME possess expertise in the methodology of conducting systematic reviews and quantitative approaches.

- CA and AH will carry out an extensive and comprehensive search to find applicable studies irrespective of publication status or language and assist in the quality checking of the studies.

Electronic Searches

The literature search for this systematic review will be comprehensive to enable the capturing of, as many relevant articles as possible and the setting will be limited to English only papers and LMICs to narrow down the search. The following journal databases, (but not limited to) will be searched: The Cochrane Library, PubMed, EBSCOHost, Academic Premier Search, Medline, PsycINFO and PsyArticles, with no limitations to publication year. Keywords and medical subject heading (MeSH) terms will be used in various arrangements conditional to the specific database and to ensure the correct name for the various outcomes is obtained. Briefly, we will use a combination of the suitable terms to ensure the inclusion of all relevant components of the PICO including Participants, Intervention, Comparison and Outcome. The details are found in the Appendices.

Additional searches

The search strategy will be completed by searching the following databases: Google and Google Scholar; and Networked Digital Library of Theses and Dissertation. CA and AH will search the reference lists of identified articles to identify titles of articles possibly meeting the inclusion criteria.

4. DATA COLLECTION AND ANALYSES

4.1. Selection of studies

CA will search databases namely: The Cochrane Library, PubMed, EBSCOHost, Academic Premier Search, Medline, PsycINFO and PsyArticles, Google Scholar, and Dissertation Abstracts International. Also, the reference lists of relevant studies will be searched manually to identify any missing articles and abstracts. Researchers will request unpublished and unattainable articles from corresponding authors or via the citing authors. Searches will have no publication limitation, however non-English

papers will be excluded and written up in the limitation section. The reason for focusing on LMICs only is because the need is greater, higher-income countries can afford private services and it is the interest of this study. The review may also include analysis of different measures and therefore, adolescent mental health policy implications will be implied and suggestible rather than made explicit.

The first step in conducting this review includes doing the research, which involves:

1. Search all pre-selected databases to compile and screen for potential eligibility
2. Compile search outputs into a reference software which will be EndNote X9,
3. Remove any duplicates found
4. Screen titles/abstracts for potential eligible trials for inclusion
5. Apply PICO to the eligible studies to assist in drawing up descriptive characteristics.
6. Use a pre-designed data extraction form and assist in compiling findings
7. Log all the findings into RevMan to draw up the graphs for analysing to write up the results section.

Both CA and AH will revise the selected studies. We will use uniform methods when searching for applicable studies, screening the titles and abstracts. Any uncertainties regarding the inclusion eligibility will be discussed. Full-text articles will be acquired for those articles identified as meeting the inclusion criteria. Thereafter, the full-text articles will be assessed independently, by both authors. In the event of disagreement to the inclusion or exclusion of articles, a discussion will be held with the third reviewer. The motivation for the excluded studies will be provided.

Keywords

Due to the volume of articles that emerge when searching for adolescent mental health originally from using keywords such as adolescents, mental health, school-based services, additional keywords will be added to narrow the focus of the review including LMICs.

3.2. Data extraction and management

A data extraction form will be used by both CA and AH (see Appendix 1). Ambiguities of the articles shall be solved by means of discussion amongst CA, AH and ME. Information to be captured on the data extraction form includes the following:

- General Details: Title, authors, country, school type, as well as the focus.

Studies selected for this review should meet the following inclusion criteria:

a. Studies that recruit participants who are between the ages of 10 and 19

b. Studies that have a mental disorder e.g. depression, anxiety, schizophrenia or bipolar as an outcome

c. Interventions needed to be applied in a school-based setting

d. All relevant studies must be interventional studies e.g. randomised control trials, quasi-experimental, pre-post-test design.

e. All studies must be conducted solely in LMICS

Studies will be excluded if:

a. Studies recruiting adolescent participants who were not in school

b. Studies presenting results of non-school based interventions e.g. community-based programs or group therapy outside a school setting

c. Studies not conducted in LMICs

d. Non-English articles will be excluded

Inclusion criteria will be set, paying particular attention to the following:

- Details of the study: Type of study design, Baseline and Post-intervention and measures used
- Details of participants: Number of participants, baseline characteristics such as age, country and status of the country
- Details of intervention: The study must report the outcomes of school-based programmes/interventions

- Details of control: Normal Curriculum or Waitlist.
    - Details of outcomes: Depressive Disorder, Anxiety, Social behaviour, Self-Concept/Self-Esteem, and Self-Concept/Self-efficacy)
    - Information relating to the risk of bias.

According to the University of Cape Town (UCT) data management policy (DMP), data management is defined as the "administrative process by which the data is acquired, validated, stored, protected" (DVC, 2018). The data is processed and its "accessibility, reliability, and timeliness is ensured to satisfy the needs of the data users" (DVC, 2018). The policy states that UCT researchers and postgraduate students who receive public funding are required to create a Data Management Plan (DMP) outlining how they will manage, select and if appropriate publish their research data (DVC, 2018). The research data should be stored on a trusted digital repository i.e. on a computer that has a password so it cannot be easily accessed (DVC, 2018). However, as the researcher of this study, I am conducting a non-funded qualitative systematic review using publicly available and already published data. If the results of this data were to produce long-term value it will be preserved on the health sciences Vula website and remain accessible and usable for future research.

4.3. Assessing risk of bias in included studies

The level of risk of bias will be independently assessed for each included study. We will use the risk of bias tool and methodology suggested by the Cochrane Collaboration (See Appendix 2) (Higgins & Altman, 2008). Details will be extracted from each study to determine if there are any bias. The criterion includes: selection of participants for each study, sequence generation and randomisation, allocation concealment, blinding of participants and/or assessors, incomplete outcome data or missing data, selective outcome reporting (participants lost to follow-up) and other relevant biases (Higgins & Altman, 2008).

4.4. Measures of intervention effect

Data will be analysed using Review Manager 5.3 (Collaboration, 2014). The outcomes (Depressive Disorder, Anxiety, Social behaviour, Self-Concept/Self-Esteem, and Self-Concept- Self-efficacy) will be considered as continuous variables. The meta-analyses will be performed in addition, on each of the five subgroups. The random-effects model will be used where significant heterogeneity is found. The effectiveness of the interventions will be calculated as standard mean difference and 95% confidence intervals.

4.5. Dealing with missing data

Every attempt will be made to contact authors if full articles or information on missing data is required.

4.6. Assessment of heterogeneity

We will not report outcome results as the pooled effect estimates in a meta-analysis if we find considerable heterogeneity that cannot be explained through subgroup analysis. As an alternative, we provide a narrative description of the results.

Heterogeneity will be identified through visual inspection of the forest plots to judge the extent of Confidence Interval (CI) overlap, including the I^2 statistic which calculates heterogeneity across studies. This will measure the impact of heterogeneity of the meta-analysis (Collaboration, 2014). The following will be used to explain I^2 statistics:

- 0% to 40%: may not be important.
- 30% to 60%: may indicate moderate heterogeneity.
- 50% to 90%: may indicate substantial heterogeneity.
- 75% to 100%: considerable heterogeneity.

In the case of finding heterogeneity, possible reasons for it will be determined by assessing individual studies and subgroup characteristics.

4.7. Subgroup analysis and investigation of heterogeneity

We anticipate the following characteristics to introduce clinical heterogeneity and plan to implement subgroup analysis. Although all interventions will be school-based, how they are measured could be different, which will require comparing and converting

measurements to produce similar findings for comparison. We will use Review Manager to test subgroup difference when comparing the subgroup analysis if there are adequate numbers of included studies (Collaboration, 2014).

4.8. Presenting and reporting of results

Results will be presented using a combination of figures, graphs, and tables. How the studies were sourced and selected will be included and explained using tables and graphs. Sourcing and selection of studies included in this review will be explained through the use of figures. Excluded studies and the reasons for exclusion will be tabulated. In addition, summary tables will be created if the use of forest plots is not possible or appropriate.

4.9. Data synthesis and analysis

Research synthesis is a term used to describe the 'bringing together' of a body of research on a particular topic, in this case, AMH in and through schools in LMICs (Ring, Ritchie, Mandava, & Jepson, 2011). The aim is to describe, analyze and draw conclusions on the research evidence discovered, and to assess the effectiveness of mental health interventions and potential interventions for adolescents (Ring et al., 2011). Synthesising quantitative literature (using meta-analysis) involves the integration of quantitative findings of multiple studies to achieve coherence (Higgins et al., 2019). Another purpose is to gain a deeper insight into the intervention being used, as well as to assess its generalisability and applicability to a certain context (Higgins et al., 2019).

Once the systematic search is completed and all relevant documents are identified, the process of analysing and synthesising the data will begin. All materials will be analysed in the same way. For this review, a narrative synthesis approach will be used to analyse and synthesise the data from selected papers. The use of narrative synthesis allows the researcher to summarise and interpret evidence, as well as synthesise evidence from multiple sources (Mays, Pope, & Popay, 2005). Secondly, a narrative review is an appropriate approach as it allows for the facilitation and incorporation of diverse forms of evidence into the systematic review (Mays et al., 2005).

5. Ethics

There will be no direct engagements with human participants. Accessible and Published data will be used in the study; thus, no confidentiality or ethical procedures need to be considered for this review (Emanuel, Wendler, Killen, & Grady, 2004). Results of this study will be obtainable via the University's online library. The study will also be written up and submitted for publication in a peer-reviewed journal.

6. Risk and Benefits

The study has significant potential benefits, as it will further knowledge of AMH in and through schools in LMICs and enable further research into the delivery and effectiveness of adolescent mental health services. This is a low-risk study because no participants are involved, thus no harm will be caused to any individual. Overall, the benefits of this study outweigh the risk of possible harms.

7. Timeline

The review will begin in July 2019. Due to the nature of a quantitative systematic review and submission deadlines, this review will involve an intensive process. The final write-up will begin in December 2019 and be completed in January 2020.

8. Budget

This study does not require any funding.

9. Dissemination

This study is a contribution to the academic literature and dedicated to promoting Adolescent Mental Health, with the intent to publish.

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11. Appendices

Appendix 1. Extraction Form

General Information

Title	
Author	
Country	
Focus	
Type of Schools	
Notes:	

Study eligibility

Study Characteristics	Eligibility criteria	Eligibility criteria met?		
		Yes	No	Unclear
Type of study				

Participants				
Types of intervention				
Types of comparison				
Types of outcome measures				
INCLUDE	EXCLUDE			
Reason for exclusion				
Notes:				

Appendix 2. Risk of Bias assessment

Domain	Risk of bias			Support for judgement
	Low	High	Unclear	
Random sequence generation *(selection bias)*				
Allocation concealment *(selection bias)*				
Blinding of participants and personnel *(performance bias)*				
Blinding of outcome assessment *(detection bias)*				
Incomplete outcome data *(attrition bias)*				
Selective outcome reporting? *(reporting bias)*				
Other bias				

PART B: LITERATURE REVIEW

Contents 1

1. Introduction

Mental health is fundamental to the wellbeing and quality of life of persons and influences social and economic outcomes across an individual's lifespan (Barry, Clarke, Jenkins, & Patel, 2013). This study intends to do a Systematic Review looking at Adolescent Mental Health (AMH) in and through schools in low-middle income countries (LMICs). However, before the systematic review can be conducted, it requires a thorough search of all pre-selected databases must be searched to compile and screen for potential eligibility. The purpose of this literature review (Part B) is to gain a broad understanding of what Adolescent Mental Health (AMH) is; the settings in which AMH is addressed and where interventions occur; where schools feature in AMH settings and what kinds of literature on school-based mental health settings are available and what it says and in particular whether literature on school-based AMH services are available in LMICs.

2. Understanding Adolescent Mental Health

Adolescence is considered a fluid concept, traditionally age bound (10 -19 years) and is influenced by social, environmental and cultural factors (Patel, Flisher, Hetrick, & McGorry, 2007). It is a period of significant physical, social and emotional changes and is considered a vulnerable period for adolescents, as they have a high risk of developing mental illness (Paruk & Karim, 2016). Child and adolescent mental health (CAMH) can be defined as "how one feels, thinks and acts," it has to do with a child's capacity to achieve and maintain optimal psychological and social functioning in their day to day living(WHO, 2005; Hunt et al., 2019, p. 131). This involves ensuring adolescents adopt healthy habits such as good sleep patterns, participate in regular exercise activities, develop healthy coping and problem-solving skills, interpersonal skills, and learn how to manage their emotions (WHO, 2018).

Child and adolescent mental ill-health, on the other hand, can be defined as the "inability of a child to reach the optimum level of competence and functioning reflected in disorders, such as depression and learning disabilities" (Patel, Flisher, Nikapota, & Malhotra, 2008). Therefore, because adolescence is a vulnerable period of physical, social and emotional change, most adolescents are at risk for developing mental illnesses (Paruk & Karim, 2016). Furthermore, there is a gap between needs and resource availability, as well as the facilitators and barriers that affect utilisation and provision of services (Kieling et al., 2011; Owens et al., 2002). The mental

health of children and adolescents in LMICs remains a neglected issue, despite a strong correlation between poor mental health and other developmental health concerns in adolescents (Barry et al., 2013; Patel et al., 2007).

3. Epidemiology of Adolescent Mental Health

Children and adolescents constitute almost a third of the world's population, and the majority live in LMICs (Kieling et al., 2011). Mental illness accounts for almost 14% of the global burden of disease with depression and anxiety as leading causes of disability worldwide (Yatham, Sivathasan, Yoon, da Silva, & Ravindran, 2018). In LMICs mental illness is an important global health concern since over 80% residing in LMICs struggle with mental illness, especially the youth (Yatham et al., 2018). Many LMICs are affected by conflict, violence, and natural disasters that contribute to the increased risk of adolescence developing depression, anxiety, as well as posttraumatic stress disorder (PTSD) because it affects their mental development and overall wellbeing (Yatham et al., 2018).

Worldwide, it is estimated that 10–20% of adolescents experience mental health challenges, yet these remain under-diagnosed and undertreated (Barry et al., 2013; WHO, 2018). For adolescents, neuropsychiatric disorders are a leading cause of health-related burdens)Barry et al., 2013; WHO, 2018). It is in the adolescent phase that mental health concerns, high rates of suicide and self-harm are detected (Kieling et al., 2011; Patel et al., 2007). Thus, epidemiological studies have shown that the rate of mental health disorders identified in community studies, especially amongst adolescents cannot be ignored (Levav, Jacobsson, Tsiantis, Kolaitis, & Ponizovsky, 2004). Nevertheless, availability and access to youth mental health services in LMICs remains limited and inadequate (Kessler et al., 2007).

4. The Ecological Framework of Mental Health

The ecological framework is not a theory, but rather a multi-directional complex and dynamic approach (Stormshak & Dishion, 2002). It shows a variety of dimensions that can affect children and that they have to adapt too (Stormshak & Dishion, 2002). An ecological framework is based on the evidence that no single factor can explain why some people or groups are at higher risk of interpersonal problems and others are protected from it (WHO, 2019). Urie Bronfenbrenner was the founder of the ecological model and suggested a multilevel framework, which has now been revised and applied to different problems and interventions (Stormshak & Dishion, 2002).

For example, the community influences the school and the school has an impact on the child. The various levels can be seen in Figure 1.1 below and explained in further detail:

Figure 1.1 Ecological framework of determinants of child and adolescent mental health

1. **Individual**- includes knowledge, attitudes, behaviour, self-efficacy, developmental history, gender, age, values, goals, expectations, and educational level.
2. **Relationships** - This includes social and supportive networks that include adults, supervisors, peers, extended family, siblings, religious networks and customs or traditions.
3. **Behaviour settings-** This is the main level of focus of the review as we look at one of the major influences on children and adolescents which includes schools, home, neighbourhood, school classroom, school park and activity organizations.
4. **Societal/Community context-** Cultural rituals and traditions, school policies, social media, economic and family resources and ethnic minority status.
5. **Political Context** - Local, state, national and global laws and policies, including policies regarding child adolescent mental health, restrictive policies or lack of policies and government influences.

The framework suggests that culture is more than the environment one grew up in; rather it is a redefining psychological construct that can help to explain behaviour (Stormshak & Dishion, 2002). It is also focused on promoting health, especially mental health and focuses on lifestyle changes and contextual influences and forces (Golden & Earp, 2012). The ecological framework acknowledges that the individual, in this case, the adolescent is embedded within larger social systems (Golden & Earp, 2012). It suggests that multiple levels of influence exist, as well as interact and reinforce larger social systems to describe the interactive characteristics of individuals and environments that contribute to health outcomes (Golden & Earp, 2012). For example, counselling interventions help to strengthen the bond between parent and child to know how to support. Thus, as mentioned earlier, this review will be zooming in on the third level, behaviour settings because of the complexities of school dynamics and the influence it has on children and adolescents.

5. Factors that influence Adolescent Mental health/illness

Studies have shown that a large proportion of the adolescent population that have mental disorders require treatment (Zwaanswijk, Van Der Ende, Verhaak, Bensing, & Verhulst, 2003). Despite the knowledge that mental disorders hamper adolescent functioning and wellbeing, many do not receive the necessary treatment required (Zwaanswijk et al., 2003). These factors have shown to play a contributing factor to AMH problems: physical and emotional abuse, substance abuse, poor self-care, low self-esteem, and suicide ideations (Zwaanswijk et al., 2003;Mackavey & Kearney, 2020). Adolescents from LMICs are often exposed to poverty, abuse, or violence, and these factors can make adolescents vulnerable to mental disorders (Barry et al., 2013). Furthermore, an adolescent's ability to internalise and externalise when dealing with difficult situations and emotions, and the academic stress and pressure they face (Barry et al., 2013). As well as, family problems also contribute to the growing prevalence of AMH (Zwaanswijk et al., 2003). Thus, the promoting of psychological well-being, and protecting adolescents from adverse experiences, as well as ensuring adolescents have a supportive environment, which includes healthy family relations, school relations, and community relations in which to grow up in is vital for their general well-being and future adulthood (WHO, 2018).

6. Adolescent mental disorders

There are many AMH problems and disorders, which fall on a spectrum and can range from acute to severe. Duration, persistence, and impact of the symptoms are the criteria to be able to

distinguish normal behaviour from mental health problems/disorders (Tate et al., 2020). Some of the characteristics of AMH problems include signs of lack of interest in usual activities, somatic complaints such as headaches, stomachaches, backaches, and sleep problems, self-harming behaviours, aggression, as well as isolation and loneliness (Michaud & Fombonne, 2005). The common disorders often diagnosed include anxiety disorders, eating disorders which often coexist with depression, anxiety or substance misuse, and are associated with biological, psychological and sociological morbidity and mortality (Reiss, 2013). Emotional disorders, hyperactivity and inattention disorder, as well as destructive or challenging behaviours, such as conduct disorder that results in children not being able to concentrate and listen to instructions (Patel et al., 2007; WHO, 2018). It also negatively affects an adolescent's ability to function, their school performance and attendance (Patel et al., 2007; WHO, 2018). Furthermore, depression and "delinquent" behaviours, which can arise as they enter puberty and try establish their own identity (Reiss, 2013). However, if left untreated or carries on for a lengthy period can be detrimental to their well-being (Patel et al., 2007). As seen, there are a variety of adolescent mental disorders and illnesses that can affect an adolescent in all aspects from psychological, to physical and the need to identify such mental illness is essential to provide the right treatment.

7. Adolescent Mental Health Inequalities

The mental health service system is fragmented, and professionals involved require training, more resources are needed, as well as the development and adoption of different approaches to ensure the provision of mental health services, especially for adolescents (Reiss, 2013). South Africa policies and legislation in post-apartheid have been consistent in suggesting the need to increase access and quality of care which emerged from the new Mental Health Care Act No. 17 of 20025 stating that a “legislated 72-hour emergency referral and observation period for mental healthcare users (MHCUs) in designated regional and district general hospitals before onward referral to tertiary hospitals with the hopes of increasing availability and accessibility of mental health services (Petersen & Lund, 2011).

Mental health is inequitably distributed as people living in poverty and other forms of social disadvantage bear the burden of mental disorders and their adverse consequences with limited assistance (Barry et al., 2013). The Mental health sector has suffered much discrimination, and the inequality is seen greatly when the population needing services do not have a voice, are considered weaker and fear healthcare professionals and government (Levav et al., 2004). Thus,

the shortage of AMH services should be considered a priority on the world mental health agenda because the cost of not providing services is higher to society, including poor quality of life and lack of opportunities preventing full development (Paula et al., 2014). The treatment gap is concerning as studies show that only 10–15 % of adolescents with mental health issues can access adolescent mental health services and this is often due to the lack of available services (Levav et al., 2004).

8. Facilitators and Barriers to Adolescent Mental Health Services

Healthcare professionals have become increasingly aware of the mental health needs of children, and the negative impact of not addressing mental disorders is having on the youth today (Atkins, Hoagwood, Kutash, & Seidman, 2010). However, studies have shown that there is a need to identify and address facilitators and barriers affecting access to mental healthcare, especially for adolescents (Atkins et al., 2010). Interventions to promote mental health aim to strengthen protective factors and enhance alternatives to risk-taking behaviours (WHO, 2018). A systematic review looking at mental health interventions for adolescents indicated that the onset of mental health issues is due to the poor or lack of environmental and parental mentorship experienced (Das, Salam, Arshad, Finkelstein, & Bhutta, 2016). The lack of parental guidance and unstable living environments can often result in unhealthy behaviours being adopted, such as drug and alcohol abuse, poverty and poor education, which is a significant public health challenge (Das et al., 2016).

There are various barriers and facilitators to the utilisation and treatment of AMH, the barriers include negative attitudes, financial pressures, lack of transportation, fear of exposure, the belief that one can solve everything on their own and treatment is not needed, as well as low emotional competence (Gulliver, Griffiths, & Christensen, 2010). Whereas, facilitators include have a strong support system from family and friends, being resilient, having a positive attitude and mindset, as well as the availability of established trusted professional relations (Gulliver et al., 2010). Other factors include structural factors, such as “the national health system, accessibility and affordability of services, and social support” (Gulliver et al., 2010). Furthermore, facilitators that lead to help-seeking included structural and personal determinants which include personal beliefs, gender norms, coping skills, self-efficacy, and stigma (Gulliver et al., 2010).

9. Mental Health Services and interventions of treatment

Over the past few years, more attention has been given to the mental healthcare services and the inadequate provision of mental health services for children and adolescents (Farmer, Burns, Phillips, Angold, & Costello, 2003). As well as the unsuccessful attempts to develop, implement and restructure the system of care, which includes individual services, child-family planning and various other forms of social delivery (Farmer et al., 2003). Most services provided for children and adolescents have included inpatient and outpatient mental health settings, family-focused treatments, because family plays an integral role in the "social and emotional development of children and adolescents" (Farmer et al., 2003; Hoagwood et al., 2001). Other interventions include, group-based interventions, cognitive behavioural therapy which can help with depression and anxiety, as well as school-based suicide prevention and community-based treatment (Das et al., 2016; Hoagwood et al., 2001). The ecological model was proposed to help the refocusing and reforming of mental health services in LMICs (Cappella, Frazier, Atkins, Schoenwald, & Glisson, 2008). This model proposes the amalgamation of mental health service and the educational services to help in developing and creating effective, accessible services to help the youth of today (Cappella et al., 2008).

Furthermore, various models also exist which include the medical home model that can be used to assist in improving communication in schools and access to mental health services and support use, as well as the School-supported mental health models, community connection models and comprehensive models (Atkins et al., 2010). Regarding school-based intervention, it includes classroom-based contingency management, which helps with reducing aggression, behavioural consultations with teachers to help with challenging students and school-based preventive interventions to assist with adolescents who have emotional and behavioural problems (Hoagwood et al., 2001). The reason for the variety of model and interventions is that studies indicated the importance of early child development and family counselling to ensure the child is raised with emotional stability(Das et al., 2016). Therefore, to ensure the successfulness of mental health services, multiple approaches need to be taken, especially when working with children and adolescents because it is not a one size fits all approach (Cappella et al., 2008; Farmer et al., 2003).

10. The role of schools in providing Adolescent Mental Health services

The education sector is one most youth have contact with and spend the majority of their time at (Wheaton, Chapman & Croft, 2016). Schools have a vital role when considering the needs and development of children globally and are considered a provider of services for youths with often fewer server problems (Fazel, Patel, Thomas, & Tol, 2014; Wheaton et al., 2016). According to studies, roughly 80% of children and adolescents live in LMICs. However, there are limited resources available to educate and train adolescents to cope with their daily pressures (Fazel et al., 2014). Many adolescents who attend schools in LMICs receive a low quality of education and have to be in classes that are larger in comparison to the HIC schools (Fazel et al., 2014). Studies have indicated that there is a correlation between mental health and educational difficulties, highlighting the importance of addressing AMH in schools in LMICs (Fazel et al., 2014). Many adolescents in LMICs are under pressure to jump into adulthood due to the increased social and economic responsibilities they face, resulting in early formal or informal employment and preventing adolescents from obtaining higher education and developing their full potential (Fazel et al., 2014). Despite school attendance, increasing AMH services has remained absent because of inadequate training and stigma, thus hampering the uptake and effectiveness of adolescent mental health services (Fazel et al., 2014).

Schools are one of the most important community environments for promoting the mental health of children and adolescents (Barry et al., 2013). They provide a forum for promoting emotional and social competence; academic learning and can reach the wide youth population who are dealing with mental disorders (Barry et al., 2013). Thus, having educational opportunities throughout life is associated with improved mental health outcomes and is a core feature of the WHOs Health Promoting Schools initiative (Barry et al., 2013). Schools are major providers in ensuring children have access to mental health services; however, the effectiveness of such services are unknown (Rones & Hoagwood, 2000). However, the complexity of the world, which places a lot of pressure on adolescents to fulfil and perform, appears to be overwhelming, resulting in adolescent substance abuse, suicide or self-harm, and/or unwanted teen pregnancies (Mason-Jones et al., 2012). According to Wheaton et al., 2016, many children and adolescents are not getting enough sleep, because of the increased workload, the compulsory afterschool activities and the lack of parent supervision/assistance (Wheaton et al., 2016). Thus resulting in many children having emotional and behavioural issues, which leads to poor mental and physical

outcomes, as well as a decrease in academic performance and their overall well-being due to their inability to cope with the stresses placed on them(Wheaton et al., 2016). Therefore, studies suggest that mental health promotion programmes in schools are needed to better adolescents mental, social and educational outcomes for adolescents (Barry et al., 2013)..

School-based mental health interventions need to not only incorporate life skills training when addressing emotional and behavioural problems, but they need to start adopting a holistic approach and become more flexible in their ways of teaching (Wehrmeister et al., 2018). As well as, look at readjust the schooling system, such as later start times and include leisure times such as reading, so students do not become so overwhelmed (Wehrmeister et al., 2018). However, due to financial disadvantages faced by many living in LMICs, the implementation of intervention mental healthcare programs are difficult to integrate and sustain, because many of the schools not having adequate physical, instructional, and social-emotional environments to protect children from potential risks of hardship (Reiss, 2013).

The potential for a partnership between education and the mental health field is unfolding slowly in the absence of clear and unifying frameworks to guide research and practice in this emerging field (Cappella et al., 2008; Reiss, 2013). However, information on the effectiveness of school-based healthcare services and interventions is limited and more access to mental health services in schools are needed to address issues and barriers being faced, as there is a link between adolescent mental health and school achievements (Mason-Jones et al., 2012). According to the various searches conducted, little research has been done on school and community-based mental health promotion interventions for young people in LMIC settings (Barry et al., 2013; Patel et al., 2007).

11. Identification of the gap or needs for further research

Adolescent Mental health remains a neglected public health issue, especially in LMICs despite a strong correlation between poor mental health and other developmental health concerns in adolescents (Barry et al., 2013; Patel et al., 2007). Despite the widespread recognition of the importance of mental health promotion and prevention in children and adolescents, there is an enormous gap between needs and resource availability (Kieling et al., 2011). There is a need for more accurate epidemiological studies and data on the prevalence of AMH which would help health professionals and policymakers understand the seriousness of the issue, as well

as intervention studies that show the efficacy and effectiveness of sustainable models of service delivery which include “cost-effectiveness, cost-benefit and cost-utility analyses” (Petersen & Lund, 2011).

What the research has highlighted is that, despite awareness of the need to address AMH and ensure good quality services are provided in and through schools, especially in LMICs. literature on AMH and the effectiveness of mental health services in LMICs, especially in South Africa, is limited and more research needs to be conducted to address the issues presented. The promotion of mental health and wellbeing helps adolescents to build resilience, so that they can cope well in stressful situations or adversities in a healthy manner (WHO, 2018). Furthermore, the studies found highlighted the need to prioritise AMH, especially in a school-based setting in LMICs because, they are often overlooked and undermined.

12. Conclusion

The need to not only improve AMH services but to ensure they are provided, especially in a school-based setting is crucial to the mental health of many adolescents living in LMICs due to the barriers they face such as socioeconomic disadvantages, unhealthy living environments and discrimination. An investment in mental health infrastructure and commitment to training healthcare providers, such as community health workers, social workers, teachers and other specialists, to enable developing countries to strengthen and deliver cost-effective interventions for adolescents is crucial (Lu, Li, & Patel, 2018). In order to ensure access and the utilisation of services the stigma that surrounds mental disorders needs to be challenged, as well as more accurate information regarding the prevalence and impact of mental disorders in children and adolescents, needs to be conducted (Lu et al., 2018). There is a need for more funding, more donor investments to ensure the building and sustaining of mental services for adolescents in school (Lu et al., 2018). Lastly, funding should be made a priority, especially in the public system to ensure the goals of mental health care integration including health, education, and social sectors be done so accurately and equitably (Lu et al., 2018).

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PART C: ARTICLE

Prepared for: The African Journal of Disability

Abstract

Background: Adolescence is considered a fluid concept influenced by many factors including social, emotional and cultural aspects. Adolescent mental health interventions have an important part to play in the prevention of mental disorders and in the promotion of mental health and wellbeing. Given the long period of schooling for adolescents, school-based interventions have great potential in addressing adolescent mental health needs. Therefore, the relative neglect of this area of health service provisioning and the paucity of knowledge on the matter, a systematic review was conducted to explore the effectiveness of school-based mental health interventions, with the purpose of identifying whether school-based interventions are effective for adolescents in low-middle income countries (LMICs).

Objectives: The aim of this systematic review is to explore the effects of school-based interventions on mental health, in particular anxiety, depression, sense of self-worth and social behaviour, as well as the holistic wellbeing of adolescents in LMICS.

Method: We conducted a review of the literature, searching several databases. Once the search was run, the duplicates were removed and the remaining articles were screened. The articles selected for inclusion were based on a predefined criteria and the data was extracted using an extraction form. The data was pooled together using a meta-analysis and then analysed to assess intervention effectiveness, what school-based interventions are there and to identify knowledge gaps for future studies.

Results: School-based interventions resulted in a statistically significant decrease in anxiety and depression. Sense of self-efficacy and social behaviour, meaning how one interacts with another human being, their mannerisms and temperament, were significantly boosted. School-based interventions were not effective in dealing with self-esteem and self-concept.

Conclusion: School-based interventions are effective in addressing Adolescent Mental Health (AMH) specifically reducing anxiety and depression, as well as having a positive effect on self-efficacy and social behaviour. However, evidence was not found for the effectiveness of SBI programmes on self-esteem and self-concept.

Keywords: Adolescents, mental health, school-based services, school-based Interventions, Low-middle income countries

Abbreviations and Acronyms

AMH- Adolescent mental health

AMHI- Adolescent mental health interventions

CAMHS- Child and adolescent mental health services

LMICs- Low- and Middle income countries

SMD- Standard Mean Deviation

WHO- World Health Organization

What this paper adds

The results from this systematic review provide evidence for the effectiveness of school-based interventions for (1) reducing depression and anxiety, and (2) enhancing self-efficacy and social behaviour. However, the results provide no evidence to support school-based interventions for boosting self-esteem and self-concept. While this review highlights the positive impact that school-based interventions have on mental health and wellbeing in adolescents, it also indicates that interventions dealing with self-esteem need to be refined. The findings of this work are important in addressing Adolescent Mental Health (AMH), a neglected topic, especially in low-middle income countries.

1. Introduction

Mental health is fundamental to a person's wellbeing and quality of life and it influences social and economic outcomes across an individual's lifespan (Barry, Clarke, Jenkins, & Patel, 2013). The World Health Organization (WHO) defines mental health as a "state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community" (WHO, 2018). Mental health is considered integral to a person's overall wellbeing and can be determined by a variety of factors such as socioeconomic, environmental and biological (WHO, 2018). Mental health disorders are considered one of the most common causes of disability worldwide making it an important public health concern (ODPHP, 2019). It is estimated that 792 million people worldwide live with mental disorders and of the many disorders that exist neuropsychiatric disorders are the most common, which includes attention deficit disorders, anxiety, depression and addictions (Ritchie, 2018; Tomlinson & Lund, 2012). Mental health is a growing global burden of disease affecting not only the adult population, but youth too (Ritchie, 2018; Tomlinson & Lund, 2012). A significant proportion, of over 70%, of the burden of mental health disorders occur in low- and middle- income countries (LMICs), where access to mental health services and interventions are limited (Barry et al., 2013; Tomlinson & Lund, 2012). The burden of mental disorders in LMICs, and their adverse consequences, are also inequitably distributed, as people living in poverty and other forms of social disadvantage have little or no access to treatment (Barry et al., 2013).

Adolescence is considered a fluid concept meaning a period of transition involving education, physical and psychological development, also known as puberty which varies from individual to individual (Patel, Flisher, Hetrick, & McGorry, 2007). It is traditionally age-bound between 10 to 19 years and is influenced by social, environmental and cultural factors (Patel et al., 2007). Adolescence is a period of significant physical, social and emotional changes and is considered a vulnerable period for adolescents, as they have a high risk of developing mental illness because of their vulnerability (Paruk & Karim, 2016). Child and adolescent mental health (CAMH) can be defined as "how one feels, thinks and acts," it has to do with a child's capacity to achieve and maintain optimal psychological and social functioning in their day to day living(WHO, 2005; Hunt et al., 2019, p. 131). Whereas, Child and adolescent mental ill-health, on the other hand can be defined as the "inability of a child to reach the optimum level of competence and functioning reflected in disorders, such as depression and learning disabilities" (Patel, Flisher, Nikapota, &

Malhotra, 2008). The complexity of the world places pressure on adolescents and can be overwhelming, resulting in adolescent developing mental, emotional and behavioural issues that impact their ability to remain focused and seek the help they need to deal with their struggles (Rones & Hoagwood, 2000). Thus, the need for adolescent mental health care is required not only to help adolescents adjust, but to address mental illness and provide the necessary care (Mason-Jones et al., 2012).

There are a variety of adolescent mental health problems and disorders, which fall on a spectrum and can range from acute to severe (Michaud & Fombonne, 2005). Some of the characteristics of AMH problems include signs of lack of interest in usual activities, somatic complaints such as headaches, stomachaches, and insomnia, self-harming behaviours, aggression, as well as isolation and loneliness (Michaud & Fombonne, 2005). The common disorders often diagnosed include anxiety disorders, depression, low-self-esteem and low - self efficacy which can often lead to eating disorders (Golden et al., 2003). As well as, social behaviour which involves how adolescents interact with others, how they relate, their mannerisms and friendships, all of which can be both positive and negative (Ciranka & van den Bos, 2019). It is estimated that about 20% of children and adolescents have mental disorders, of which 85% live in LMICs (Erskine et al., 2016; Paruk, & Karim, 2016). As a result, children and adolescents are at an increased risk of developing a mental illness because of their exposure to vulnerable environments lacking in social support and socioeconomic inequalities (Paruk & Karim, 2016). Studies indicate that the prevalence of depression amongst adolescence is 4%-8%, and the prevalence for generalised anxiety disorder is about 10%, but these figures could not be accurate as representative prevalence data is lacking because it is dependent on self-reporting (Erskine et al., 2016). Also “there is limited evidence-based research regarding the burden of child and adolescent mental disorders in African countries, especially in low- and middle-income countries (LMICs) (Mokitimi, Schneider, & de Vries, 2018).” This lack of data is concerning as it is needed to inform and assist in figuring out ways to meet the needs of children and adolescents (Erskine, 2016). As seen there are a variety of adolescent mental health problems and illnesses that can affect an adolescent in all aspects from psychological, to physical and the need to identify such mental illness is essential in order to provide the right treatment. However, the choice to focus on anxiety, depression, self-worth which includes self-esteem and self-efficacy, as well as social behaviour is because they were the most common disorders when reading through the selected articles, as well as some of the excluded

ones. These disorders can be debilitating and affect both the psychological, physical, social and emotional side of an individual (Ciranka & van den Bos, 2019).

The ecological framework is not a theory, but rather a multi-directional complex and dynamic approach (Stormshak & Dishion, 2002). It shows a variety of dimensions that can affect children and that they have to adapt too (Stormshak & Dishion, 2002). An ecological framework is based on the evidence that no single factor can explain why some people or groups are at higher risk of interpersonal problems and others are protected from it (WHO, 2019). Urie Bronfenbrenner was the founder of the ecological model and suggested a multilevel framework, which has now been revised and applied to different problems and interventions (Stormshak & Dishion, 2002). For example, the community influences the school and the school has an impact on the child. The various levels can be seen in Figure 1.1 below and explained in further detail:

Figure 1.1 The ecological framework of determinants of child and adolescent mental health (Golden & Earp, 2012).

1. **Individual**- includes knowledge, attitudes, behaviour, self-efficacy, developmental history, gender, age, values, goals, expectations, and educational level.
2. **Relationships** - This includes social and supportive networks that include adults, supervisors, peers, extended family, siblings, religious networks and customs or traditions.

3. **Behaviour settings-** This is the main level of focus of the review as we look at one of the major influences on children and adolescents which includes schools, home, neighbourhood, school classroom, school park and activity organizations.
4. **Societal/Community context-** Cultural rituals and traditions, school policies, social media, economic and family resources and ethnic minority status.
5. **Political Context** - Local, state, national and global laws and policies, including policies regarding child adolescent mental health, restrictive policies or lack of policies and government influences.

The framework suggests that culture is more than the environment one grew up in; rather it is a redefining psychological construct that can help to explain behaviour (Stormshak & Dishion, 2002). It is also focused on promoting health, especially mental health and focuses on lifestyle changes and contextual influences and forces (Golden & Earp, 2012). The ecological framework acknowledges that the individual, in this case, the adolescent is embedded within larger social systems (Golden & Earp, 2012). It suggests that multiple levels of influence exist, as well as interact and reinforce larger social systems to describe the interactive characteristics of individuals and environments that contribute to health outcomes (Golden & Earp, 2012). For example, counselling interventions help to strengthen the bond between parent and child to know how to support. Thus, as mentioned earlier, this review will be zooming in on the third level, behaviour settings because of the complexities of school dynamics and the influence it has on children and adolescents.

The education sector is one most youth have contact with and spend the majority of their time at (Wheaton, Chapman & Croft, 2016). Schools have a vital role when considering the needs and development of children globally (Fazel, Patel, Thomas, & Tol, 2014; Wheaton et al., 2016). They provide a forum for promoting emotional and social competence; academic learning and can reach the wide youth population who are dealing with mental disorders (Barry et al., 2013). They provide a potential location to address the mental health needs of children and adolescents because they have access to the adolescent and form part of their development on a daily basis (Fazel et al., 2014; Stormshak & Dishion, 2002). Health services, in conjunction with the education system, can offer school-based opportunities to improve and promote mental health, and help prevent the development of more serious mental disorders (Fazel et al., 2014; Stormshak & Dishion, 2002).

Many adolescents who attend schools in LMICs receive a low quality of education and have to be in classes that are larger in comparison to the HIC schools (Fazel et al., 2014). Studies have indicated that there is a correlation between mental health and educational difficulties, highlighting the importance of addressing AMH in schools in LMICs (Fazel et al., 2014). Many adolescents in LMICs are under pressure to jump into adulthood due to the increased social and economic responsibilities they face, resulting in early formal or informal employment and preventing adolescents from obtaining higher education and developing their full potential (Fazel et al., 2014).

In South Africa, many children and adolescents are exposed to violence and face maltreatment in the community, in schools and in the home (Flisher et al., 2012). South Africa has one of the highest poverty and crime rates which poses a major challenge to the country and results in the neglect of mental health, especially among children and adolescents (Hunt, 2019). South African studies indicate that exposure to violence and unstable living environments are associated with the development of psychological disorder in children and adolescents (Flisher et al., 2012). Child and adolescent mental health (CAMH) is a concern in a middle-income country such as South Africa, where with 34% of the population is under the age of 18. This is especially so given that 50% of mental health issues reportedly develop around the age of 14 and about 75% by 24 years, (Proudlock & London, 2019). Furthermore, it is estimated that globally 10% to 20% of adolescents experience mental health issues, such as depression, anxiety and other cognitive disorders (Proudlock & London, 2019). Despite the absence of representative epidemiological data on the burden of child and adolescent mental disorders in South Africa, little research has been conducted to determine the prevalence estimates that are essential for service planning (Flisher et al., 2012).

South Africa has a policy and legislative framework in place to address adolescent health. The Mental Health Act of 2002 at a national level has emphasised the human rights of those with mental illness, such as their right to access care (Stein, 2014). South Africa is one of the countries recognized by the United Nations to have a detailed National Child and Adolescent Mental Health policy (Shatkin & Belfer, 2004). According to the Integrated School Health Policy (ISHP), the South African government stated that Children should be prioritised to ensure their rights are upheld (HBE, 2012). Therefore, school-based mental health interventions need to not only incorporate life skills training when addressing emotional and behavioural problems, but they need to start adopting a holistic approach and become more flexible in their ways of teaching (Wehrmeister et al., 2018). As well as, look at readjust the schooling system, such as later start

times and include leisure times such as reading, so students do not become so overwhelmed (Wehrmeister et al., 2018). However, due to financial disadvantages faced by many living in LMICs, the implementation of intervention mental healthcare programs are difficult to integrate and sustain, because many of the schools not having adequate physical, instructional, and social-emotional environments to protect children from potential risks of hardship (Reiss, 2013). Thus, looking at the state of CAMH in South African schools where the prevalence rate of mental illness continues to grow, there is a need to pay greater attention to not only the provision of CAMH services in LMICs, schools use different educational approaches, however, all children and adolescents have similar basic needs, which include the nurturing, and development of their academic, physical, emotional, social, and moral aspects (Fazel et al., 2014).

There is a variety of Mental health care options available worldwide as the severity of the issue grows and becomes more prevalent (Rathod et al., 2017). Some of these school-based interventions include, classroom-based contingency management, which helps with reducing aggression, behavioural consultations with teachers to help with difficult students and school based preventive interventions to assist with adolescents who have emotional and behavioural problems (Hoagwood et al., 2001). However, although there are mental healthcare services available, there are also inequalities that can be seen when comparing LMICs to high income countries, which place many individuals in need at a disadvantage (Rathod et al., 2017). The reality in South Africa is that, although we have policies and guidelines such as the IHSP and various other mental health policies, the implementation and sustaining of such is poor and the funds are lacking. There is a need to develop clearer guidelines of what school-based models of AMH service/interventions could and should look like, especially in LMICs, hence, a review of the literature as to what this is elsewhere in LMIC world is important, as it may help shape ideas of what it could be in South Africa.

The aim of this systematic review, *using a meta-analysis approach,* was therefore to identify and synthesize existing literature on addressing adolescent mental health (AMH) in and through schools in LMIC, and to assess the effectiveness of school-based interventions in addressing AMH. This systematic review of quantitative studies asks the following question: How effective are school-based interventions in addressing adolescent mental health in and through school-based settings in LMICs? Furthermore, the objectives of the study were: to identify what kinds of services/interventions are currently available and have been

implemented; to identify what the facilitators and barriers faced in schools based in LMICs are when trying to access mental healthcare services for adolescents, and lastly, to explore/examine the effectiveness of school-based AMH interventions on mental health issues. We sought to identify what the gaps were that needed to be addressed when dealing with AMH and school-based services/interventions in a LMIC, such as South Africa.

2. Methods

This study employed a quantitative systematic review. Systematic reviews use a "transparent and systematic process to define a research question, search for studies, assess their quality and synthesize findings qualitatively or quantitatively" (Armstrong, Hall, Doyle, & Waters, 2011). It involves the summarizing of results from the selected articles chosen after reviewing the literature. A crucial step in the systematic review process is to define the research question clearly (Armstrong et al., 2011). Therefore, a thorough understanding of existing literature is needed, which includes clarification of definitions, the identification of gaps and uncertainties of the topic to help when analysing the data acquired (Armstrong et al., 2011). A quantitative systematic review allows for the provision of a high level of evidence speaking to the effectiveness of healthcare interventions (Higgins & Green, 2011). As well as generates new insight and strengthens commentary on recommendations of interventions (Shorten & Shorten, 2013).

2.1. Eligibility criteria

Studies selected for this review needed to meet the following inclusion criteria:

a. Studies needed to recruit participants who were between the ages of 10 and 19
b. Studies needed to have a mental disorder e.g. depression, anxiety, schizophrenia or bipolar as an outcome
c. Interventions needed to be applied in school-based settings
d. All relevant studies needed to be interventional studies e.g. randomised control trials, quasi-experimental, pre-post-test design.
e. Studies conducted solely in LMICS

Studies were excluded if:

a. Studies recruited adolescent participants who were not in school
b. Studies presenting results of non-school based interventions e.g. community-based programs or group therapy outside a school setting
c. Studies not conducted in LMICs
d. Non-English studies
e. Full-text articles that were not accessible to the researchers, and/or corresponding authors were unable to provide data in time.

2.2. Search strategy

Various strategies were used to identify studies appropriate for inclusion in the review. Appendix 1 contains an example of the search strategy. Cleo Albertus (CA) searched databases, without any time limitations, however, one limitation was the selection of studies published in English only. Databases searched were: PubMed, EBSCOHost, Academic Premier Search, Medline, PsyInfo and PsyArticles. We also searched the Cochrane Library (Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials (CENTRAL), and the Cochrane Methodology Register). In addition, we manually searched reference lists of relevant studies to identify any missing articles or valuable studies. Searches furthermore included Google scholar and other grey literature sites. CA and AH then revised all relevant material obtained from the search. After reading the titles and abstracts of the identified studies, we retrieved the full-text studies for every citation potentially meeting inclusion criteria. Both CA and Ameer Hohlfled (AH) individually evaluated the full text articles. Authors discussed uncertainties pertaining to inclusion eligibility where required.

2.3. Data extraction

CA and AH independently extracted the data based on the chosen criteria and compared findings. ME settled discrepancies where necessary. Information extracted from the studies were: the country the study was conducted in, age of target population, sample size, interventions used, outcomes assessed and measures used. We extracted means, standard deviations, and sample sizes for each relevant intervention study for our analysis. Where studies did not provide standard deviations, we calculated them using MS Excel where possible. Only baseline and first-recorded post intervention scores were extracted.

2.4. Data Analysis categories

This review assessed four mental illness domains prevalent amongst children and adolescents in the literature: Depression, Anxiety, Social behaviour, Sense of self-worth (comprising self-concept, self-esteem and self-efficacy). The measurement instruments included: The Spence Anxiety Scale for Children (SCAS), Strength and Difficulties Questionnaire (SDQ), Rosenberg scale of Self-Esteem (RSES), Generalized Self-Efficacy Scale (GSES) and the Beck Youth Inventories (BYI). Four of the studies, (Bonhauser et al., 2005), (Jegannathan, Dahlblom, & Kullgren, 2014), (Kumakech, Cantor-Graae, Maling, & Bajunirwe, 2009) and (Rivet-Duval, Heriot, & Hunt, 2011) used measuring tools deemed to be valid and reliable. However, the

remaining six studies did not specifically comment on the validity of the instruments used: (Berger, Benatov, Cuadros, VanNattan, & Gelkopf, 2018), (De Villiers & Van den Berg, 2012), (Jordans et al., 2010), (Karam et al., 2008), (Leventhal et al., 2015) and (Srikala & Kishore, 2010).

We used the standardised mean difference (SMD) measure, given that although studies had similar outcomes, different tools were employed across the studies (Higgins & Green, 2011). The I^2 statistic for each analysis was calculated to assess the heterogeneity (Hozo, Djulbegovic, & Hozo, 2005). The Data were analysed using Review Manager 5.3 to produce forest plots (Collaboration, 2014). The outcomes (Depression, anxiety, self-esteem, self-efficacy and social behaviour) were considered as continuous variables. The meta-analysis was carried out on each of the five subgroups for a subgroup analyses and where significant heterogeneity was found, the random-effects model was used.

2.5. Risk of bias

We used risk of bias assessment criteria as per the study design:

(1) RCTs: evaluating selection of participants, random sequence generation (selection bias), allocation concealment (selection bias), blinding of participants and personnel (performance bias), incomplete outcome assessment (attrition bias), and other sources of bias. Each criteria item was scored with low, moderate or high risk of bias (Higgins & Altman, 2008) and,

(2) ITSs: evaluating intervention independent of other changes, shape of the intervention effect pre-specified, intervention unlikely to affect data collection, knowledge of the allocated intervention adequately prevented during the study, incomplete outcome data adequately, selective outcome reporting and other risk of bias (EPOC, 2017).

Where there was a disagreement between reviewers, scoring was determined through consultation and discussion.

3. Results

3.1. Description of studies

Figure 2 depicts a flow diagram of the literature search results. We retrieved 922 titles from electronic databases and trial registries. An additional 11 references were found through manually searching the reference lists of included studies. Following removal of 521 studies due to duplication, 412 were subject to scrutiny using our inclusion / exclusion criteria. From these, 385 articles were excluded based on title and abstract screening, after which, 26 articles were potentially eligible for inclusion, pending full-text assessment. After full text examination, a further 16 articles were excluded. Ten articles were ultimately included in the review. Table. 1 summarises the characteristics of the included studies. The list of excluded studies and the reason for exclusion has been tabulated in Table.2 (Seen Below).

Each of the ten studies were conducted in a different country: Uganda, South Africa, Tanzania, Cambodia, Chile, Nepal, Lebanon, India, Bangalore and Mauritius. All studies were conducted in public sector schools. All studies dealt with adolescents between the ages of 10 - 18 years of age. The total number of adolescents across all ten studies were 5267. All studies included both sexes, except for Leventhal et al., 2015 which looked at girls only.

We conducted subgroup analyses of those studies for which peer-reviewed measurement instruments were employed. There were a variety of measures used to measure the selected outcomes including: The General Self-Efficacy Scale(GSES); General anxiety disorder-7(GAD-7); Patient health questionnaire (PHQ-9); The Spence Anxiety Scale for Children (SCAS), Strength and Difficulties Questionnaire (SDQ), Rosenberg scale of Self-Esteem (RSES), Generalized Self-Efficacy Scale (GSES) and the Beck Youth Inventories (BYI). Two of the studies, Karam et al., 2008 and Leventhal et al., 2015 were included in this study, however, they were not amenable to a meta-analysis and one of the studies, by Jegannathan et al., 2014 was split into two, because it calculated boys and girls separately. As mentioned previously, some of the studies provided details pertaining to validation of the instruments used in the research, while others did not specifically state the validation of the instruments used, but all the instruments used in each study was validated for the context in which these were applied.

The interventions across all ten studies were often educationally based, using cognitive behavioural therapies, stress reduction, resilience programmes and life skills programmes. The control group still attended school and received the normal curriculum, including basic studies and

physical activities. The predominant study designs were randomised control trials, some cluster randomised, quasi-randomised and pre-post-test designs. The studies were predominantly focused on the effect the intervention would have on the adolescent, especially those who had experienced severe external stresses such as war or harsh living conditions. However, there were no differences in the outcomes between boys and girls and the effect of the intervention.

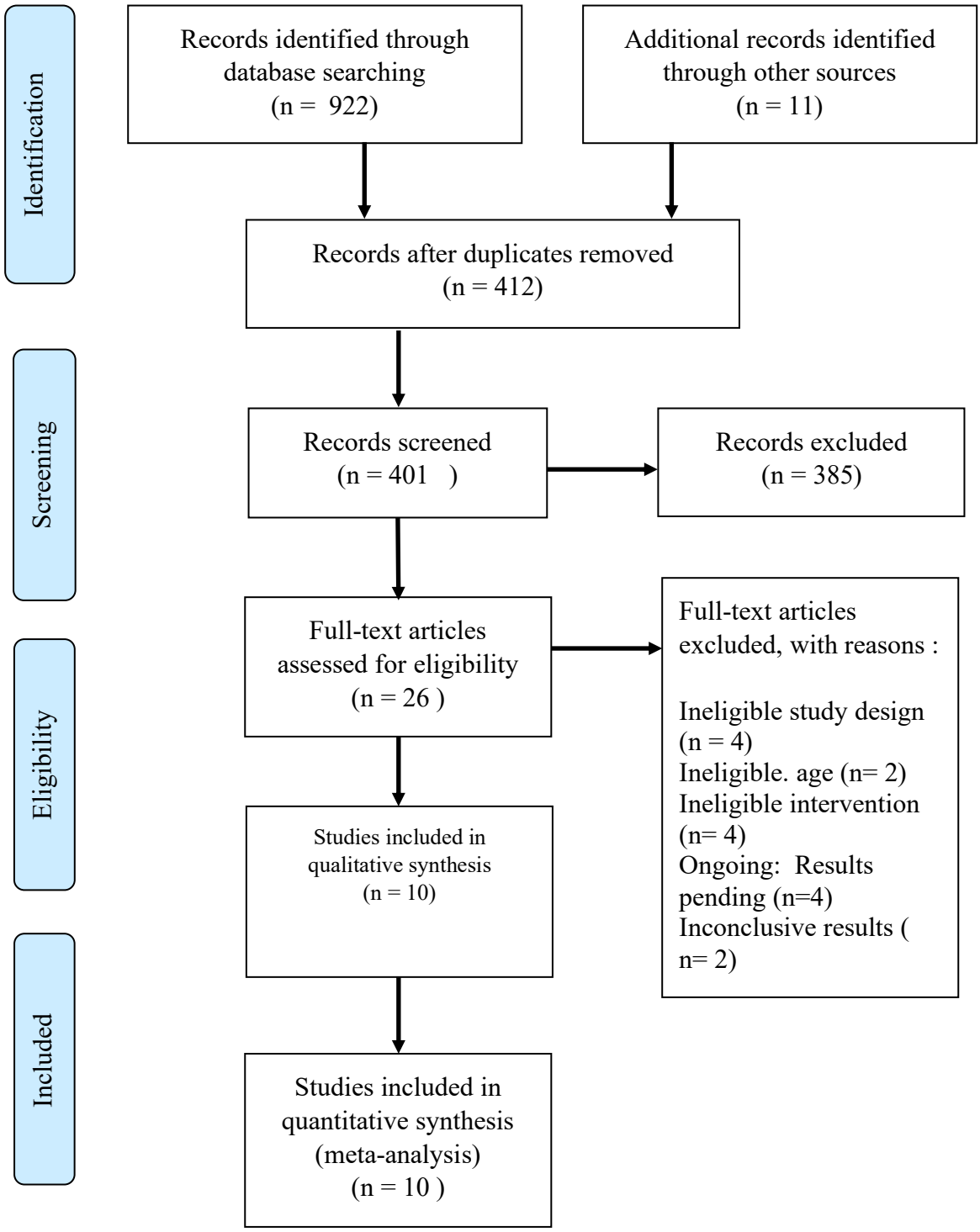


Figure 2. PRISMA flow chart presenting the documentation and selection of included studies in the systematic review. Adjusted from (Moher et al., 200

Table 1. Characteristics of interventional studies that met the inclusion criteria

Study authors (year)	Country	Child Age	Intervention	Outcome	Measures	Sample size	Study Design	No. of Schools	Population Gender
Berger et al., 2018	Tanzania	11-14 years	Educational Curriculum	Anxiety/ Social Behaviour	SCAS/SDQ	183	RCT	6 Schools- Meru District	Both Sexes
Bonhauser et al., (2005)	Chile	15 years	Educational Curriculum	Anxiety/Depression/ Self-esteem	HADS	198	RCT	6 schools- different villages	Both Sexes
*de Villiers & van den Berg, (2012)	South Africa	12-13 years	Resilience programme	Self-Esteem/Self-efficacy	BERS-2	161	Pre-post test	4 schools - Bloemfontein	Both Sexes
Karam et al., (2008)	Lebanon	6-18 years	CBT/Stress inoculation	Depression/Anxiety	DICA	194	Pre-Post Test	8 schools- South-western Nepal District	Both Sexes
Kumakech et al., (2009)	Uganda	10-15 years	Peer-group support	Self-concept/ Anxiety/Depression	BYI	392	RCT	20 schools - Mbarara District	Both Sexes
Jordans et al., (2010)	Nepal	11-14 years	Educational Curriculum	Anxiety/Depression/ Social behaviour	DSRS/SCARED-S/SDQ	325	Pre-Post Test	2 schools - south-western District	Both Sexes
Jegannathan et al., (2014)	Cambodia	11-18 years	Educational Curriculum	Anxiety/Depression/ Social behaviour	YSR	321	Pre-Post Test	2 Schools- Takhau	Girls only
Leventhal et al., (2015)	India	15-16 years	Educational Curriculum	Anxiety/Depression/ Self-efficacy/	GSES/PHQ-9/GAD-7	2308	RCT	76 schools- Patna District	Both Sexes
Rivet-Dual et al., (2011)	Mauritius	12-16 years	CBT/Interpersonal approaches	Depression/Self-esteem/ Self-efficacy	RADS-2/ RSE/YCI	160	RCT	2 schools -	Both Sexes
Srikala & Kishore, (2010)	Bangalore	14-16 years	Educational Curriculum	Social Behaviour/Self-efficacy/ Self-esteem	SDQ/GSE/ RSE	1028	Pre-post test	2 schools - Chennapatna	Both Sexes

Note: SCAS, Spence Scale for children; SDQ, Strengths and Difficulties; HADS, Hospital Anxiety Depression Scale; BERS-2, Behavioural and Emotional Rating Scale; DICA, Diagnostic Interview for Children and Adolescents; BYI, Beck Youth Inventories; DSRS, Depression Self Rating Scale; SCARED, Screen for Child Anxiety Related Emotional Disorder; YSR, Youth Self Report Scale; PHQ-9, Patient health Questionnaire-9; GAD-7, General Anxiety Disorder-7; GSES, Generalised Self-Efficacy Scale; RSSE, Rosenberg Self-Esteem Scale; RADS-2, The Reynolds Adolescent Depression Scale-2; YCI, The Youth Coping Index
*Only study conducted in a middle class school, the rest were public

Table 2. Excluded Studies

Author and Date	Reason for Exclusion
(Baker-Henningham, 2014)	Excluded based on Study Design
(Baker-Henningham, Scott, Jones, & Walker, 2012)	Excluded Based on the age range of the population
(Barbosa Filho et al., 2015)	Excluded based on intervention
(Dang, Weiss, Nguyen, Tran, & Pollack, 2017)	Excluded based on the age range of the population
(Devries et al., 2014)	Excluded based on Study Design
(Ismayilova et al., 2018)	Excluded based on intervention
(Isrctn, 2012)	Excluded based on intervention
{Leventhal, 2015 #34	Excluded based on Study Design
(Leventhal et al., 2016)	Excluded based on inconclusive results
(McMullen & McMullen, 2018)	Excluded based on Study Design
(Mueller, Alie, Jonas, Brown, & Sherr, 2011)	Excluded based on intervention
(Nct, 2016)	Excluded based on ongoing trial: results pending
(Nct, 2018)	Excluded based on ongoing trial: results pending
(Nct, 2019)	Excluded based on ongoing trial: results pending
(Parikh et al., 2019)	Excluded based on ongoing trial: results pending
(Ul Hassan, Sekar, & Raj, 2017)	Excluded based on inconclusive results

Table 3. Studies research site and intervention

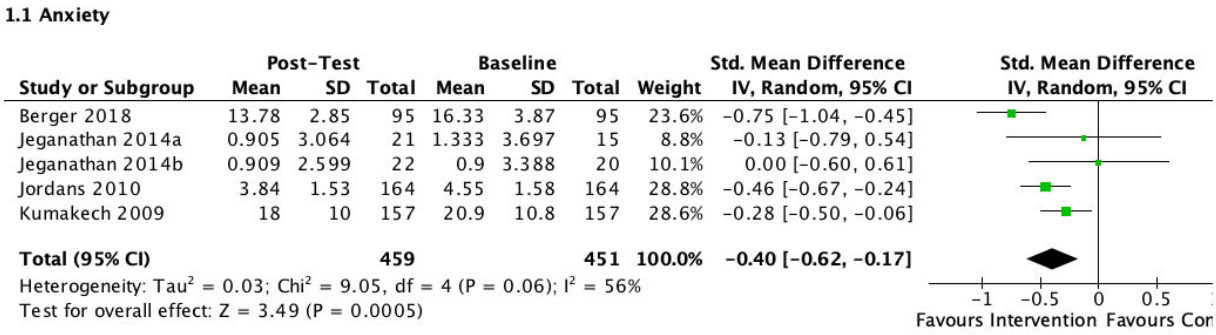
Author and Date	Country	Area	Context	Description of intervention
Berger et al., (2018)	Tanzania	Meru District	Public schools where poverty and health issues were prominent. The reason for the school based intervention was to deal with behavioural and emotional problems, as well as social conflicts the students were having.	The intervention was known as ESPS, which is a "universal school-based program composed of sixteen 90 minute sessions" It was divided into two strategies: Stress reduction intervention and prosocial interventions i.e. mindfulness.
Bonhauser et al., (2005)	Chile	Santigo	Public schools, catering to students of low-income. The purpose of a school-based intervention was to improve self-esteem and performance.	The intervention included three 90 minute sessions a week, including physical exercise, weight transfer activities and sports practise, which was mandatory.
de Villiers & van den Berg, (2012)	South Africa	Bloemfontein	Public schools in which, many of the students are exposed to difficult situations and do not get the psychological help needed.	They received a resilience programme that included 15 sessions, to assist in developing competencies to cope with adversities.
Jordans et al., (2010)	Nepal	Southwest Nepal District	Public schools, in rural areas. Where mental health resources are scarce and students are struggling mentally	The Classroom-based intervention, which lasted 5 weeks. It included 15 sessions of 60 minutes. CBI is based on creative expressive and experiential therapy
Jegannathan et al., (2014)	Cambodia	Takhmau	Public schools, where the educational system is flawed and students come from poor families with little guidance.	The intervention was about equipping students with life skills to make good life choices and, reduce risky behaviour
Karam et al., (2008)	Lebanon	6 Different villages	Public Schools, looking to assist students who have been exposed to war and help them cope with the trauma experienced	The intervention took place over 12 days , lasting 60 minutes long and consisting of different strategies such as problem solving, role playing, and cognitive restructuring.
Kumakech et al., (2009)	Uganda	Mbarara District	Public schools, looking at orphans who lost their parents and are potentially living with Aids	The peer-group support interventions was adapted from psychosocial methodologies. It involved 16 psychosocial exercises implemented over 10 weeks, lasting 60 minutes. It aimed at raising self-esteem and helping students who were struggling.
Leventhal et al., (2015)	India	Patna District	Public schools, where girls experience poor outcomes in health, education and living experiences.	The intervention was a resilience curriculum consisting of 23 sessions lasting 60 minutes and covering different topics such as strengths, problem solving, coping skills and more
Rivet-Duval et al., (2011)	Mauritius	N/A	Public schools, looking to assist students that come from poor families who are dealing with depression.	The RAP-A programme is manualized group treatment, involving 11 weekly sessions lasting 60 minutes. It included cognitive- behavioural and interpersonal approaches covering a variety of topics.
Srikala & Kishore, (2010)	Bangalore	Chennapatna	Public schools, looking to assess the impact of life skills education programme on adolescents who come from rural districts.	It was a life skills programme intervention implemented in 3 phases over a period of time that lasted 1 year, which involved about 16 sessions and were followed up.

3.2. Treatment effects

Two articles Karam et al., 2008 and Leventhal et al., 2015 did not provide data amenable to meta-analysis. One article included two study populations and thus, ten datasets were available for meta-analysis, which were grouped according to four domains, arising out of the mental health issues from the ten papers.

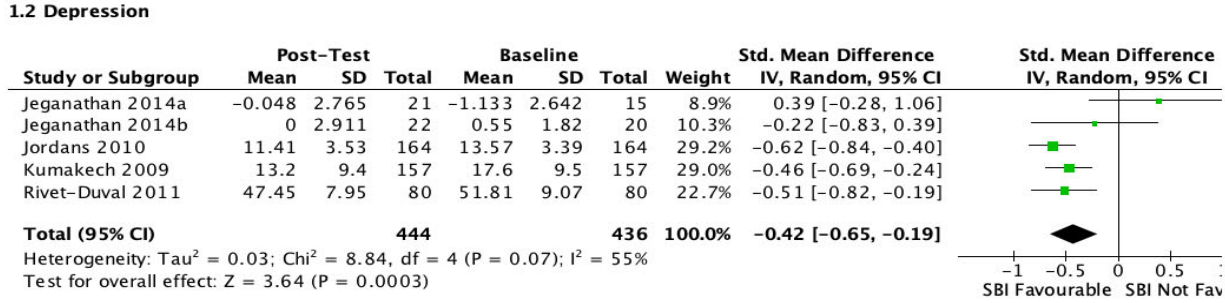
3.2.1. Anxiety

A meta-analysis of four of the 10 studies which considered anxiety present evidence for the effectiveness of school-based interventions in reducing anxiety among adolescents (n= 459 participants ; SMD, -0.40 (95% CI, -0.62; -0.17); I^2=56%). These results indicated that school-based interventions such interventions would be beneficial in reducing anxiety.



3.2.2. Depression

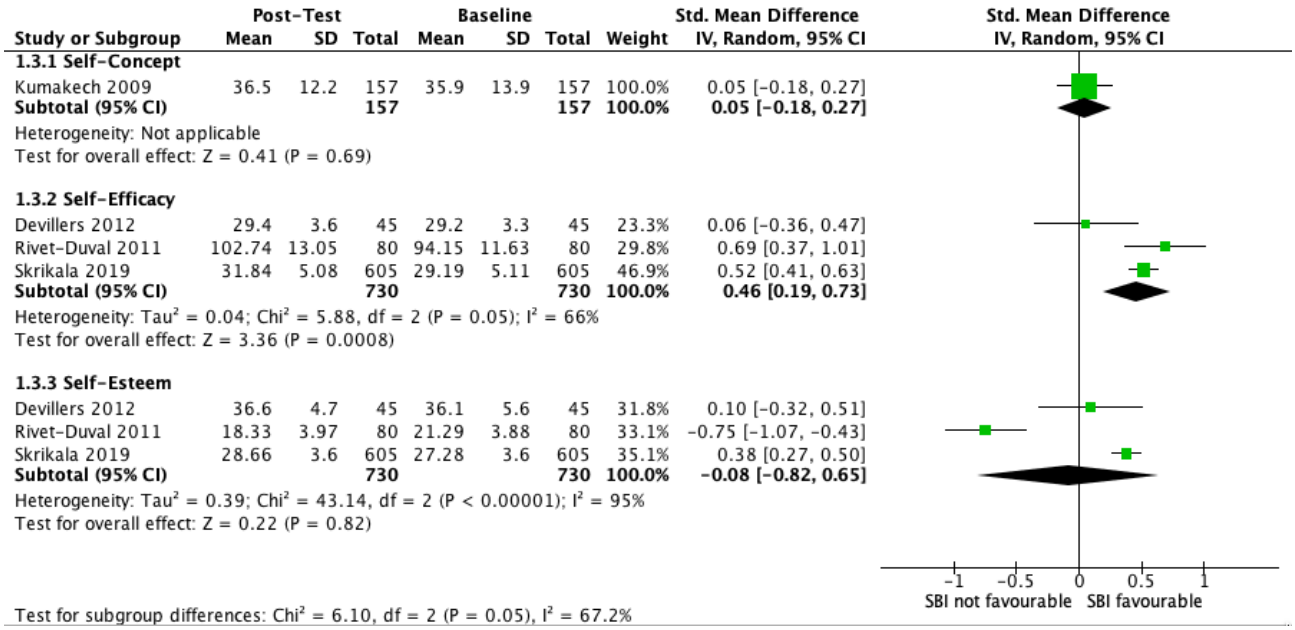
Study results showed school-based interventions were favoured in helping to reducing depression (n= 444 participants (4 Studies); SMD, -0.42 (95% CI, -0.65; -0.19); I^2=55%). These results indicated that school-based interventions such interventions would be beneficial in helping to treat adolescents suffering from depression or depression like symptoms. .



3.2.3. Sense of self-worth

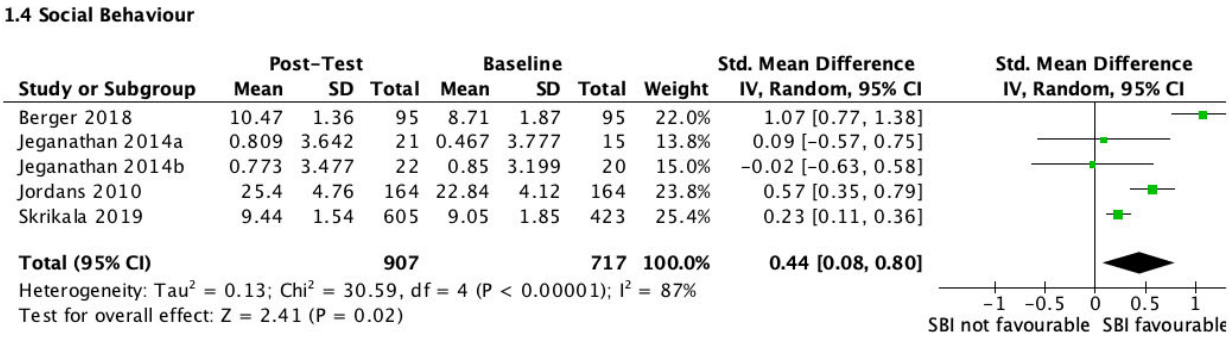
Under the domain of "Sense of self-worth", we considered three subgroups viz, self-concept which can also be described as self-esteem and self-efficacy. A single study failed to present evidence for the effectiveness of school-based interventions in improving self-concept (SMD, 0.05 (95% CI, -0.18,0.27); 1 study, pre-post-test design, n=157) or self-esteem (SMD, -0.08 (95% CI, -0.82; 0.65); I^2=95%); 2 studies, pre-post-test design, n=125). These results indicated that school-based interventions did not help in increasing adolescents self-concept/self-esteem.

However, regarding self-efficacy, adolescents exposed to school-based interventions showed improved scores (SMD, 0.46 (95% CI, 0.19;0.74); I^2=66%); 2 studies, pre-post-test design, n=125 participants). These results indicated that school-based interventions did have a positive effect on increasing adolescent self-esteem.



3.2.4. Social Behaviour (4 Studies)

Study results showed school-based interventions had a positive effective on a social behaviour, meaning how one behaves, interacts with others and their mannerisms (SMD, 0.44 (95% CI, 0.08; 0.80; I^2=87%); 2 studies, pre-post-test design, n=259 participants; 2 studies, Case/Control design, n=1106 participants)



3.3. Risk of bias for all included studies

Amongst the RCTs, lack of reporting made assessment challenging as regards allocation concealment and blinding (Figure 6). Low levels of risk of bias was found for the remaining domains.

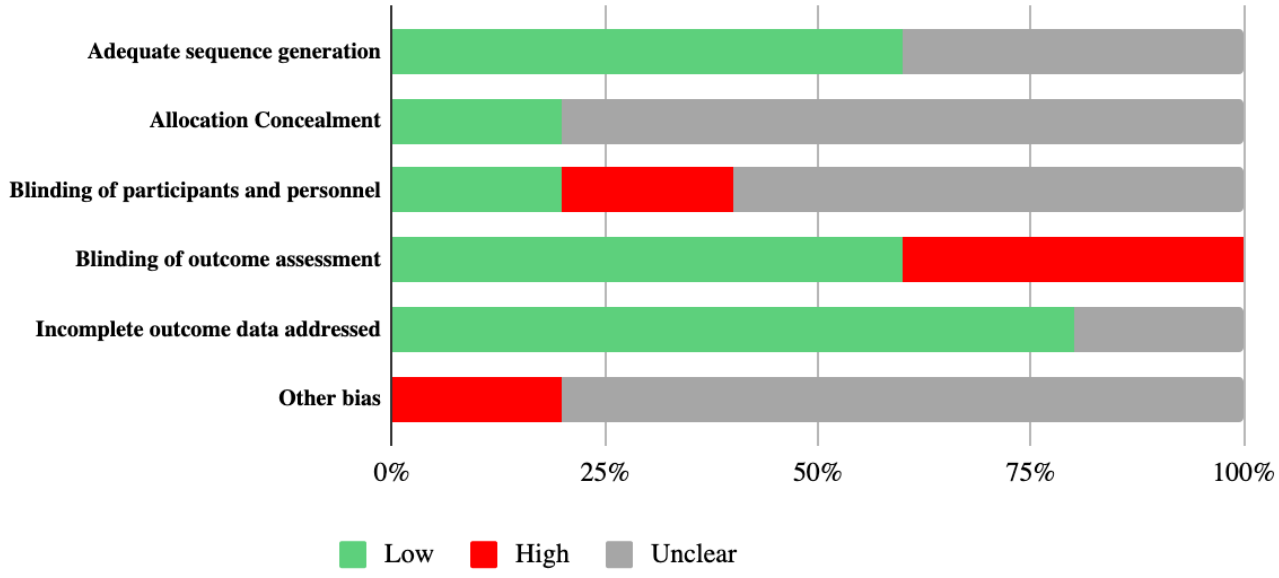


Figure 6. Criteria for judging risk of bias in RCTs

For the ITSs, bias was generally assessed as being of low risk (figure 7).

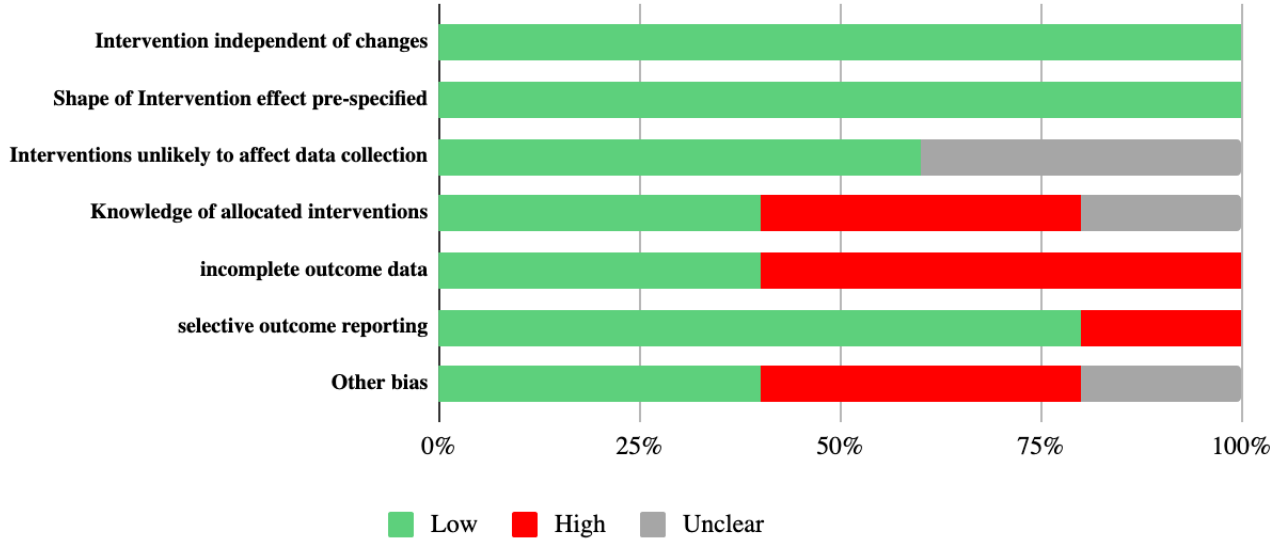


Figure 7. Risk of bias assessment for included ITS studies

3.4. Effects of Heterogeneity

We assessed the percentage scores of the I^2 test as a measure of variability in the effect sizes across the school-based interventions for AMH in each subgroup analysis that was present. There were substantial heterogeneity ranging from 55% to 95%. However, when doing a sensitivity analysis for anxiety, it showed that by removing Berger et al., 2018 from the pooled analysis it reduced the heterogeneity to 0%, however, it still indicated that the result is favourable towards school-based interventions in treating anxiety -0.33[-0.48; -0.19]. The same sensitive analysis was done for depression and when removing Jegnathan et al.,2014 it also reduced the heterogeneity to 0%, but the results did not change much and still favoured school-based interventions in dealing with adolescent depression -0.52[-0.60; -0.38].

4. Discussion

4.1. Main findings

This systematic review found evidence for the effectiveness of school-based interventions in LMICS for dealing with adolescent mental health and wellbeing across three mental health domains viz., anxiety, depression, and social behaviour. However, evidence was found only for the effectiveness of SBI programmes for the subcategory of self-efficacy, and not for self-esteem and self-concept. AMH is a neglected issue and even though there is evidence on AMH interventions and services, there are very few studies that address the effectiveness of school-based interventions for AMH. This review is one of the first to evaluate the effectiveness of school-based interventions on dealing with AMH in a school based setting.

The ten studies were from LMICs, and focused on students from poor socioeconomic environments who have suffered adverse circumstances such as war, trauma, parents dying, violence and extreme poverty. These circumstances were a contributing factor to the developmental struggles and psychological issues faced by children and adolescents when exposed. Furthermore, the lack of funding and resources, as well as parents being unable to provide their children with the necessary psychological care was the motivation to try implement school-based interventions. Thus, the purpose behind this review was to see how effective is school-based interventions in dealing with the mental disorders being experienced by adolescents.

In ten articles selected for inclusion in the review, four adolescent mental disorders predominated which included anxiety, depression, poor sense of self-worth and social behaviour. These remain common among the majority of adolescents and have the potential to hinder the adolescent in all aspects. The interventions and programmes developed were funded by university grants and foundations focused on promoting healthcare and schools for the betterment of children and adolescents. All studies received ethical clearance and consent forms were signed by either a parent or a legal guardian. This study highlighted the importance of early intervention for adolescents and the need for school-based interventions to ensure students get the help they require for their mental and physical well-being.

Adolescence is a vulnerable developmental stage for most adolescents and is often characterised by high demands and pressures, both from school and home (Anyan, & Hjemdal, 2016). Due to the complex world we live in adolescence face stressful life events and traumas, which impacts their mental, social and emotional wellbeing negatively (Anyan & Hjemdal, 2016). The most

common mental disorders experienced by children and adolescents are anxiety and depression, and these often occur together and have the potential to be debilitating, physically and psychologically (Garber & Weersing, 2010). Unfortunately for many adolescents living with mental disorders they often go undiagnosed and untreated, which impacts them negatively in their adulthood (Anyan & Hjemdal, 2016). This study showed that although school-based interventions cannot eliminate anxiety and depression, it can help in reducing the mental disorders and assist in meeting the adolescents needs to help them cope better with the pressures of life, both at school and home.

Many adolescents struggle with low self-esteem and low self-efficacy for many reasons, which include having an unsupportive upbringing, social media that often leads to comparison and self-doubt, body dysmorphia and the feelings of never being good enough (Woods & Scott, 2016) Studies indicate that adolescents with low self-esteem struggle academically and socially, because they lack the required confidence when trying to complete a task or interact with their peers (Wong, Lau, & Lee, 2012). Whereas, self-efficacy is not only having the ability, but believing in one's ability to take control over their behaviour, emotions and work ethic (Wong et al., 2012). The results in the study confirmed that school-based interventions are effective in improving self-efficacy which is vital in adolescent development and growth. However, the findings were surprising for self-esteem as it suggested that school-based interventions were not effective in raising self-esteem. A study conducted by Woods & Scott, 2016, suggest that the reason therapy is often not effective is because there are many factors that contribute to being confident and having a positive self-esteem, such as an individual's home environment, what an adolescent is exposed to and the company they keep. The results suggest that boosting self-esteem is complex due to the many factors that influence it.

Schools have great potential to provide a safe and natural environment for dealing with AMH, as adolescents spend a substantial amount of time in school (Stallard, 2013). Despite the primary focus of schools being on academic performance and achievement, attending to the mental and emotional health of students is key, as it not only influences their well-being, but also their educational attainment (Stallard, 2013). The analysis of the studies confirmed the hypothesis that school-based interventions, especially cognitive behavioural approaches, stress reduction and coping skills, are effective in reducing anxiety and depression in adolescents. These interventions are known to improve a student's performance academically, their attendance and the life choices they make, as well as, assist in improving the social behaviour of adolescents ((Caprara et al.,

2014). Furthermore, adolescents receiving school-based interventions were found to have reduced physical aggression, more pleasant to teach and considerate of their peers (Caprara et al., 2014). A systematic review conducted by Das et al., 2016 confirmed the findings that school-based interventions are valuable in helping adolescence who are struggling with mental disorders, especially in the short-term. However, it also highlights that most of the findings are from high-income countries and there is a need for more quality evidence from low-middle income countries, as well as long-term follow ups to ensure its effectiveness and sustainability of school-based intervention and prevention to accurately report on the effectiveness of such services. .

Overall, this review supports the effectiveness of school-based interventions in addressing AMH in LMICs and schools. However, it was not considered effective in improving self-esteem which could be due to a variety of reasons such as puberty, the transition from primary school to high school, which can result in vulnerability and the decrease in self-esteem levels (Bos, Muris, Mulkens, & Schaalma, 2006). Another reason includes the adolescents early development, which includes his or her upbringing and the role of the parents. Furthermore, studies show the type of parenting style or lack thereof can have a positive or negative impact on a child's self-esteem (Milevsky, Schlechter, Netter, & Keehn, 2007). For example, a healthy authoritative parenting approach can boost a child's self-esteem, allow the child to develop resilience and autonomy because the parent or parents are present and interested in their child's life (Milevsky et al., 2007). Whereas a permissive or neglectful approach can lead to low self-esteem and poor autonomy (Milevsky et al., 2007). There is a link between parent-child relationships and self-esteem, which can either have a positive or negative impact on a child's self-esteem leading into adolescence (Furnham & Cheng, 2000). These findings corroborate with the body of evidence that suggests parents play a vital role in boosting children's self-efficacy and self-esteem. A systematic review conducted by Hohlfeld, Harty & Engel, 2018 confirm that if parents have a healthy level of self-efficacy, it can result in developing a health self-esteem and level of self-efficacy in adolescents. Thus, highlighting a potential reason for school-based interventions not being successful in boosting self-esteem. The reason being is that children have to go back to their home environment and if the environment is volatile or unsupportive the positive changes from the programmes may be undone (Furnham & Cheng, 2000). These results thus indicate that more effective school-based interventions dealing with self-esteem need to be devised and developed for the betterment of adolescents living in LMICS self-worth and wellbeing.

It is important to understand that it is not a one size fits all approach, different interventions are required when treating mental health issues (Bos et al., 2006). As previously mentioned, the context and circumstances faced by children and adolescents living in LMICs is often adverse. These adverse conditions can be challenging when it comes to trying to address the issues being experienced by the individual and the settings they find themselves in, such as school and peer interaction. Thus, skilled team of health professionals, including teachers and parent cooperation with sufficient resources is needed, in order to not only treat, but ensure school-based interventions are efficient, accessible and sustainable. Fortunately, all parents, and the schools involved were supportive of the school-based interventions being implemented, as they knew it would not only benefit the individuals psychologically and academically, but equip the school with necessary skills needed to ensure support was given to the students struggling.

4.2. Risk of bias and heterogeneity of studies

The risk of bias was evaluated within all 10 studies according to the risk of bias criteria assessment tool of Cochrane Effective Practice and Organisation of Care (EPOC) (EPOC, 2017). The assessment indicated that some studies potentially were at high risk of selection bias, including allocation concealment, performance bias and detection bias due to the under-reporting of tnformation. These biases should be carefully considered in the design and implementation of future studies involving school-based interventions. For the primary outcome measures there was considerable heterogeneity amongst studies evaluating anxiety, depression and self-efficacy and substantial heterogeneity in self-esteem and social behaviour. We acknowledge the difficulty in assessing risk of bias due to some of the studies' poor reporting of information. However, after conducting a sensitivity analysis it was discovered that even though the heterogeneity decreased, school-based intervention was still found to be favourable and the statistical data did not change much. We acknowledge that it is difficult to deal adequately with heterogeneity, but there are various reasons explaining why considerable levels of heterogeneity can be found. These include clinical differences, methodological issues with randomisation, as well as, adopting different measures of risk and various bias (Fletcher, 2007). On reviewing the studies many used different treatment measures, sample sizes were not equal and how findings were measured varied, thus all contributed to the considerable heterogeneity found. And may have also attributed to the high risk of bias presented in this study. Furthermore, these findings have highlighted the need for more evidence-based studies dealing with school-based mental health services, especially in LMICs.

4.3. Strengths of this review

We used robust methods in the preparation of this review. This review used an extensive search strategy, seeking to include published and unpublished studies, thus limiting selection bias. Another strength of the study was that the search terms did not limit certain LMIC regions or countries. We included 10 peer-reviewed studies that met our inclusion criteria for the review, of which all studies were conducted in various LMICs including South Africa, Uganda, Nepal, Tanzania, Cambodia, Lebanon, Chile, India, Bangalore and Mauritius. It also only analysed randomised trials, thus, interventions and control arms were interchangeable. We included all forms school-based interventions available for AMH, rather than selecting specific programmes, and concentrated on specific domains to ensure focus. RCTs and ITSs studies were the design of choice, given their attention to rigour in general. We included PRISMA guidelines to assess risk of bias for all included studies (Moher, 2009).

4.4. Limitations and implications for practice and research

We acknowledge a number of limitations. The presence of bias in studies due to lack of allocation concealment, limited blinding and lack of generalisability may impact the selected studies' quality and validity. Therefore, it is important that future studies try to diminish risks of bias as much as possible, by describing their methods and procedures more adequately (Tellegen & Sanders, 2013). Another limitation, is that a full meta-analysis could not be undertaken due to the fact that two studies were not amenable to meta-analysis and non-English studies were excluded from the systematic review. Nevertheless, this review provides evidence for the potential of schools to provide AMH, especially in LMICs. Although this was not the focus of this review, it would indeed be complemented by future studies documenting the experiences of adolescents who have received school-based interventions in schools in LMICs.

5. Conclusion

The results of the current systematic review provides evidence to suggest that school-based intervention programmes have a positive impact in reducing anxiety and depression, and have a positive effect on self-efficacy and social behaviour. However, they do not have a positive effect on boosting self-concept and self-esteem. Within our context in South Africa and its current policies, this review provides motivation for more funding and human resources to allow for implementation of school-based interventions to address AMH.

Contributors

CA and Maylene Shung-King conceptualised the study and all authors contributed to the design of the protocol. CA and AH selected the articles and extracted and interpretation of the data. CA performed the analysis and final write up under the critical guidance of ME. CA wrote the first draft. All authors critically revised successive drafts of the manuscript and approved the final version.

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7. Appendices

7.1 Appendix A : Search Strategy (PubMed)

#19	#15 AND #16 AND #17 AND #19
#18	#12 OR #13
#17	#8 OR #9 OR #10 OR #11
#16	(#5 OR #6) AND #7
#15	#3 AND #4
#14	#1 AND #2
#13	(Afghanistan OR Albania OR Algeria OR ""American Samoa"" OR Angola OR Armenia OR Azerbaijan OR Bangladesh OR Belarus OR Byelarus OR Belorussia OR Belize OR Benin OR Bhutan OR Bolivia OR Bosnia OR Botswana OR Brazil OR Bulgaria OR Burma OR ""Burkina Faso"" OR Burundi OR ""Cabo Verde"" OR ""Cape Verde"" OR Cambodia OR Cameroon OR ""Central African Republic"" OR Chad OR China OR Colombia OR Comoros OR Comores OR Comoro OR Congo OR ""Costa Rica"" OR ""Cote d'Ivoire"" OR Cuba OR Djibouti OR Dominica OR ""Dominican Republic"" OR Ecuador OR Egypt OR ""El Salvador"" OR Eritrea OR Ethiopia OR Fiji OR Gabon OR Gambia OR Gaza OR Georgia OR ""Georgia Republic"" OR Ghana OR Grenada OR Grenadines OR Guatemala OR Guinea OR ""Guinea Bissau"" OR Guyana OR Haiti OR Herzegovina OR Hercegovina OR Honduras OR India OR Indonesia OR Iran OR Iraq OR Jamaica OR Jordan OR Kazakhstan OR Kenya OR Kiribati OR Korea OR Kosovo OR Kyrgyz OR Kirghizia OR Kirghiz OR Kyrgyzstan OR ""Lao PDR"" OR Laos OR Lebanon OR Lesotho OR Liberia OR Libya OR Macedonia OR Madagascar OR Malawi OR Malay OR Malaya OR Malaysia OR Maldives OR Mali OR ""Marshall Islands"" OR Mauritania OR Mauritius OR Mexico OR Micronesia OR Moldova OR Mongolia OR Montenegro OR Morocco OR Mozambique OR Myanmar OR Namibia OR Nepal OR Nicaragua OR Niger OR Nigeria OR Pakistan OR Palau OR Panama OR ""Papua New Guinea"" OR Paraguay OR Peru OR Philippines OR Principe OR Romania OR Rwanda OR Ruanda OR Samoa OR ""Sao Tome"" OR Senegal OR Serbia OR ""Sierra Leone"" OR ""Solomon Islands"" OR Somalia OR ""South Africa"" OR ""South Sudan"" OR ""Sri Lanka"" OR ""St Lucia"" OR ""St Vincent"" OR Sudan OR Surinam OR Suriname OR Swaziland OR Syria OR ""Syrian Arab Republic"" OR Tajikistan OR Tadzhikistan OR Tajikistan OR Tadzhik OR Tanzania OR Thailand OR Timor OR Togo OR Tonga OR Tunisia OR Turkey OR Turkmen OR Turkmenistan OR Tuvalu OR Uganda OR Ukraine OR Uzbek OR Uzbekistan OR Vanuatu OR Vietnam OR ""West Bank"" OR Yemen OR Zambia OR Zimbabwe)"

#12	(""Deprived Countries"" OR ""Deprived Population"" OR ""Deprived Populations"" OR ""Developing Countries"" OR ""Developing Country"" OR ""Developing Economies"" OR ""Developing Economy"" OR ""Developing Nation"" OR ""Developing Nations"" OR ""Developing Population"" OR ""Developing Populations"" OR ""Developing World"" OR ""LAMI Countries"" OR ""LAMI Country"" OR ""Less Developed Countries"" OR ""Less Developed Country"" OR ""Less Developed Economies"" OR ""Less Developed Nation"" OR ""Less Developed Nations"" OR ""Less Developed World"" OR ""Lesser Developed Countries"" OR ""Lesser Developed Nations"" OR LMIC OR LMICS OR ""Low GDP"" OR ""Low GNP"" OR ""Low Gross Domestic"" OR ""Low Gross National"" OR ""Low Income Countries"" OR ""Low Income Country"" OR ""Low Income Economies"" OR ""Low Income Economy"" OR ""Low Income Nations"" OR ""Low Income Population"" OR ""Low Income Populations"" OR ""Lower GDP"" OR ""lower gross domestic"" OR ""Lower Income Countries"" OR ""Lower Income Country"" OR ""Lower Income Nations"" OR ""Lower Income Population"" OR ""Lower Income Populations"" OR ""Middle Income Countries"" OR ""Middle Income Country"" OR ""Middle Income Economies"" OR ""Middle Income Nation"" OR ""Middle Income Nations"" OR ""Middle Income Population"" OR ""Middle Income Populations"" OR ""Poor Countries"" OR ""Poor Country"" OR ""Poor Economies"" OR ""Poor Economy"" OR ""Poor Nation"" OR ""Poor Nations"" OR ""Poor Population"" OR ""Poor Populations"" OR ""poor world"" OR ""Poorer Countries"" OR ""Poorer Economies"" OR ""Poorer Economy"" OR ""Poorer Nations"" OR ""Poorer Population"" OR ""Poorer Populations"" OR ""Third World"" OR ""Transitional Countries"" OR ""Transitional Country"" OR ""Transitional Economies"" OR ""Transitional Economy"" OR ""Under Developed Countries"" OR ""Under Developed Country"" OR ""under developed nations"" OR ""Under Developed World"" OR ""Underserved Population"" OR ""Underserved Populations"" OR ""Underdeveloped Countries"" OR ""Underdeveloped Country"" OR ""underdeveloped economies"" OR ""underdeveloped nations"" OR ""underdeveloped population"" OR ""Underdeveloped World"" OR ""Underserved Countries"" OR ""Underserved Nations"" OR ""underserved Population"" OR ""Underserved Populations"")"
#11	(Service OR Services OR program OR programs OR programme OR programmes OR prevention OR preventive OR intervention OR interventions OR treatment)"
#10	Mental Health Services [MeSH]
#9	School Health Services [MeSH]
#8	Adolescent Health Services [MeSH]

#7	(""Mental health"" OR ""emotional well-being"" OR ""psychological well-being"" OR ""social well-being"" OR ""mental illness"" OR ""mental illnesses"" OR ""mental disorder"" OR ""mental disorders"" OR ""psychiatric disorder"" OR ""psychiatric disorders"")
#6	Mental Disorders [MeSH]
#5	Mental Health [MeSH]
#4	(School OR schools OR school-based)
#3	Schools [MeSH]
#2	(Adolescence OR adolescent OR adolescents OR teen OR teens OR teenage OR teenager OR teenagers)
#1	Adolescent [MeSH]

7.2 Appendix 2: Risk of Bias assessment

	Study Design	Method of Random Sequence Generation	Allocation concealment	Blinding of participants and personnel	Blinding of outcome assessment	Incomplete outcome data	Other Bias
Berger et al., 2018	RCT	low - we randomly chose (by tossing dice) one school for the study.	Unclear - no mention	low - Trained local psychology students who were blind to the participants' experimental condition administered the questionnaires and assisted students who had comprehension problems.	low - The teachers who implemented the intervention were not present during the administration and the questionnaires were coded to protect the students' confidentiality.	Unclear - No mention	unclear
Bonhauser et al., 2005	Quasi-Experimental Design	High - no explanation given	Unclear - No mention	Unclear - no mention of blinding	High- The same teachers conducted both the intervention and control classes.	Low - Mention how many dropped out of experimental and control. No adverse effects were reported in the control or intervention groups during the year of intervention	unclear

Kumakech et al., 2009	Cluster Randomised Trial	low - Assigning numbers 1-20, picking out of a box	High- no explanation given	High - Unfortunately the self-esteem of control orphans declined from baseline to follow-up. It is possible that the control partici- pants' knowledge of not being chosen for the intervention might have led to a temporary worsening of self-esteem.	low -Although no inter-rater reliability tests were performed for the data collected by interview, the use of a standardized assessment instrument would minimize any tendency towards an interviewer ''effect''.	low - due to two orphans from the intervention and 26 from the control group being lost to follow-up at the time of the follow-up assessment.	A positive Hawthorne Effect
Leventhal et al., 2015	RCT	low - Stratified block randomization was conducted based on school	Higher - no explanation given	High - no explanation given	low - Women from local communities were recruited to serve as program facilitators	low - Loss to follow up was reported and no differences was found on demographic or outcome variables	unclear
Rivet-Dual et al., 2011	RCT	High - no explanation given	High - primary researcher not blinded to group allocation	Unclear	High- Students completed questionnaires supervised by teachers running the program	low - No missing data as all students completed the program	Unclear

Appendix B.2

	Study Design	Intervention independent of other changes	Shape of the intervention effect pre-specified	Intervention unlikely to affect data collection	Knowledge of the allocated intervention adequately prevented during the study	incomplete outcome data adequately	Selective outcome reporting bias
de Villiers et al., 2012	Pre-Post-test	low - they had a comparative group to assess confounders	low - Prespecified	unclear	Unclear	low - Did posttest right after	low
Jordans et al., 2010	Pre-Post-test	low - they had a comparative group to assess confounders	low - prespecified	low	High - researchers not blinded	High - Did posttest 2 months later	low
Jegannanthan et al., 2014	Pre-Post-test	low - they had a comparative group to assess confounders	low - prespecified	low	unclear	High - did posttest and follow up different days	low
Karam et al., 2008	Pre-Post-test	low - they had a comparative group to assess confounders	low - prespecified	low	low	high - Did not do posttest right after	low
Srikala et al., 2019	Pre-Post-test	low - they had a comparative group to assess confounders	low - Prespecified	unclear	low	low	high

Appendix 3 : Submission Guidelines

Prepared for

African Journal of Disability

An original article provides an overview of innovative research in a particular field within or related to the focus and scope of the journal, presented according to a clear and well-structured format.

Word limit	7000 words (excluding the structured abstract and references)
Structured abstract	250 words to cover a Background, Objectives, Method, Results and Conclusion
References	60 or less
Tables/Figures	no more than 7 Tables/Figure
Ethical statement	should be included in the manuscript
Compulsory supplementary file	ethical clearance letter/certificate