BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-037237
Article Type:	Protocol
Date Submitted by the Author:	24-Jan-2020
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Keywords:	MENTAL HEALTH, PUBLIC HEALTH, QUALITATIVE RESEARCH

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Adolescent mental wellness: A systematic review of instruments measuring general mental health and well-being.

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Word count: 2511

ABSTRACT

Introduction: The promotion of mental health well-being among global adolescent populations is of great public health and social significance. This is particularly true for adolescents living with chronic illnesses as studies have shown that these populations are at higher risk for experiencing challenges to their mental health. However, while there is a recognised need for age and culturally appropriate interventions to promote mental well-being and prevent mental health challenges, less is known about the availability of relevant measures of mental well-being among adolescents. To this end, we will conduct a systematic review to identify measures of mental well-being and to assess the content, psychometric properties and relevance to adolescent populations

Methods and analysis: The systematic review methodology will be guided by the seven steps proposed by Eggar, Davey and Smith. Documents will be sourced from electronic databases (Academic Search Complete, ERIC, Medline, CINAHL, PsyArticles, SocIndex, and Sabinet). All documents will be exported to Mendeley and two reviewers will independently screen the titles, abstracts and full texts for inclusion. Any discrepancies will be resolved by a third party. We will include studies published in all languages from 2000-2020, that utilise an instrument(s) that measure mental well-being among adolescent populations. Studies reporting on clinically significant mental illnesses or disorders will be excluded. A descriptive meta-synthesis approach will be used to identify and describe the mental health instruments used among adolescent populations, and to report on the psychometric properties.

Ethics and dissemination: Ethical approval is not required. The results of this review will be disseminated through a peer-reviewed publication as well as conference presentations.

STRENGTHS AND LIMITATIONS OF THE STUDY

- This study contributes to the knowledge around the available and appropriate measures used to measure adolescent mental well-being, which are necessary to develop interventions and inform health policy.
- The search strategy comprises of seven electronic databases to search for peer-reviewed and grey literature.
- A descriptive meta-synthesis approach will be used to describe the mental health well-being components being measured and to assess the psychometric properties of the measurements in the study.
- The limits of this study are related to the time span of the search strategy (2000-2020).

INTRODUCTION

In recent years, mental health has been identified as a key public health concern, particularly for children and adolescents [1, 2]. According to the World Health Organisation (WHO) [3] mental health conditions account for 16% of the global burden of disease and injury for adolescents aged 10-19 years, with depression being identified as the leading cause of disability and illness among this population. Evidence suggests that half of all lifetime mental disorders will start during adolescence, yet the majority of these will go unrecognised and untreated [4]. This is concerning as adolescence represents a crucial period of development, where exposures, behaviours and experiences can set the trajectory that will influence an individual's mental and physical health later in life [3, 4]. Thus improving adolescent mental health has become a global priority as effective interventions during adolescents protect public health investments in child survival and early childhood development, and ultimately, ensures the health and development of the next generation [5].

Studies exploring mental health problems among children and adolescents have found that there are various attitudinal, stigma-related, and structural barriers to accessing mental health services. Findings from a study suggested that 80 percent of children and adolescents who are in need of mental health services did not receive any [6]. These barriers are particularly apparent among adolescents living with a chronic disorder or disease. According to the WHO the incidence and prevalence of chronic conditions is rising in most developed and developing countries and will constitute the main cause of death for children and adolescents by 2020 [7]. As such, it is necessary to consider mental health challenges in the context of adolescents living with chronic conditions.

Research has demonstrated that while children and adolescents with chronic health conditions are at increased risk for developing mental health problems, the overall mental well-being of chronically ill youth is largely determined by several factors including; the severity of the disease, the amount of treatment required and the psychological and social complications that may be associated with such conditions [6, 7]. The variable nature of these factors have resulted in contradictory findings in different research studies. For example, findings from a meta-analysis review found that risk of developing mental health problems can vary across disease groups, with younger people with chronic conditions more likely to display internalising symptoms than those in healthy control groups. Additionally, other studies have found gendered differences with chronically ill girls more likely to demonstrate emotional health problems than chronically ill boys when compared to healthy control groups [7]. Findings from a South African study comparing psychological vulnerabilities among

perinatally and behaviourally infected HIV positive adolescents found that perinattaly infected adolescents were more likely to be ART adherent and retained in care while behaviourally infected adolescents were more likely to be depressed, report internalised stigma and express suicidal ideation [8]. These findings suggests that adherence, retention in care and mental health problems among ALHIV are differentially influenced by the mode of infection [8]. As such, tailored interventions are recommended to address the differences between these groups to ensure optimal health outcomes. However, the differences between these two groups may also be influenced by external circumstances related to the care received rather than factors related to the disease. For example, perinatally infected adolescents receive support and build a trusting relationship with their healthcare worker while being in paediatric care. Behaviourally infected adolescents may not have the similar experiences in the healthcare system.

In the context of prioritising adolescent mental health, prevention and health promotion programmes have been identified as key strategies to help adolescents thrive [3]. In line with the United Nations (UN) Sustainable Developmental Goal 3 (SDG 3), which aims to promote well-being for all ages, many countries and organisations are aiming to improve the development of age appropriate interventions to provide psychosocial support and services to adolescents. For example, the *Every Child Matters* United Kingdom government initiative increased investment in child and adolescent mental health services (CAHMS) to increase access to appropriate services. Additionally, the South African *National Adolescent and Youth Policy 2017-2022* has identified mental health as a priority area and has committed to developing specific programmes to promote mental health among adolescents.

Despite the increased focus on adolescent mental health on the global health agenda, there is a lack of evidence concerning mental health conditions among adolescents, especially in low- and middle-income countries (LMIC). According to Vreeman, McCoy and Lee [2], the lack of information about adolescent mental health in LMICs may be partially related to the lack of validated instruments for these contexts. To address this, UNICEF has launched a project to develop a measure of mental health among adolescents at the population level [4]. This is of great significance as it will provide valuable evidence regarding the prevalence of mental disorders, inform policy makers and healthcare workers, and guide intervention and treatment programmes.

However, the majority of the research focused on adolescent mental health adopts a pathological view by focusing on mental health disorders such as psychiatric disorders, general mental health disorders, emotional and behavioural problems and psychological distress [2].

Social scientists have argued that people who are free of mental illness are not necessarily mentally healthy and productive [9]. Studies have shown that while adolescents may experience multiple physical, social and emotional changes which can negatively impact their mental well-being, providing psychosocial support and mental health promotion to support positive mental health can protect against psychopathology [3, 9]. For example, a longitudinal study in Australia found that one third of boys and nearly half of girls in a secondary school experienced an episode of depressive and anxiety symptoms. However, these episodes did not follow into their adult life thereby suggesting that interventions may prevent morbidity in later life [10]. As such, mental health should be viewed as more than the absence of mental illness. To this end, the WHO has adopted the complete state model to define mental health as 'a state of wellness in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community' [11].

It is argued that the development of valid instruments to measure mental health are dependent on the ways in which mental health is conceptualised. Traditionally, clinical psychologists focused more on the pathogenic side of mental health by describing and treating mental disorders. As such, measures of mental health have mostly focused on lower levels of illness symptoms as representative of mental well-being[12]. Measurements of mental health play a significant role in policy and intervention development as these are used to provide empirical evidence regarding the effectiveness of programmes aimed at improving adolescent mental well-being. Focusing primarily on measuring low level symptoms of a disorder may result in ceiling effects by limiting the range of scores in a positive direction. Consequently, this limits the opportunity to measure the full range of mental health well-being [12]. Measuring mental health among adolescents necessitates the use of age-appropriate and culturally valid instruments that can capture improvements in mental well-being where variances in general mental health can be accurately measured [12, 13].

More research focused on emphasising the healthy psychosocial development of adolescents that moves beyond identifying and addressing social and psychological problem trajectories is needed to support the development of psychosocial support programmes and interventions for adolescents who do not qualify for a mental illness diagnosis, yet experience challenges to their mental wellness [14]. These interventions should be theory driven and accessible within the local culture without placing strain on healthcare systems, especially in resource limited contexts [10, 15].

Rationale for the Review

To identify currently available mental health well-being instruments for adolescents aged 10-19 years to describe the content and review the psychometric properties of the instruments. The findings of this review will provide evidence-based knowledge regarding what mental health instruments are being used in research focused and adolescents, and how reliable and valid these instruments are.

METHOD AND DATA ANALYSIS

This section describes the methods that will be used in conducting the systematic review. The seven steps described by Eggar, Davey and Smith [16] will be used to guide the systematic review process. These steps are; 1) *formulate the review question;* 2) *define the inclusion and exclusion criteria*; 3) *develop a search strategy*; 4) *study selection*; 5) *assess the quality of studies*; 6) *extract data*; and 7) *analyse or synthesis the data*.

Review Question

The following question will guide the review;

1) What instruments are being used to measure/describe mental health outcomes among adolescents?

2) What are the psychometric properties of instruments being used to measure/describe mental health outcomes among adolescents?

Inclusion and Exclusion Criteria

Inclusion criteria for the search are as follows; 1) Studies published in peer reviewed journals or grey literature; 2) the sample included adolescents aged 10-19; 3) the measure used was a self-report measure of general mental health and well-being; 4) quantitative and mixed methods studies; 5) studies published in the English language and 6) studies from all countries will be included. Studies will be excluded based on the following criteria; 1) review papers or case studies; 2) Screening tools for mental disorders or measures that are disorder/symptom specific; 3) book chapters, conference proceedings or dissertations; 4) and measures developed specifically for people with learning disabilities or Autism Spectrum Disorders.

Search Strategy

The search strategy was developed after consultation with the faculty librarian. The search strategy is broad to include all research articles that use a psychological or psychometric instrument to measure mental health outcomes among adolescents. A systematic database search will be performed using Ebscohost (Psycharticles, Academic Search Premier),

Cumulative Index of Nursing and Allied Health Literature (CINAHL), Educational Resource Information Center (ERIC), Medical Literature Analysis Retrieval System Online (MEDLINE) and Sabinet. The list of key words have been identified for the search strategy; "((adolescen* OR teenage* OR young people OR youth) [AND] (psychological instrument OR measurement OR tool) [AND] (mental health OR mental well-being OR psychological well-being) [AND] {psychometri*; reliability*; validit*)).

Study Selection

Studies were included in the scoping review using the PICOT mnemonics for reviews. These included;

Patient population	Adolescents aged 10-19 years
Intervention or Interest	Reviewing the psychometric properties of psychological tools or instruments which measure general mental health and well-being among adolescents
Comparison interventions	Not applicable
Outcomes	
Primary outcomes	Psychometric properties of instrument/measure
Secondary outcomes	(1) Mental health, (2) psychological well-being
Time	2000–2019
Other considerations	Geographical area: Global
	Age limits: Adolescents or young adults in the age group 10 – 19 years.
	Language: All language.
	Study designs: Quantitative method or mixed methods.

The above mentioned criteria and search strategy will be used to search the databases. The screening and reporting of the review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysess (PRISMA) guidelines. The number of hits for each database will be recorded and the citations will be exported to Mendeley citation software. Following this, the researcher will review all the titles and abstracts to assess which articles are appropriate for inclusion. The full-text articles of the included abstracts will be downloaded and reviewed to determine which articles should be included for the final assessment [16, 17].

Quality Assessment

Evaluating the quality of a study is an essential step in systematic reviews as it ensures validity and reliability of findings [17]. Therefore each of the potentially relevant articles to be included in the review will be evaluated using the SFS scoring system (version D). Version D of the SFS is an appropriate tool to use for assessing the quality studies in this review as it will

allow the researcher to assess the appropriateness of the methodological elements of the included studies, such as the psychometric properties of the instruments and the theoretical and operational definitions used to define constructs. The SFS version D scoring systems contains 29 questions covering the following sub-sections; 1) *purpose of the measure* which includes questions regarding the purpose, target group and theoretical dimensions of the measure*;* 2) *methodological rigour* which focuses on the design, sample, data collection and analyses; 3) and *general considerations* which includes questions regarding the type of publication. The researcher will score each of the included studies using the scoring system and presented in tabular form to be reviewed by the supervisor. The overall quality of the study is based on the score it obtained and will be categorised as either weak (0-25%), moderate (26-50%), strong (51-75%), or excellent (76-100%). Only articles with a score of 51% and above will be included in the analysis.

Data Extraction

The researcher will extract the sample characteristics, geographic location, mental health concepts, psychometric properties of the instrument, type of instrument and the format of the instrument and the results of the instrument.

Data Synthesis

A descriptive meta-synthesis approach will be used to identify and describe the mental health instruments used among adolescent populations, and to report on the psychometric properties. The synthesis of information regarding each instrument will be presented in tabular form in which the included articles will be ranked based on the methodological rigour scores of the quality assessment [18]. This will allow the researcher to assess whether the research design used reflects the aims and objectives of a particular study and whether the conclusions are supported by the data [17, 18]. Additionally, the data extracted from each of the included articles will be presented in the table to clearly present a summary of the core findings.

Patient and Public Involvement

As this is a protocol for a systematic review, no patients or public were involved in the design or research of this study.

CONCLUSION

Improving adolescent mental well-being has been identified as a public health priority. This is of particular concern among adolescents living with a chronic illness or condition. To add to the body of knowledge regarding adolescent mental health, this review aims to search for and evaluate research articles using mental health instruments among adolescents to determine the

availability and reliability of such instruments. This is necessary as there is a perceived lack of culturally valid and appropriate instruments to use among adolescent populations.

Author's contributions: ZO conceived the idea, developed the research question and study methods and contributed meaningfully to the drafting and editing; she also approved the final manuscript. BVW aided in developing the research question and study methods, contributed meaningfully to the drafting and editing, and approved the final manuscript.

Funding: This work was supported by the National Research Foundation, grant number [118160]

Competing interest: None declared.

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BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2020-037237.R1
Article Type:	Protocol
Date Submitted by the Author:	27-May-2020
Complete List of Authors:	Orth, Zaida; University of the Western Cape, School of Public Health van Wyk, Brian; University of the Western Cape, School of Public health
Primary Subject Heading:	Public health
Secondary Subject Heading:	Mental health
Keywords:	MENTAL HEALTH, PUBLIC HEALTH, QUALITATIVE RESEARCH

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ABSTRACT

Introduction: The promotion of mental health well-being among global adolescent populations is of great public health and social significance. This is particularly true for adolescents living with chronic illnesses as studies have shown that these populations are at higher risk for developing mental health problems. There is vast recognition of the need for age and culturally appropriate interventions to promote mental well-being and prevent mental health problems. In stark contrast, there is a dearth of relevant measures of mental well-being for adolescents. Our proposed systematic review aims to identify measures of mental well-being and to assess content, psychometric properties and relevance to adolescent populations.

Methods and analysis: The systematic review methodology will be guided by the seven steps proposed by Eggar, Davey and Smith. Documents will be sourced from electronic databases (Academic Search Complete, ERIC, Medline, CINAHL plus, PsyArticles, SocIndex, and Sabinet). All documents will be exported to Mendeley and two reviewers will independently screen the titles, abstracts and full texts for inclusion. Any discrepancies will be resolved by a third party. We will include studies published in all languages from 2000-2020, that utilise an instrument(s) that measure mental well-being among adolescent populations. Studies reporting on clinically significant mental illnesses or disorders will be excluded. A descriptive meta-synthesis approach will be used to identify and describe the mental health instruments used among adolescent populations, and to report on the psychometric properties.

Ethics and dissemination: Ethical approval is not required. The results of this review will be disseminated through a peer-reviewed publication as well as conference presentations.

The protocol has been submitted to Prospero and is currently under review [186707]

STRENGTHS AND LIMITATIONS OF THE STUDY

- This study contributes to the knowledge around the available and appropriate measures used to measure adolescent mental well-being, which are necessary to develop interventions and inform health policy.
- The search strategy comprises of seven electronic databases to search for peer-reviewed and grey literature.
- A descriptive meta-synthesis approach will be used to describe the mental health well-being components being measured and to assess the psychometric properties of the measurements in the study.
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INTRODUCTION

In recent years, mental health has been identified as a key public health concern, particularly for children and adolescents [1, 2]. According to the World Health Organisation (WHO) [3] mental health conditions account for 16% of the global burden of disease and injury for adolescents aged 10-19 years, with depression being identified as the leading cause of disability and illness among this population. Evidence suggests that half of all lifetime mental disorders will start during adolescence, yet the majority of these will go unrecognised and untreated [4]. There are various factors which hinder the effective treatment of adolescent mental health. These include lack of resources, lack of communication between parents and health care practitioners, lack of policies aimed at child and adolescent health, and the ways in which mental health problems are diagnosed. According to Wissow et al.[5] , many children and adolescents have functional problems related to emotions or behaviour, but do not meet the criteria for diagnosis of a mental health disorder. It is critical though that such at-risk children and adolescents be identified so that appropriate prevention be put in place. This is concerning as adolescence represents a crucial period of development, where exposures, learnt behaviours and experiences can set the trajectory for an individual's mental and physical health in adult life [3, 4]. The life-course approach advocates for effective interventions during adolescence to protect public health investments in child survival and early childhood development, and to ensure the physical and mental health and development of the next generation [6]. To this end, it is imperative to widen the focus from providing care and treatment for adolescents diagnosed with a mental health disorder to include those who are challenged with their mental health and wellbeing, before diagnoses is reached

Studies exploring mental health problems among children and adolescents have found that there are various attitudinal, stigma-related, and structural barriers to accessing mental health services. Findings from a study suggested that 80 percent of children and adolescents who are in need of mental health services did not receive any [7]. These barriers are particularly apparent among adolescents living with a chronic disorder or disease. According to the WHO the incidence and prevalence of chronic conditions is rising in most developed and developing countries and will constitute the main cause of death for children and adolescents by 2020 [8]. As such, it is necessary to consider mental health challenges in the context of adolescents living with chronic conditions.

Research has demonstrated that while children and adolescents with chronic health conditions are at increased risk for developing mental health problems, the overall mental well-

being of chronically ill youth is largely determined by among others, the severity of the disease, the amount of treatment required, and the psychological and social complications associated with such conditions [7, 8]. The variable nature of these factors have resulted in contradictory findings in different research studies. For example, studies have found gendered differences with chronically ill girls more likely to demonstrate emotional health problems than chronically ill boys when compared to healthy control groups [8].

Findings from a South African study comparing psychological vulnerabilities among perinatally and behaviourally infected HIV positive adolescents found that perinatally infected adolescents were more likely to be adherent to antiretroviral therapy (ART) and retained in care while behaviourally infected adolescents were more likely to be depressed, report internalised stigma and express suicidal ideation [9]. These findings suggests that adherence, retention in care and mental health problems among adolescents living with HIV (ALHIV) are differentially influenced by the mode of infection [9]. As such, tailored interventions are recommended to address the differences between these groups to ensure optimal health outcomes. However, the differences between these two groups may also be influenced by external circumstances related to the care received rather than factors related to the disease. For example, perinatally infected adolescents receive support and build a trusting relationship with their healthcare worker while being in paediatric care [9]. Behaviourally infected adolescents may not have the similar experiences in the healthcare system.

In the context of prioritising adolescent mental health, prevention and health promotion programmes have been identified as key strategies to help adolescents thrive [3]. In line with the United Nations (UN) Sustainable Developmental Goal 3 (SDG 3) - which aims to promote well-being for all ages - many countries and organisations are aiming to improve the development of age-appropriate interventions to provide psychosocial support and services to adolescents. For example, the *Every Child Matters* United Kingdom government initiative increased investment in child and adolescent mental health services (CAHMS) to increase access to appropriate services [10]. Additionally, global and local policies such as the *Global Strategy for Women's, Children's and Adolescents' Health* [11], the *Global Accelerated Action for the Health of Adolescents* [12], the *Lancet Commission on Adolescent Health and Well-being* [13], and the South African *National Adolescent and Youth Policy 2017-2022* [14], have identified adolescent mental health as a priority area and has committed to developing specific programmes to promote mental health among adolescents.

Despite the increased focus on adolescent mental health on the global health agenda, there is a lack of evidence concerning mental health conditions among adolescents, especially

in low- and middle-income countries (LMIC) (AHAH). According to Vreeman, McCoy and Lee [2], the lack of information about adolescent mental health in LMICs may be partially related to the lack of validated instruments for these contexts. To address this, UNICEF has launched a project to develop a measure of mental health among adolescents at the population level [4]. This is of great significance as it will provide valuable evidence regarding the prevalence of mental disorders, inform policy makers and healthcare workers, and guide intervention and treatment programmes. However, the aim of this instrument is majorly focused on improving data on the prevalence and burden of mental illness, meaning that adolescents who experience challenges to their mental health and wellbeing, but do not meet the characteristics for a mental diagnosis, may be overlooked.

It is argued that the development of valid instruments to measure mental health are dependent on the ways in which mental health is conceptualised. However, currently there is little agreement on a general definition of 'mental health' which results in inconsistencies in the way mental health is being measured and addressed in global health policies [15]. Traditionally, clinical psychologists focused more on the pathogenic side of mental health by describing and treating mental disorders. As such, mental health has popularly been used as a euphemism for 'mental illness' [15]. Consequently, the majority of the research focused on adolescent mental health adopts a pathological view by focusing on mental health disorders such as psychiatric disorders, general mental health disorders, emotional and behavioural problems, psychological distress and lower levels of illness symptoms as representative of mental well-being [2, 16].

However, this pathological view of mental health, and human health in general is not without its critiques. According to the WHO defining human health as more than the absence of illness has been on ongoing and elusive objective [17]. As Ryff [18] argues, to advance our understanding of human health, we should also focus on the presence of wellness and what it means to flourish. In contrast to the pathological view of health, positive psychologists have focused on positive mental health or general mental [15] health, which is defined not only as the absence of psychopathology, but also the presence of optimal wellbeing [19]. From this point, mental health is viewed as including both hedonic (feeling well) and eudemonic (functioning well) traditions of wellbeing.

The concept of wellbeing in mental health has gained significant interest as evidence has shown that positive mental health functions as a recovery factor and a protective factor against both physical and mental illness [13, 20, 21]. Studies have shown that high levels of wellbeing are associated with better health outcomes in both general and chronic adult

populations, while low levels of wellbeing were associated with poorer health outcomes [20]. For example, psychological factors, including wellbeing, has been associated with adjustment in patients diagnosed with hypertension [22]. Additionally, research has shown that individuals who engage in diverse types of physical activity are more likely to report higher levels of psychological wellbeing than those who do not exercise, thereby suggesting a link between physical outcomes and wellbeing [23].

There are fewer studies focused on adolescent health and psychological wellbeing. However, the available evidence shows that while adolescents may experience multiple physical, social and emotional changes which can negatively impact their mental well-being, providing psychosocial support and mental health promotion to support positive mental health can protect against psychopathology and support physical health [3, 19]. For example, a longitudinal study in Australia found that one third of boys and nearly half of girls in a secondary school experienced an episode of depressive and anxiety symptoms. However, these episodes did not follow into their adult life thereby suggesting that interventions may prevent morbidity in later life [24]. Additionally, research with ALHIV suggests that mental health wellbeing may play a role in supporting adherence to ART. A randomised control trial conducted by Willis et al. [25] found that adolescents who received the community adolescent treatment support intervention where 3.9 times more likely to be adherent to ART in comparison to those who only received standard of care.

While there may be disputes regarding the definition of mental health, there is agreement that mental health should be viewed as more than the absence of mental illness. To this end, the WHO has adopted the complete state model to define mental health as ‘a state of wellness in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community’ [26]. While this is a step forward in advancing our understanding of mental health in general, considerations should be made that focus specifically on adolescent mental health and its association with physical health, especially given the rise of chronic conditions Understanding how positive mental health can be used as a resilience resource to protect against psychopathology and poor physical health outcomes is necessary to develop appropriate health policies and interventions. Measures aimed at diagnosing or screening mental health problems are useful in contexts where CAMHS are well-developed and supported. However, LMICs like South Africa face challenges relating to lack of policy development and implementation for CAMHs, and a lack of resources and overburdened public

healthcare facilities which challenges the sustainability of adolescent mental health and health care in general [27].

Measurements of mental health play a significant role in policy and intervention development as these are used to provide empirical evidence regarding the effectiveness of programmes aimed at improving adolescent mental well-being. Focusing primarily on measuring low level symptoms of a disorder may result in ceiling effects by limiting the range of scores in a positive direction. Consequently, this limits the opportunity to measure the full range of mental health well-being [16]. Additionally, based on evidence linking wellbeing and physical health outcomes, it is important to consider these associations in adolescence. Measuring mental health among adolescents necessitates the use of age-appropriate and culturally valid instruments that can capture improvements in mental well-being where variances in general mental health can be accurately measured [16, 28].

More research focused on emphasising the healthy psychosocial development of adolescents that moves beyond identifying and addressing social and psychological problem trajectories is needed to support the development of psychosocial support programmes and interventions for adolescents who do not qualify for a mental illness diagnosis, yet experience challenges to their mental wellness [29]. These interventions should be theory driven and accessible within the local culture without placing strain on healthcare systems, especially in resource limited contexts [24, 30].

Rationale for the Review

To identify currently available general mental health and well-being instruments for adolescents between the ages of 10-19 years to describe the content and review the psychometric properties of the instruments. For the purpose of this study, general mental health and well-being instruments are those that measure 'generic' outcome measure that does not aim to diagnose and can be applied in a wide range of settings. In other words, these wellbeing and general mental health factors may include social and psychological functioning, relationships with others, social support, self-perception, quality of life etc. The findings of this review will provide evidence-based knowledge regarding what mental health instruments are being used in research focused and adolescents, and how reliable and valid these instruments are.

METHOD AND DATA ANALYSIS

This section describes the methods that will be used in conducting the systematic review. The seven steps described by Eggar, Davey and Smith [31] will be used to guide the systematic review process. These steps are; 1) *formulate the review question;* 2) *define the inclusion and exclusion criteria*; 3) *develop a search strategy*; 4) *study selection*; 5) *assess the quality of studies*; 6) *extract data*; and 7) *analyse or synthesis the data*.

Review Question

The following question will guide the review;

1) What instruments are being used to measure/describe mental health outcomes among adolescents?

2) What are the psychometric properties of instruments being used to measure/describe mental health outcomes among adolescents?

Inclusion and Exclusion Criteria

Inclusion criteria for the search are as follows:

(1) Studies published in peer reviewed journals or grey literature;

(2) the sample includes adolescents between the ages of 10-19;

(3) the measure used was a self-report measure of general mental health and well-being;

(4) quantitative and mixed methods studies;

(5) studies published in all languages

(6) studies from all countries will be included; and

(7) Studies aimed at developing or validating instruments

Studies will be excluded based on the following criteria:

1) review papers or case studies;

2) Screening tools for mental disorders or measures that are disorder/symptom specific.

The decision to include studies with adolescent samples between the ages of 10-19 is based on the WHO definition of adolescence. However, not all studies focus specifically on adolescents between these age groups. Some studies may include samples of younger children (under 10 years), while other studies may focus on older adolescents and young adults (older than 19 years). Additionally, other studies may focus on mental health for general populations and have adolescents included in the sample. The aim of this study is to review instruments used with adolescents specifically and that recognise adolescence as a unique period of development. Therefore, studies focused on mental health in general populations or young

adults (including 18-19 year olds) will be excluded. Studies that include samples of children younger than 10 may be included if there is a strong focus on adolescent mental health. Furthermore, studies with measures aimed at diagnosing mental health disorders, or that are specific to mental illness are excluded as measures for mental health conditions are well known in comparison to measures of general mental health and well-being. As previously mentioned, many adolescents are often overlooked in mental health policies as they do not meet the requirements for a mental disorder diagnoses. Therefore, we aim to review instruments that can provide a broad measure of general health and wellbeing that capture a range of common presenting difficulties and strengths.

Search Strategy

The search strategy was developed after consultation with the faculty librarian. The search strategy is broad to include all research articles that use a psychological or psychometric instrument to measure mental health outcomes among adolescents. A systematic database search will be performed using Ebscohost (Psycharticles, Academic Search Premier), Cumulative Index of Nursing and Allied Health Literature (CINAHL), Educational Resource Information Center (ERIC), Medical Literature Analysis Retrieval System Online (MEDLINE) and Sabinet. Full-texts will be searched using the list of key words for the search strategy; "((adolescen* OR teenage* OR young people OR youth) [AND] (psychological instrument OR measure* OR tool) [AND] (mental health OR mental well-being OR psychological well-being) [AND] {psychometri*; reliability*; validit*)).

Study Selection

Studies were included in the systematic review using the PICOT (Table 1) mnemonics for reviews. These included;

Table 1. *PICOT based inclusion criteria*

Patient population	Adolescents aged 10-19 years
Intervention or Interest	Reviewing the psychometric properties of psychological tools or instruments which measure general mental health and well-being among adolescents
Comparison interventions	Not applicable
Outcomes	

Primary outcomes	The definitions and/or concepts of mental health and psychological wellbeing
Secondary outcomes	Psychometric properties of instrument/measure
Time	2000–2020
Other considerations	Geographical area: Global
	Age limits: Adolescents or young adults in the age group 10 – 19 years.
	Language: All language.
	Study designs: Quantitative method or mixed methods.

The above mentioned criteria and search strategy will be used to search the databases. The time period of the search strategy was chosen as due to the paucity of research in this area [2, 12, 30]. Furthermore, the prioritization of adolescent health and the focus on adolescent friendly services occurred after the year 2000 [32]. However, we recognise that studies published after 2000 may use measures that have already been developed and that have established psychometric properties. In these cases, we will compare the psychometric data of the study included in the review with the psychometric data available from previous studies if those studies also focused on our population of interest. The screening and reporting of the review will be conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The number of hits for each database will be recorded and the citations will be exported to Mendeley citation software. Following this, two reviewers will independently review all the titles and abstracts to assess which articles are appropriate for inclusion. The full-text articles of the included abstracts will be downloaded and independently reviewed to determine which articles should be included for the final assessment [31, 33].

Quality Assessment

Evaluating the quality of a study is an essential step in systematic reviews as it ensures validity and reliability of findings [33]. Therefore each of the potentially relevant articles to be included in the review will be evaluated using the SFS scoring system (version D) [34].Version D of the SFS is an appropriate tool to use for assessing the quality studies in this review as it will allow the two reviewers to assess the appropriateness of the methodological elements of the included studies, such as the psychometric properties of the instruments and the theoretical and operational definitions used to define constructs. The SFS version D scoring systems

contains 29 questions covering the following sub-sections; 1) *purpose of the measure* which includes questions regarding the purpose, target group and theoretical dimensions of the measure; 2) *methodological rigour* which focuses on the design, sample, data collection and analyses; 3) and *general considerations* which includes questions regarding the type of publication. The first reviewer will score each of the included studies using the scoring system and presented in tabular form to be reviewed by the second reviewer. The overall quality of the study is based on the score it obtained and will be categorised as either weak (0-25%), moderate (26-50%), strong (51-75%), or excellent (76-100%). Only articles with a score of 51% and above will be included in the analysis.

Data Extraction

Following the quality assessment, a data extraction sheet will be set up in excel. The two reviewers will then extract the sample characteristics (ages, gender, school grade, etc.) geographic location, mental health concepts, psychometric properties of the instrument, type of instrument and the format of the instrument and the results of the instrument. For the purpose of this study, only data presented in the articles will be used as we are interested in how the data is reported. Where needed, we will contact authors for original data.

Data Synthesis

A descriptive meta-synthesis approach will be used to identify and describe the mental health instruments used among adolescent populations, and to report on the psychometric properties. The synthesis of information regarding each instrument will be presented in tabular form in which the included articles will be ranked based on the methodological rigour scores of the quality assessment [35]. This will allow the reviewers to assess whether the research design used reflects the aims and objectives of a particular study and whether the conclusions are supported by the data [33, 35]. As part of the aims of the review, we will focus on how mental health or concepts of mental health are being defined in the studies and which theories are being used (if any) to frame mental health. As we are looking at sample characteristics, we will consider if there are any notable differences in the studies based on sample characteristics. We would also be interested to see what the differences are across countries regarding the number of studies being conducted in higher and LMICs, and how mental health is investigated in these contexts. The data extracted from each of the included articles will be presented in the table to clearly present a summary of the core findings.

Patient and Public Involvement

As this is a protocol for a systematic review, no patients or public were involved in the design or research of this study.

ETHICS AND DISSEMINATION

Ethics approval is not required as the systematic review does not involve the participation of human subjects; rather it involves reviewing and collecting data from publicly available sources.

This review aims to contribute to research on adolescent mental health. Specifically, it aims to understand what measures are available to measure mental health and well-being to identify gaps and areas of improvement for future measures. There is an increasing need to develop instruments, which can measure all aspects of adolescent mental health. These include instruments which can identify adolescents who may be experiencing challenges to their mental health, yet do not qualify for a mental illness diagnosis. Measures of general mental health and well-being may provide useful information to inform intervention and policy. We plan to publish the results of this systematic review and present the findings to key stakeholders and colleagues on various platforms such as webinars and conferences.

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Author's contributions: ZO conceived the idea, developed the research question and study methods and contributed meaningfully to the drafting and editing; she also approved the final manuscript. BVW aided in developing the research question and study methods, contributed meaningfully to the drafting and editing, and approved the final manuscript.

Funding: This work was supported by the National Research Foundation, grant number [118160]. Additionally, the authors would like to acknowledge funding form the Belgian Development Cooperation, through the Institute of Tropical Medicine Antwerp. Any opinion, finding and conclusion or recommendation expressed in this material is that of the authors and not the funders.

Competing interest: None declared.

Word count: 4999

PRISMA-P(preferredreportingitemsforsystematicreviewandmeta-analysisprotocols)2015checklist:recommendeditemsto address in a systematic reviewprotocol

Section and topic	Item No	Check List	
Administrative information			
Title:		Adolescent mental wellness: A systematic review protocol of instruments measuring general mental health and well-being.	
Identification	1a	Identify the report as a protocol of a systematic review	Identified in title (page 1)
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	The protocol is not an update
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	The review is submitted to PROSPERO for review. The receipt number is [186707]. The information is found on page 2
Authors:		Zaida Orth & Brian van Wyk	The information is found on page 1
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	Zaida Orth School of Public Health, University of the Western Cape, Corresponding author: Zaida Orth P Bag X17 Bellville South Africa 7535 Email: zaidaorth@gmail.com Contact: +27728718490 Brian van Wyk School of Public Health, University of the Western Cape, Email: bvanwyk@uwc.ac.za The information is found on page 1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	ZO conceived the idea, developed the research question and study methods and contributed meaningfully to the drafting and editing; she also approved the final manuscript. BVW aided in developing the research question and study methods, contributed meaningfully to the drafting and editing, and approved the final manuscript. The information is found on page 17
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	Not Applicable
Support:			
Sources	5a	Indicate sources of financial or other support for the review	The review forms part of the corresponding authors' PhD work. She is receiving a NRF grant to fund her studies. The information is on page 17
Sponsor	5b	Provide name for the review funder and/or sponsor	National Research Foundation
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	The funders play no role as the funding is in support of the corresponding author's studies
Introduction			
Rationale	6	Describe the rationale for the review in the context of what is already known	To identify currently available general mental health and well-being instruments for adolescents between the ages of 10-19 years to describe the content and review the psychometric properties of the instruments. For the purpose of this study, general mental health and well-being instruments are those that measure 'generic' outcome measure that does not aim to diagnose and can be applied in a wide range of settings. In other words, these wellbeing and general mental health factors may include social and psychological functioning, relationships with others, social support, self-perception, quality of life etc. The findings of this review will provide evidence-based knowledge regarding what mental health instruments are being used in

			research focused and adolescents, and how reliable and valid these instruments are. The information is on page 8.
Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	The following question will guide the review; 1) What instruments are being used to measure/describe mental health outcomes among adolescents? 2) What are the psychometric properties of instruments being used to measure/describe mental health outcomes among adolescents? Participant: Adolescents age 10-19 Intervention: Review measures of adolescent mental health Comparison Intervention: N/A Outcomes: Mental health & psychological wellbeing Time:2000-2020 This information is found on page 10
Methods			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	Participant: Adolescents age 10-19 Intervention: Review measures of adolescent mental health Comparison Intervention: N/A Outcomes: Mental health & psychological wellbeing Time:2000-2020 Studies published in all countries and all languages will be included. Peer reviewed studies and grey literature will be included. Quantitative and mixed method studies will be included. This information is found on page 10-11
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	. A systematic database search will be performed using Ebscohost (Psycharticles, Academic Search Premier), Cumulative Index of Nursing and Allied Health Literature (CINAHL), Educational Resource Information Center (ERIC), Medical Literature Analysis Retrieval System Online (MEDLINE) and Sabinet. Contact with authors is not necessary. Searches will be conducted from 2000 to 2020. This information is on page 10-11
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could berepeated	Database: Academic Search Premier "((adolescen* OR teenage* OR young people OR youth) [AND] (psychological instrument OR measure* OR tool) [AND] (mental health OR mental well-being OR psychological well-being) [AND] {psychometri*; reliability*; validit*)). Limits: Full text Scholarly (Peer Reviewed) Journals, Academic Journals , Journals ,Books, Dissertations, Reports, Research Instruments This information is on page 10
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	Mendeley will be used as a reference manager while excel will be used for the data extraction. This information is on page 12
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	Two independent reviewers will be used for all stages of the review. This information is on page 11
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	Following the quality assessment, a data extraction sheet will be set up in excel. The two reviewers will then extract the sample characteristics (ages, gender, school grade, etc.) geographic location, mental health concepts, psychometric properties of the instrument, type of instrument and the format of the instrument and the results of the instrument. For the purpose of this study, only data presented in the articles will be used as we are interested in how the data is reported. Where needed, we will contact authors for original data. This information is on page 12
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	1) Adolescent populations between the ages of 10-19 2) General mental health and wellbeing. For the purpose of this study, general/mental health and well-being instruments are those that measure 'generic' outcome measure that does not aim

			to diagnose and can be applied in a wide range of settings. In other words, these wellbeing and general mental health factors may include social and psychological functioning, relationships with others, social support, self-perception, quality of life etc. This information is on page 10-11
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	(1) The definitions and/or concepts of mental health and psychological wellbeing (2) Psychometric properties of the measures/instruments In the review, we will look at how mental health and wellbeing are defined in the research and what concepts are associated with it (i.e. resilience, self-concept etc). With regards to the psychometric properties, we will be looking at the reliability and validity of the instruments used. This information is found on page 11
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	We have not planned to assess any risk of bias, as we are not looking at specific studies (RCTs) or interventions; rather we are reviewing the tools/measures used. We will be conducting a meta-synthesis to describe the underlying constructs of the outcomes (mental health) and we will describe the methodological properties therefore, we will be assessing the methodological rigour using the SFS scoring system
Datasynthesis	15a	Describe criteria under which study data will be quantitatively synthesised	Not applicable
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency	Not applicable
	15c	Describeanyproposedadditionalanalyses(suchassensitivityorsubgroupanalyses,meta-regression)	Not applicable
Meta-bias(es)	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	A descriptive meta-synthesis approach will be used to identify and describe the mental health instruments used among adolescent populations, and to report on the psychometric properties. The synthesis of information regarding each instrument will be presented in tabular form in which the included articles will be ranked based on the methodological rigourscores of the quality assessmen. This will allow the reviewers to assess whether the research design used reflects the aims and objectives of a particular study and whether the conclusions are supported by the data. As part of the aims of the review, we will focus on how mental health or concepts of mental health are being defined in the studies and which theories are being used (if any) to frame mental health. As we are looking at sample characteristics, we will consider if there are any notable differences in the studies based on sample characteristics. We would also be interested to see what the differences are across countries regarding the number of studies being conducted in higher and LMICs, and how mental health is investigated in these contexts. The data extracted from each of the included articles will be presented in the table to clearly present a summary of the core findings.
Confidence in cumulative evidence	16	Specifyanyplannedassessmentofmeta-bias(es)(suchaspublicationbiasacrossstudies,selectivereportingwithin studies)	We will be assessing the psychometric properties of the instruments used in the reviewed studies as we are interested in the reliability and validity of these measures.
	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	Version D of the SFS is an appropriate tool to use for assessing the quality studies in this review as it will allow the two reviewers to assess the appropriateness of the methodological elements of the included studies, such as the psychometric properties of the instruments and the theoretical and operational definitions used to define constructs. The SFS version D scoring systems contains 29 questions covering the following sub-sections; 1) *purpose of the measure* which includes questions regarding the purpose, target group and theoretical dimensions of the measure*;* 2) *methodological rigour*which focuses on the design, sample, data collection and analyses; 3) and *general considerations* which includes questions regarding the type of publication. This information is on page 11