Review Article

Mental health and non-communicable diseases: a narrative review

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Background and Objective: Children and adolescents need environments and systems that prevent mental health and developmental disorder problems, comprehensive primary care that is able to respond early to their needs, and methods of compassionate mental health care when other interventions fail.

Methods: This paper provides a narrative review of the history of child and adolescent mental health practices and prevailing themes that connect mental health with the wider field of non-communicable disease (NCD) prevention and treatment.

Key Content and Findings: Inclusion of mental health as part of the World Health Organization NCD agenda has raised global awareness of mental health issues, including the need for continued de-stigmatization, clinician training, and access to essential medicines. The policy arena for mental health is complex, and we reflect on missed opportunities for meaningful integration of mental health within holistic life-course oriented healthcare delivery systems. We explore bidirectional links between physical and mental health, and the impact of social determinants and early childhood experiences on morbidity and mortality. We examine the prevention of mental health problems, noting risk factors shared with other NCDs, and reflect on mental health treatment—with and without the use of medicines—underlining the importance of universal health coverage (UHC) for children and adolescents' mental health and wellbeing.

Conclusions: Considerable work is needed to better integrate mental health and other NCD related care into front-line primary health care delivery and to include a true life-course approach to NCD prevention and treatment for children and youth.

Keywords: Mental health; non-communicable diseases (NCDs); child health; adolescent health; universal health coverage (UHC)

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Children and adolescents and mental health

Globally, traditional understanding and management of mental health issues shows diverse approaches, and these significantly affect the life circumstances of people who experience mental health challenges. Viewing mental illness as a personal weakness and a threat to society, for example, manifested strongly in many countries' history of confining the mentally ill in punitive settings. In many cultures, people experiencing sensory hallucinations (visions, voices) were said to be possessed by spirits. In some contexts, this was considered problematic and was addressed by driving out the spirits with the assistance of spiritual leaders. In others, these individuals were revered as spiritual guides, their otherworldliness inspiring to their community.

The advent of psychiatry as a conventional medical discipline meant that the afflictions of the mind became a source of study comparable to those of the body. Treatment

Table 1 The search strategy summary

Items	Specification
Date of Search (specified to date, month and year)	n/a
Databases and other sources searched	n/a
Search terms used (including MeSH and free text search terms and filters) Note: please use an independent supplement table to present detailed search strategy of one database as an example	n/a
Timeframe	n/a
Inclusion and exclusion criteria (study type, language restrictions etc.)	n/a
Selection process (who conducted the selection, whether it was conducted independently, how consensus was obtained, etc.)	One author identified each reference cited for its relevance to the underlying summarization of prior evidence or policy in the working outline or working draft of the manuscript. The other author then reviewed the intended citation and its content, and either agreed with the initiating author, or raised additional considerations. Any differences were settled through further examination of the evidence and any supplemental references, through a consensus process between the two authors
Any additional considerations, if applicable	This is a narrative review of the evolution of a broad practice and policy issue in global health and health care for children and adolescents

regimens became established, but institutionalization in many countries continued well into the 20th century, often in asylum-based conditions (1). The development of psychoanalytic techniques in the late nineteenth century, and the advent of modern antipsychotic drugs in the 1950s, accelerated movement towards community-based, deinstitutionalized care (2). The concept of preventing mental health problems, rather than seeing them as an inherent personal risk, is a much more recent phenomenon. Persistent stigma relating to mental health conditions—in no small matter resulting from this history—continues to deter individuals from seeking help.

An example of establishing a system within which to manage child and adolescent mental health dates to the turn of the 20th century in the United States of America, with Chicago's creation of the first juvenile court; Jane Addams' founding of Hull House, embodying the concept of social welfare; the development of child guidance centers based in school and community settings; followed mid-century by the development of child psychiatry as a field (3). Pediatrics followed a similar path, only in recent decades embracing community-pediatrics, the "new" morbidities, and the social determinants of health, recognizing the need for a comprehensive, developmental approach to helping children thrive throughout the life-course.

It is harder to track the origin of the non-communicable disease (NCD) movement; recognition of common needs among those living with a variety of chronic illnesses emerged as a global policy issue in the late 1990s, and by the early 2000s NCDs had become well-recognized as major impediments to successful human development, and to achieving global health goals (4,5). While many NCD advocates continue to focus on disease-specific issues for adults, child health leaders have argued for a life-course approach to NCD prevention and treatment within health systems in order to address the comprehensive needs of children, adolescents, and their families (6). In this chapter, we bring mental health and NCDs into focus, setting the stage for further explication of global efforts for child and adolescent health.

Methods

We searched PubMed for relevant papers from Jan 1, 1980, to Aug 31, 2020, using the search terms "mental health" and "non-communicable diseases" (*Table 1*). Papers and reviews were also identified through searches of our own files and publications, and review of the WHO Global Coordinating

Mechanism of NCDs, NCD Child, and NCD Alliance websites and monograph publications. Only publications in English were included. The final reference list was based on the relevance to the broad scope of this narrative review. The authors purposefully reviewed selected articles from the published literature and from summary reports on mental health and children and on non—communicable diseases based on their experience and expertise, and their participation in global organizational and WHO/UN agency discussions of NCDs and child health. Thus the categories identified in the Narrative Review methods guidelines (https://pm.amegroups.com/pages/view/guidelines-for-authors#content-2-2-2) do not fit well when applied to this paper.

Mental health and NCDs within international health policy

The 1978 United Nations Declaration of Alma Alta recognized health as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" as a fundamental human right. This congress further noted that attaining the highest possible level of health was a most important world-wide social goal (7).

Mental health has also been widely accepted as a critical component of well-being in high-level international policy and rhetoric about the needs of children and adolescents. In 1989, the UN Convention on the Rights of the Child recognized the goal of physical and mental health, and the right of every child to a standard of living adequate for the child's physical, mental, spiritual, moral and social development (8). More recently, in 2019, UNICEF's *Leading Minds* conference series highlighting major issues affecting children and young people devoted a meeting to child and adolescent mental health problems, noting that 20% of adolescents have mental disorders, and that 15% of low-and middle-income (LMIC) country adolescents report suicidal ideation (9). WHO has similarly called for initiatives to include mental health in recent efforts to ensure universal health coverage (UHC) (10) and improve adolescent health (11).

However, all too often these policy goals do not match the reality of available and accessible services in communities or in countries (12). Enormous gaps exist between the ideal and the reality for mental health care or prevention (13). Mental health problems cast a shadow over the lives of many children and adolescents worldwide (14). Despite an increasing evidence-base demonstrating the biologic and genetic basis for diagnosable mental illnesses and behavioral conditions, continued stigma and discrimination prevent effective care from reaching those in need. Armstrong and Henshall noted that "*The integration of a life-course approach within the draft WHO MHAP [Mental Health Action Plan] is particularly relevant given that the global mental health burden has shifted to younger ages and because most mental health disorders first manifest themselves during adolescence*" (15). The need for early intervention, including diagnosis and treatment, is well documented (14). Despite this knowledge, far too many children and young people face interminable delays in accessing care, and disparities within nations remain a significant and vexing problem, requiring both substantial investments in social resources, and significant attention to principles of justice and distribution to achieve parity and access to care in most settings.

NCDs, often referred to as 'chronic disease' or 'chronic illness', were first acknowledged and recognized as an area needing focused attention in a high-level UN meeting in 2011 (16). NCDs, whether acquired or genetic, are often thought of as chronic and of long duration. NCDs arise from a complicated combination of genetic, physiological, environmental and behavioral factors—many of which are still poorly understood. Initially, WHO focused its NCD agenda on a 4×4 model (17). Four adult chronic illnesses: cancer, heart disease, diabetes, and chronic lung disease; and on four risk factors: smoking, alcohol, unhealthy diet, and physical inactivity. This initial narrow framing of NCD prevention and treatment was criticized by child and adolescent health advocates, who called for a life course approach to NCDs and a child rights approach to recognizing special health-care needs and providing for resources to allow children and adolescents with these issues to achieve their full potential (15). The original NCD agenda was also critiqued by mental health advocates (18); various efforts called for recognition of the importance of a comprehensive physical and mental health approach to achieving universal health care (19).

In 2017, WHO's NCD Global Coordinating Mechanism workgroup on the inclusion of NCDs in other programmatic areas called for "*a paradigm shift in our approach—from addressing NCDs and other programmatic areas separately or vertically to collectively addressing diseases in an integrated manner, from a clinical to a public health approach guided by the principles of universal access and social justice, and from action expected from the health sector alone to a broad-based, coordinated, and intersectoral "whole of society" response*" (20).

Despite this plea for fundamental change, the 2018 expansion of the NCD agenda remained categorical, adding mental health to the disease conditions and the environment to NCD risk factors, respectively, for a 5×5 approach (21), rather than recognizing a life-course, comprehensive approach to staying healthy or living with illness. While this put "NCDs and mental health conditions" into the discussion of effective national responses, it was a missed opportunity to address mental health and other special health care needs of children, youth and their families. Additionally, this call for integration has mostly been ignored by both the NCD advocacy community and the Maternal and Child Health and child survival service communities.

Most notably, while many mental health conditions are biologic in origin, they require treatment that is both biologic and behavioral to help young people achieve the goal of best possible health. Additionally, many individuals with mental health conditions experience them as chronic illnesses and require services beyond those needed by the general population. Primary care systems and front-line health care workers require training to be able to screen for mental health disorders, and the resources to refer those who could benefit from mental health services to treatment. This is a particularly important issue in considering the life course approach to NCDs, as most mental health conditions emerge during adolescence (13), and treatment to mitigate the consequences of mental health disorders can significantly change the trajectory of young people's lives. Thus, despite inclusion of mental health in the NCD agenda, missed opportunities continue to abound; for example, in excluding toxic stress and the impact of maternal depression on newborn development. By focusing on adult services, the agenda supports a disease specific and categorical approach, rather than strengthening the ability of primary care services to include mental health prevention and treatment into population and primary care systems.

The impact of mental health problems on children and youth

Mental health problems are largely accepted as the leading cause of disability and mortality among global youth aged under 25 years (22). Nonetheless, uncertainty about the actual prevalence of these problems is of concern (23). A detailed epidemiological study of Austrian adolescents aged 10–18, for example, found that point prevalence and lifetime prevalence of mental health disorders were 23.9% and 35.8%, respectively (24). Anxiety disorders were most common, and nearly half (47%) of those reporting a lifetime mental health problem had more than one diagnosis. Furthermore, fewer than half of those with a diagnosis had accessed mental health services. Erskine *et al.* asserted that "*To address the dearth of data on child and adolescent mental disorders and the consequently poor global coverage of prevalence data, funding is required for nationally representative epidemiological surveys using the DSM and ICD approach across a range of disorders in young age groups*" (23). They further noted the challenges of logistics, time to administer, and cross-cultural barrier that might threaten collection of robust data; and they recommend targeted studies in regions where no data exist (such as sub-Saharan Africa) as essential to allow better understanding of mental health problems in LMIC settings, where the majority of the world's youth live.

Even before the Coronavirus-SARS-Type 2 (COVID-19) pandemic and the widespread disruption of schools and much of society, the mental health problems of children were getting worse. For example, a retrospective analysis of three UK cohort studies from 1965–2008 showed that mental health problems affected a significant proportion of children aged 7 years, and that this impacted negatively on each cohort's educational attainment and mental health by 16 years of age (25). In the most recent cohort, who were aged 7 in 2008, children reporting mental health problems at age 7 were more likely than others (and earlier cohorts) to report social functioning difficulties (e.g., victimization, being bullied) at age 11, and more likely to report poor mental health at age 16. For boys, the more recent cohort also showed greater negative effects on the educational outcome of gaining five good high-stakes examination grades at age 16.

There is a bidirectional relationship between the mental health of children and young people and their social circumstances. Recent papers on adolescents from the Health Behaviours of School-aged Children (HBSC) 2017-18 Survey [using data from 45 countries across Europe and North America (26)] show the complexity of these associations. This includes the intersection between individual and group/national characteristics. A cross-national survey, for example, showed aggravated negative effects on mental health among adolescents from multiple disadvantaged social groups (immigrant, low socioeconomic status and/or female gender) who live in countries with strict migration rules and significant income inequality (27). In turn, national wealth and income inequality similarly

have negative effects on the lives of adolescents (28). Not all matters of social justice, however, result in better outcomes; adolescent girls living in nations with greater gender equality were more likely to report feeling "fat", low life satisfaction and school pressure (29).

The associations between mental health and gender are complex. Young men and women may show differing prevalence in different types of conditions, such as earlier onset schizophrenia and higher substance abuse in boys, and more mood disorders and anxiety in girls (30). The link between gender and suicide is similarly complex, with more attempts in adolescent girls but more deaths in boys explained by access to firearms and other more lethal means by boys (31). The advent of puberty and the resulting hormonal and physical changes can also precipitate mental health challenges regarding gender. Moreover, ongoing debates highlight the shortcomings of considering gender as a binary or developmentally fixed characteristic, with growing empathy for the concept of gender fluidity. Children and adolescents can experience gender dysphoria (GD), however, and as their body takes on a more male or female appearance they can become increasingly distressed. It has been estimated that 0.17–1.3% of adolescents and young adults might experience GD (32). Sexual minority adolescents also show higher rates of mental health problems than peers; recent research shows that a significant amount of the difference was explained by bullying, unmet service needs and low family satisfaction (33). This underlines the complex links between social context, health service access and mental health challenges.

Prevention and mental health

Unhealthy behaviors are implicated in the development of many physical and mental health related NCDs. For example, there is a significant link between food, including both malnutrition and obesity, and mental health, especially during pregnancy and early childhood (34). The report of the WHO Independent High-Level Commission on NCDs noted that the promotion of mental health and wellbeing was a vital part of the strategy to reduce the global NCD burden (35). They recognized the 'untold suffering' of mental health problems across the lifespan, especially for children and young people. Self-reported healthy behaviors, consistent with established recommendations to avoid physical health NCDs (e.g., eating healthily, good sleep hygiene, moderating screen time, doing physical activity) has been shown to significantly reduce the need for mental health related primary care consultations (36). Mental illnesses and NCDs share many risk factors and often influence each other with regard to disease progression and severity of health, social, and economic consequences (37).

The promotion of wellbeing for children and young people links to many other elements of sustainable development relevant to NCDs, such as air pollution (38), the provision of green spaces for play, exercise and leisure activities (39-41) and the creation of meaningful work opportunities (42). In terms of employment, the relationship is in both directions: childhood mental health problems can affect the likelihood of later employability (43), and the lack of work opportunities for youth can precipitate mental health problems (44). Positive youth development and advocacy activities by adolescents and young adults such as volunteering and civic engagement, including voting, can enhance mental health in themselves, and future positive life outcomes as adults (45).

In the past decade, growing awareness of how "toxic stress" impacts early brain development in children has become widely recognized. Toxic stress is due to chronic activation of physiologic stress responses, in the absence of protective and responsive human relationships (46). Toxic stress and chronic undernutrition have lifelong damaging effects on physical and mental health, impairing cognitive function, stunting physical growth, affecting learning and behavior (47), and reducing lifetime potential. Early interventions that strengthen caring adult relationships and support parent's mental health have a protective effect and can positively impact the number and severity of adverse experiences, as well as their sequelae (46). Children who experience violence, abuse and neglect, and those living under conditions of poverty, deprivation, and extreme adversity are particularly at risk for the impact of these adverse experiences on their social, emotional, and physical well-being (47).

The experiences of children and young people in school are strongly connected to mental health and wellbeing—particularly with regard to development of self-esteem, self-perception and health behavior (48). The recognition of the impact of mental health problems on the everyday life of young people is reflected in global increases in school-based interventions to prevent symptoms of depression and anxiety, either as a specific objective or as part of wider interventions to improve health and wellbeing (49-51). The results of such initiatives are generally disappointing (52), but the recognition that mental health problems affect readiness to learn means that there are opportunities for

health and education professionals to embed wellbeing strategies into the life of our schools. Opportunities for play and exercise—protective for mental health and many other NCDs for children and adolescents (53)—should be available in schools, and the Child Friendly Cities initiative also shows how these facilities can be planned into our communities, also promoting nature connectedness (54).

The social circle and circumstances of young people also have profound effects on their mental health. For example, having a parent living with depression was associated with depressive symptoms in a longitudinal study of Mexican youth (55). Traumatic events in the community can trigger mental health symptoms that can persist for months and years (56), including anxiety resulting from the current pandemic (57), and this should be recognized in efforts to 'build back better'. Migration, refugee camps, and armed conflict settings have been linked to mental health problems not only in children and youth who experience these fragile settings, but also in children and youth born to parents who are immigrants—the second generation to bear a 'migration-induced burden' (58).

The presence of a physical NCD has an association with mental health problems for children and adolescents. This association has been shown with NCDs ranging from asthma (59) to cancer (60) to atopic dermatitis (61). This can be particularly acute for visible NCDs like acne (62) and vitiligo (63). Children and adolescents living with chronic illness should routinely be assessed for mental health problems and active prevention efforts employed. Effective management of the NCD is important to try and limit its negative impact on mental health, especially where symptoms are visible or have a concrete impact on everyday life, like juvenile arthritis (64). This is best achieved in a universal coverage system that enables access to different physical and mental health therapies. Conversely, children and adolescents presenting with psychological symptoms may be at risk of future NCDs; this has been shown for musculoskeletal conditions, but the causality is as yet poorly understood (65) and could form the basis of useful future research. This underlines the significant impact that optimal and accessible services for management of NCDs can also offer for mental health in this age group.

Management of mental health as an NCD

Access to any healthcare services that are appropriate to the needs of children and youth—particularly for adolescents and young adults—can be challenging (13). Access for mental health care needs intensifies this problem. The lack of training and expertise in prevention and treatment of mental health disorders makes early intervention challenging, and often beyond the training of the primary care workforce (66). The recognition of mental health issues and other NCDs, and subsequent care-seeking behavior, has a complex association with culture. It is important that the workforce can engage across different cultures, looking for positive community resources and a recovery agenda for families that reduces stigma (67). Moreover, the age at which transfer of care between pediatric and adult services can happen varies widely across countries, and across specialties (68), meaning that children and youth with mental health problems could experience serious disruption in care during a period of increased vulnerability. National and global NCD child mental health advocates are also encouraged to press for a "*comprehensive*, *co-ordinated response from health and social sectors at the country level*" (15). The case to properly consider mental health problems and risks across the lifecourse as part of the fight against NCDs is very strong, including evidence of links between childhood adversities and development of NCDs, including diabetes and asthma, in later life (69).

Choosing the right treatment pathway depends upon the availability of valid and reliable, age- and context-appropriate diagnostic tools. A review of general mental health and well-being self-report measures for adolescents found that psychometric quality of existing tools was poor (70). The authors asserted that "*when selecting measurement tools*, *clinicians should not only consider the purpose of the measure*, (*i.e.*, *discriminative*, *predictive*, *and evaluative*) *and characteristics of the instrument* [*e.g.*, *intended population*, *measure length* (*time taken to complete*)], *but should also consider the quality of the psychometric properties of the instrument*". Most scales for measuring the incidence and severity of mental health problems are derived from Western psychiatric criteria and may not reflect the characterization of conditions in other cultures. A study of mental health symptoms in HIV/AIDS-affected children and adolescents in Rwanda, for example, reported a number of local syndromes that shared some characteristics with Western notions of mental health, but had some important culture-specific features and differences in gradation of severity (71).

Most of the evidence we have on mental health treatment in children and adolescents comes from high-income countries; much more needs to be known about the practices and experiences of families and healthcare workers in LMIC countries. There has been recent recognition that both

adverse childhood experiences and interventions in early childhood (47) and intervention to promote positive youth development (72) impact both mental health trajectories and treatment effects; but, there remains little evidence about best practices for these interventions across various settings. Moreover, the combination of cultural influences and the significant impact of life events such as migration and trauma—especially when children or adolescents are separated from their families and other protective mental health assets—means that health workers must be sensitive to the trajectory of each child or adolescent's life journey when devising treatment relevant to their needs (73,74).

Non-pharmacologic treatment

A number of non-pharmacologic treatments ('talking' and behavioral therapies) exist as first-line for child and adolescent mental health problems (75). An overview of systematic reviews of mental health interventions noted the heterogeneity of services and populations in the peer-reviewed literature (76). The authors asserted that "*Future trials should also focus on standardized interventions and outcomes for synthesizing the existing body of knowledge. There is a need to report differential effects for gender, age groups, socioeconomic status, and geographic settings since the impact of mental health interventions might vary according to various contextual factors*". Results from a recent randomized controlled trial study of cognitive behavioral therapy (CBT) for adolescents in Norway showed significant improvements in many outcomes for the intervention group and reinforce the potential of this approach as first-line therapy for emotional problems (77).

It has been noted that poor rates of non-pharmacologic treatment access may be influenced by parental perception of barriers and facilitators (78). Reardon *et al*. concluded, in their review of 44 studies on this subject, that "*interventions are required to improve parents' identification of mental health problems, reduce stigma for parents, and increase awareness of how to access services*" (79). Newer studies of novel interventions including animal-assisted therapies, such as dog companions being available in schools, are creating interest in this area (80). Standardization of practice, however, is sparse and there is a need to better characterize the goals, processes and effects of novel approaches.

Of particular interest to many stakeholders is the potential for digital therapies—especially apps for smartphones that could maximize accessibility, enable customization of experience and improve privacy in use. Even though there are a number of products emerging in this field, evidence of their benefit is limited in the peer-reviewed literature. A systematic search of bibliographic databases in 2017, for example, yielded only seven qualifying studies which included very diverse adolescent populations and mental health concerns (81). The functionality of the apps reviewed included monitoring, assessment, psychoeducation and skills practice. Overall, app use was reported as beneficial, but commentators agree that more evidence is needed (82).

Pharmacologic treatment

Treatment for mental health conditions in children and young people presents challenges—both in terms of securing a sustainable supply of effective medicines for their needs, and in supporting adherence. Many medicines for mental health conditions are not licensed for pediatric use, reflected in the contents of the WHO Essential Medicines List for Children (EMLc) (83). The section in the EMLc for 'Mental and Behavioral disorders' contains just three medicines: first-generation antipsychotics chlorpromazine and haloperidol, and the SSRI fluoxetine for depression. The very restricted content of this list is indicative of the inequalities that exist in LMIC countries, where national lists of essential medicines are unlikely to offer modern choices for children and youth.

The off-label or off-license prescribing status of many medicines in pediatric and adolescent mental health also has serious implications for shared decision-making and for informed consent. Unlicensed use of such medicines obliges the prescriber to justify their decision and demands a rigorous discussion of relative risk and benefit with the patient, but there is some evidence to suggest that these discussions are not taking place—and are not adequately recorded in medical notes (84).

Under-prescribing for mental health conditions in children and adolescents seems to be the norm (85), recognizing that any prescription needs to follow evidence-based guidance—and this is often lacking. Many primary care practitioners feel that they lack the expertise to prescribe psychoactive medicine for children and adolescents (86). Yet somewhat paradoxically, mental health specialists also criticize primary care for prescribing medication too readily, due to pressure from families or limited access to other forms of treatment (87,88).

The role of medication in the treatment of NCDs

for children and young people, including mental health conditions, should—in itself—promote wellbeing if the condition is well controlled with few symptoms (89). The use of psychoactive medications by young people, however, can predispose them to other NCDs. Attention has been drawn to the early seeding of cardiovascular problems and weight gain in young people taking antipsychotics. Moreover, lifestyle factors clustered among young people with conditions like psychosis—such as sedentary behavior, smoking and substance use—places them at heightened risk for future NCDs (90).

Access to medicines is an issue for all young people living with chronic illness and may be particularly challenging in the context of mental health. This coincides with a life period of increasing autonomy and independence, within which young adults may wish to discontinue treatment. Good transition arrangements and UHC are needed to ensure maintenance of treatment throughout adolescence and young adulthood for sustained positive outcomes.

Summary

Children and adolescents need environments and systems that prevent mental health and developmental disorder problems, comprehensive primary care that is able to respond early to their needs, and access to compassionate mental health care when other interventions fail. Inclusion of mental health within the NCD agenda has raised global awareness of mental health issues, including the need for continued de-stigmatization, clinician training, and access to essential medicines. But much work is still needed to truly integrate mental health and other NCD related care into front-line primary health care delivery, and to include a true life-course approach to NCD prevention and treatment for children and youth.

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Footnote

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Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at https://pm.amegroups.com/article/view/10.21037/pm-20-84/coif). The series "Integrating Mental Health in the Comprehensive Care of Children and Adolescents: Prevention, Screening, Diagnosis and Treatment" was commissioned by the editorial office without any funding or sponsorship. Dr. NG reports reports that she is a registered pharmacist in Great Britain. She is an affiliated researcher for the UNESCO Chair and WHO Collaborating Center in Global Health and Education. She is also a member of the NCD Child governing council, a global coalition dedicated to inclusion of children and youth in the NCD and SDG agendas. Dr. JDK reports that he is an elected member of the Executive Committee and Standing Committee of the International Pediatric Association, a global organization of national and regional pediatric associations, and is former chair and member of the NCD Child governing council, a global coalition dedicated to inclusion of children and youth in the NCD and SDG agendas. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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