



Original article

Trends in Adolescent Health: Successes and Challenges From 2010 to the Present



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ABSTRACT

Purpose: This review considers trends in some of the major adolescent health outcomes and contextual influences since 2010, and explores the relevance of recent cultural, societal, and public health developments on adolescent well-being.

Methods: Based on a review of major reports published since 2010, we identified key topics of impact on adolescent health and development across several domains (education, economic opportunity, sexual and reproductive health, nutrition, and mental health) and ecological levels (from individual- to macro-level influences). Within these areas, we synthesized findings to describe recent trends, noting variation across countries/regions, gender/sex, and other social stratifications when possible.

Results: Since 2010, progress in several areas of sexual and reproductive health has been most striking, with notable global declines in female genital mutilation/cutting, child marriage, HIV transmission, and adolescent childbearing. Participation and retention in school has increased, although the COVID-19 pandemic interrupted positive progress for many adolescents and contributed to social isolation and economic insecurity. The mental health and nutrition domains have clear challenges. Increased internalizing mental health issues have been observed cross-culturally, especially among girls. The prevalence of anemia has remained stagnant, while overweight and obesity rates are rising. Within domains, we highlight uneven progress across and within countries.

Discussion: Based on recent successes and emerging challenges in adolescent well-being, we find that more and better research is needed that consistently takes an intersectional perspective, and critically, action must be taken to consolidate the gains in sexual and reproductive health and extend them to other areas of adolescent health.

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IMPLICATIONS AND CONTRIBUTION

This review describes recent trends affecting adolescents' lives and well-being around the globe across multiple domains. Depending on the health issue, there has been progress, stagnation, or decline. Prevalent disparities in each area point towards the continued need for equity-focused policy and investment.

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Adolescence, defined by WHO as ages 10–19 years (Table 1), is a developmental process as well as a period of significant change in the eyes of society and the law. Developmentally, the adolescent period allows for the emergence of reproductive capability as well as increasingly complex capacities for reasoning and decision-making [1]. That said, the age bracket of 10–19 years does not fully capture the dramatic transitions of

Table 1
Age groups and definitions

Age group	Years of life
Children	0–17 years
Adolescents	10–19 years
Young adolescents	10–14 years
Youth	15–24 years

Sources: United Nations, World Health Organization, The Lancet.

this developmental stage [2]. Adolescence includes changes that are physical in nature, as with puberty, which may begin as young as age 8; meanwhile, other changes such as brain development may continue well into the third decade of life. During this transition from childhood to adulthood, adolescents also assume or are thrust into new social roles [3]. They have to negotiate new expectations and responsibilities including the increasing relevance of peers and peer group influences, their developing sense of self, and the growing recognition that childhood is behind them and adulthood is on the horizon. For some adolescents, it is also a period marked by the initiation of risk behaviors, the emergence of mental health challenges, or expectations that they will rapidly assume adult roles [4,5]. Depending on context, adolescents also experience some or all transitions into legal adulthood. Depending on the country, older adolescents can consent to treatments, vote, and access substances such as alcohol, while younger adolescents cannot. So too, older adolescents can consent to participate in research studies on their own.

Today, adolescents face new and challenging contexts that were not experienced to the same extent by previous generations. Adolescence is a period when reliable institutions, structures, stability, and supports are of great importance to ensuring healthy development [6]. Yet those who entered adolescence since 2010 have experienced disruption after disruption. Conflict and crisis contributed to displacement which for those under age 18 has increased from 21 to 43 million between 2010 and 2022 [7]. The COVID-19 pandemic introduced further destabilization to adolescents' education, their social lives, and to the expectation that family members and loved ones would stay healthy and living. While the costs of social isolation among adults has been well-documented in high-income nations for more than 2 decades [8], now it is being observed and linked with loneliness among adolescents around the world [9]. Isolation related to COVID-19 coincided with growing concern around adolescents' mental health [10] and use of social media [11]. The expansion of digital connections to adolescents around the globe can offer them new and exciting opportunities [12], but a nuanced understanding of the interrelationships between social media, social isolation, loneliness, and mental health among adolescents is still lacking.

The adolescent population has grown to approximately 1.3 billion, comprising nearly one in six people alive today [13]. Today's adolescents are not only the largest cohort but also among the most diverse group the world has ever seen. The proportion of the population made up by adolescents is even greater in sub-Saharan Africa, South Asia, the Middle East and North Africa (23%, 18%, and 18%, respectively) [14]. While global data are scant, it is clear that more and more adolescents are publicly sharing their nonbinary gender identities [15]. Around the world, there are still physical, emotional, and social threats faced by members of the LGBTQ+ community, including the criminalization of same-sex relationships in 67 countries [16]. In

the United States, waves of legislation banning or restricting gender-affirming care for transgender young people have been proposed or codified [17]. Discrimination faced by the LGBTQ+ community is just one of many examples of rising intolerance and mistrust around the globe. Today, nearly four in 10 countries has severe legal restrictions or social hostilities against free religious practice [18], and globally, levels of institutional trust are on the decline [19].

Decades of migration related to economic and educational opportunity, drought, conflict, and oppression means that more than ever before, many adolescents are growing up in ethnically diverse contexts [20]. While such diversity confers many benefits to communities, adolescent immigrants and descendants of immigrants face emotional and social discrimination [21]. While there has been growing awareness over the past decade that the contexts in which young people live impact both their health and behaviors, and a growing body of research is working to reflect this fact [22]. Going forward, it will be essential for such research to consider context-specific experiences by sex, cultural background, gender identity, age group, and other factors.

Changing social contexts of adolescence

The major physical and cognitive changes that take place during adolescence are matched by changes in young people's social experiences. Early adolescence, the period from ages 10 through 14, represents some of the most significant changes to how a young person negotiates their environments. For many adolescents, this period also brings increasingly gendered experiences. Girls entering adolescence may face increased expectations for housework and sibling care, disconnection from schooling and peers, and even the possibility of forced or unwanted marriage [3]. Male adolescents also experience new burdens in this period facing mounting pressure to meet masculine gender expectations such as toughness and physical dominance [23,24]. Additionally, some boys are pressured to leave school before completion to work in formal or informal economies [25,26]. These gender differences become starkly apparent when looking at mortality data with boys experiencing excess death due to violence, substance use, and numerous other preventable risks [27].

Priority concerns for adolescent health

The factors and outcomes highlighted in the present paper were selected based on three considerations: their empirical relevance for health and development over the life course, their connection to the broader macro-level trends that have shaped the world in which adolescents live since 2010, and adolescent health issues prioritized in a range of publications including the Lancet Commission on Adolescent Health and Well-being [28,29], WHO's Global Accelerated Action for the Health of Adolescents [30], the State of the World's Children series from UNICEF [31], and PMNCH's Interim Analysis, *What Young People Want* [32]. A crosswalk between the priority areas highlighted by these efforts and the focal topics of this review is included in Table 2. We organize the review into five subsections starting with nutrition, sexual and reproductive health, mental health, and finally education and employment.

Table 2
Priority areas for adolescent health and well-being

Topic in review	LC	AA-HA	SOWC	WYPW
Nutrition	<ul style="list-style-type: none"> • Undernutrition • Overnutrition 	<ul style="list-style-type: none"> • Optimum nutrition 	<ul style="list-style-type: none"> • Nutritional status 	<ul style="list-style-type: none"> • Optimum nutrition
<ul style="list-style-type: none"> • Undernutrition (anemia) • Overnutrition (Overweight/obesity) 				
Sexual and reproductive health	<ul style="list-style-type: none"> • Child marriage • HIV • Childbearing 	<ul style="list-style-type: none"> • HIV • Other STIs • Female genital mutilation/cutting • Child marriage • Childbearing 		<ul style="list-style-type: none"> • Sexual and reproductive health • Child marriage
<ul style="list-style-type: none"> • HIV • Non-HIV STIs • Female genital mutilation/cutting • Child marriage • Childbearing 				
Mental health	<ul style="list-style-type: none"> • Mental disorders 	<ul style="list-style-type: none"> • Mental health 	<ul style="list-style-type: none"> • Mental health 	<ul style="list-style-type: none"> • Mental health
<ul style="list-style-type: none"> • Depression • Loneliness 				
Education	<ul style="list-style-type: none"> • School enrollment 	<ul style="list-style-type: none"> • Education 	<ul style="list-style-type: none"> • Education 	<ul style="list-style-type: none"> • Education
<ul style="list-style-type: none"> • School enrollment • Educational aspirations 				
Employment and economic opportunity	<ul style="list-style-type: none"> • Connection to workforce 	<ul style="list-style-type: none"> • Employability 	<ul style="list-style-type: none"> • Employment and economic opportunity 	<ul style="list-style-type: none"> • Employability
<ul style="list-style-type: none"> • Connection to workforce 				
Other health and well-being topics	<ul style="list-style-type: none"> • Violence/injury • Substance use • Infectious/vaccine-preventable diseases • Physical disorders 	<ul style="list-style-type: none"> • Violence/injury • Substance use • Communicable/noncommunicable diseases • Physical activity/sedentary behavior • Agency/resilience • Safety/supportive environment • Connectedness, positive values, contribution to society 	<ul style="list-style-type: none"> • Disability 	<ul style="list-style-type: none"> • Agency/resilience • Safety/supportive environment • Connectedness, positive values, contribution to society

Text in shaded cells indicates overlap between the topic or one or more subtopics in our review and major adolescent health issues raised by the cited report/series (bullets use terminology from the report/series). “Other health and well-being topics” include health issues and elements of well-being that were covered by the cited report/series but were not of primary focus in our review.

AA-HA = WHO Global Accelerated Action for the Health of Adolescents; LC = Lancet Commission on Adolescent Health and Wellbeing; SOWC = State of the World’s Children (2010–2023 reports); WYPW = What Young People Want.

Objective. The objectives of this paper are first to present trend data since 2010 related to the five categories noted above, and then to highlight some of the contextual factors impacting adolescent health and well-being. There is no attempt to exhaustively review all adolescent health concerns; rather, we focus on a set of priorities informed by the literature and the voices of young people.

Nutrition

Both undernutrition and overnutrition have major impacts on health during adolescence and across the lifespan. However, until recently global attention to these outcomes in adolescence has not reached a level commensurate with their health consequences [33]. As Patton et al.’s commentary correctly notes, the UN’s Sustainable Development Goals have no adolescent-specific weight or nutrition targets, nor do targets of the UN Decade for Action on Nutrition [34,35]. *The Lancet Commission on Adolescence* drew attention to this deficit in 2016 [28]. More recently, 2022, *The Lancet* published a series on adolescent nutrition [36]. While it is beyond the scope of this paper to review all global nutrition trends, two are especially worth highlighting due both to their prevalence and consequences: iron deficiency anemia and overweight.

Iron deficiency anemia. While adolescent-specific global data on anemia are limited, research from the Global Burden of Disease Study estimated the number of prevalent cases worldwide among adolescent girls at between 60 and 70 million for girls ages 10–14 and between 80 and 90 million for those ages 15–19 [37]. Le Dain et al. reported that nearly half (49%) of adolescent girls in West and Central Africa—where global prevalence of anemia is highest—are anemic; and there has been very little change over the past 20 years [38]. Similarly, UNICEF reports that globally the prevalence of anemia for adolescent girls and women of child-bearing age is 30%, essentially unchanged since 2010 [39]. In their analysis of data from 1990 to 2016, Azzopardi et al. found that year-over-year declines in adolescent anemia were modest, with increases in the overall burden of disease due to larger population sizes [29]. Thus, data from recent years point toward a continuation in the lack of progress in addressing this outcome. As Kasbaum has shown, iron deficiency anemia is associated with numerous short- and long-term health risks including poor pregnancy outcomes, impaired cognitive and motor development and diminished school and work performance [40].

Overweight and obesity. Analyzing more than a decade of data for adolescents ages 12–15 from 21 middle- and high-income countries, Fan and Zhang [41] estimated a pooled prevalence of

27.7% for overweight and obesity, with upward trends during the study period noted in half the countries and decreases found in only two. The *World Obesity Atlas, 2023* indicated that, in 2020, an estimated 10% of adolescent boys (103 million) and 8% of girls (72 million) worldwide were obese [42]. The report also indicates that without significant investments the prevalence of adolescent obesity is projected to double by 2035. Nowhere is there indication that these trends are slowing.

The consequences are profound; the United States Centers for Disease Control and Prevention indicates that obesity in childhood increases the risks for hypertension, Type 2 diabetes, hypercholesterolemia, asthma, sleep apnea, joint problems, gallbladder disease, mental health disorders, and social problems such as isolation and bullying [8]. So too, the *World Obesity Atlas* estimates that worldwide in 2020 the economic costs of overweight and obesity were nearly two trillion dollars, or 2.4% of the global gross domestic product [42]. Clearly, there is no indication that either malnutrition (as measured by iron-deficiency anemia) or obesity is declining; rather, they will remain among the most pressing adolescent health concerns over the next decade.

Sexual and reproductive health

HIV. Since 2010, new HIV infections for all age groups have declined by a third from approximately 2.2 million per year to an estimated 1.5 million per year [43]. During the same period, declines for those under the age of 15 have been particularly steep: from 310,000 new infections per year to 130,000, a nearly 60% reduction [43]. From 2010 to 2020, declines for adolescent boys and girls ages 15–19 were also notable (approximately 22% and 27%, respectively), although new infections for girls remain nearly 70% greater than those in boys of the same age group [44]. In most regions of the world, the coming years point towards sustained progress. The number of infections among adolescents and young adults ages 15–24 are expected to decrease by 30% or more from 2010 to 2030 in areas including East Asia and the Pacific (44.3% projected decrease), South Asia (38.0%), North America (34.4%), and Eastern and Southern Africa (32.4%) [44].

Sexually transmitted infections. While there have been impressive reductions in adolescent HIV incidence since 2010, the same is not true for most other STIs. Analyzing Global Burden of Disease data for five STIs (syphilis, chlamydia, gonorrhea, trichomoniasis, and genital herpes), Du et al. [45] reported significant yearly increases in each condition, with the exception of gonorrhea (which remained unchanged). While incidence rates vary substantially by region, age, and socioeconomic factors, broadly, STI incidence tends to increase sharply during the adolescent years, leading up to a peak during adulthood [45]. In the United States, for example, of the more than 20 million new STIs annually, about half are among youth ages 15–24 [46,47]. Today, approximately one in four sexually active adolescents in the United States have an STI, with chlamydia and human papillomavirus infections the most common [48]; rates remain particularly elevated for those experiencing social marginalization, such as Black adolescents [49]. Shannon and Klausner [48] suggest that there are several reasons for the higher rates among adolescents: their greater likelihood to have multiple concurrent partners, lower likelihood than other age groups to use condoms, greater biological susceptibility due to cervical immaturity, and a lower likelihood than adults to use health services. The health

consequences of STIs have been well documented including risks for infertility, cervical cancer, adverse birth outcomes, and increased risk of acquiring HIV [50].

Female genital mutilation/cutting. A concerted global effort to reduce FGM/C appears to have had quite positive results. Specifically, the evidence is that over the past 2 decades there has been a decline in FGM/C among 15–19 year olds in 31 marker countries, from about one-in-two in the 1990s to about one-in-three today [51]. Using both Multiple Cluster Indicator Survey and Demographic and Health Surveillance data, from 29 countries in Africa, researchers reported striking reductions in FGM/C over the course of one generation. In East Africa, the prevalence of FGM/C declined from 71.4% in 1995 to 8% in 2016, and in West Africa the decline was from 73.6% in 1996 to 25.4% in 2017 [52].

Child marriage. Marriage before the age of 18 has declined from one in four girls at the turn of the millennium to one in five today [53]. The World Bank has noted that when averaged around the world, the age of marriage has increased 1 year from 1994 to 2015 [54]. Today, women first marry on average at age 24 and men at 27 years of age. The greatest delay in marriage has been in Latin America and the Caribbean, where for women the average age of marriage rose from 23 to 26 years, and for men it increased from 26 to 28 years. However, among regions where the prevalence of child marriage was over 20% in 2012, Latin America also had the smallest decrease over the past decade [53]. In Latin America and sub-Saharan Africa, child marriage has decreased among girls from the wealthiest backgrounds but increased among girls from the poorest backgrounds [53]. Such bifurcated trends suggest that, while child marriage is reducing, is it also becoming increasing concentrated among the economically disadvantaged. Not surprisingly, delaying marriage until after age 18 is associated with less childbearing over the lifespan [55], as well as longer spacing between childbirths and higher educational achievement [56].

Despite these overall declines, substantial work remains. According to the latest data, one in 20 girls around the world married before age 15 [57]. While marriage at such early ages occurs in many parts of the world, it remains most prevalent in the West and Central African region, where an estimated 12% of girls are married by age 15 [57]. Recently, experts noted that despite great progress made in numerous countries (in South Asia, the prevalence of child marriage was nearly cut in half from 2012 to 2022), the pace of change in other parts of the world remains exceedingly slow [53].

Childbearing and family formation. Between 2010 and the present, adolescent childbearing has continued a decades-long decline at the global level; and among the most recent cohort of adolescents with available data, fewer than one in three began childbearing as teenagers [58]. Declines were especially steep in Central, South, and Western Asia as well as Northern Africa; meanwhile, there has been an uptick in adolescent childbearing in Oceania; and the rate of adolescent childbearing in sub-Saharan Africa still exceeds that of other regions [58]. As the United Nations Population Fund notes, globally “...the pace of decline has been alarmingly slow – often by only a few percentage points per decade – and has not kept pace with declines in total fertility.” [58] A recent analysis of data from 21 Latin American and Caribbean countries found that since 2010, 13 had

detectable declines in adolescent childbearing while only two (Mexico and Colombia) had increases. [59] The study also found the continued presence of social and economic inequities on this outcome, as poorer, rural, and Indigenous and Afro-descended girls still experienced greater childbearing in adolescence relative to their peers – similar to the disparities found in child marriage.

While declining fertility rates impact family formation, as Pesando et al. [60] have noted, the declining fertility rates are but one part of the story of changing family formation. Beyond fertility, trends in family formation and structure include changes in the nature and form of marriage worldwide and the decline of patriarchal gender roles [61–65]. Today, we see the latter two drivers represented in worldwide changes such as technological development, macro-economic trends and uncertainty, the largest cohort ever of adolescents, and the rise in both female education and paid employment [66,67].

Mental health

It is estimated that approximately one in seven adolescents globally lives with a mental health disorder [68], and many more experience significant psychosocial distress that does not rise to the level of a clinical diagnosis [69]. For adolescents the most widespread of these mental health conditions are anxiety and depression. Other prevalent conditions include drug and alcohol abuse, conduct disorders, eating disorders and suicidal behaviors [70,71]. Taken together, of lifetime mental health conditions, approximately one-third have their onset before age 14, half by age 18, and fully three-quarters by age 24 [72].

Analyses of 19 longitudinal studies conducted over a 20-year period found that externalizing behaviors (e.g., fighting, drug use) appear to have been relatively stable, while internalized distress (e.g., suicidal thoughts and attempts) appears to be increasing [73]. Study authors concluded that internalizing problems appear to be worsening for adolescent girls, but boys' externalizing behaviors, while problematic, do not appear to have changed much over time. This worrying trend was echoed by Blomqvist et al. [74] The rise of depression has been well documented among adolescent girls since the 1980s, especially in high income countries such as Germany, Greece, Iceland, New Zealand, Norway, People's Republic of China and Sweden [75]. More recently, Shorey et al. [76] estimated an overall 14% increase in adolescent depression over the two decades of the current century (greater among female adolescents). Yang et al. [77], studying long term trends in anxiety, estimated that incidence of anxiety disorders consistently peaks in early adolescence.

Despite the rise of depression, adolescent suicide appears on the decline globally from yearly rates of 8.5 per 100,000 in the 1990s to 7.4 in 2014, although there are some countries that have seen increases in adolescent suicide: Japan, Korea, Latvia, Mexico, and New Zealand [78]. Historically, adolescent girls have had higher rates of suicidality (thoughts and attempts) than males, but lower suicide mortality [79]. With the proliferation of guns in the United States, there has been an increase in completed suicides among young adolescent girls 10–15 years old [80]. In an analysis of suicidality among adolescents in 32 low- and middle-income countries (LMICs), McKinnon et al. [81] reported a 12-month prevalence of 16.2% among females and 12.2% among adolescent males. Their study also found suicidal ideation to be significantly higher in the Americas than other

regions of the world. This pattern was supported by Global School-based Health Survey data analyzed by Abio et al. [82], who also found that suicidal ideation was lowest in Southeast Asia (7% of students), and particularly high in several countries in Oceania (Kiribari, 34%; Samoa, 34%; Nauru, 28%). In India, a meta-analysis by Malhotra and Patra [83] found nearly a quarter (23.3%) of school children had “significant mental health morbidity”. Suicide appears to be the leading cause of death among older adolescents in India [84].

While there is concern that adolescent mental health issues are increasing in sub-Saharan Africa, as Flisher et al. [85] indicate most published reports are based on small and often unrepresentative samples. Consequently, prevalence data are limited to small geographic areas such as the Western Cape and are frequently 15 or more years out of date. This point was underscored by Erskine et al. [86] who found that out of 187 countries, 124 had no data at all on adolescent mental health. In India, Aggarwal and Berk [87] reported that there was no consistent adolescent mental health data.

Loneliness. As has been seen with depression, there has been a dramatic increase in loneliness, especially among girls around the world. Specifically, analyzing PISA data from 37 countries, Twenge et al. [9] found a significant increase in loneliness between 2012 and 2018; by 2018, twice the number of adolescents were reporting feeling lonely than was found in 2012. Remarkably, trends in loneliness had been stable or even decreasing prior to 2012.

Data from mainly high-income countries, especially the United States, suggest the increase in loneliness parallels the increase in adolescent use of the internet and social media [9,88,89]. However, is it not yet clear if such relationships are causal or associational. It has been hypothesized that social media creates an exclusionary culture at school, exacerbating the experience of being an outsider [90]. Sherman et al. [91] suggested that social media favors superficial relationships, which in turn can enhance feelings of loneliness. Available evidence points towards a nuanced and bidirectional, rather than linear and unidirectional, relationship between internet or social media use and mental well-being. At the individual level, “well-being is usually highest at low levels of digital media use, not at non-use.” [92] Between 2011 and 2019, there were 42 studies from high-income countries that reported a reciprocal relationship between social media and depression. For example, Romer et al. [93] reported that heavy internet use (more than four hours per day of gaming and social media) predicted depression a year later. Conversely, other research has shown that depression predicted heavier internet use as well as diminished participation in noninternet activities [94]. It is important to note that the effect sizes for these reciprocal relationships are small and probably insufficient in themselves to explain the changes in loneliness and depression. More work engaging broader, more diverse adolescent populations is needed to understand the drivers of loneliness among adolescents worldwide.

Education

One of the great success stories since the establishment of the Millennium Development Goals in 2000 has been the increases in matriculation. Today, nearly 90% of children of primary school age worldwide have matriculated; and in 2021, approximately nine-out-of-10 children who matriculated in primary school

completed it [95]. Since 2000, the number of secondary-school-age children out of school has decreased by nearly 30%, although an estimated 195 million were still out of school in 2021 [96]. Additionally, in much of the world the sex gap in primary and secondary school enrollment have been all but eliminated. In fact, prior to the COVID-19 pandemic, girls matched boys in secondary school attendance at the global level [96]. In low- and middle-income countries, gross secondary school enrollment increased to 73% (up from 66%) for girls and 74% (up from 68%) for boys between 2010 and 2020 [97]. As enrollment has increased, so too has academic achievement. Standardized, internationally normed, tests point toward significant gains worldwide in improved learning outcomes [98]. While the trends are positive, the gaps between countries are substantial and significant; for example, in Vietnam over 80% of children achieve at least minimal proficiency in mathematics, reading and science while in the Democratic Republic of the Congo and Yemen it is closer to 40% [98].

Over the past decade, increases in adolescent educational attainment were matched by rising educational expectations. A survey of early adolescents living in seven low-income urban areas in five countries around the world found that, in every site sampled, at least 70% of young people planned on completing a minimum of an undergraduate university education [99]. The same study also found that gender differences in educational expectations, where present, favored girls; in Bandar Lampung, Indonesia, for example, 83% of girls expected to complete an undergraduate degree, compared with 61% of boys. The Young Lives Study – which provides longitudinal data for Ethiopia, Peru, Vietnam, and Andhra Pradesh, southern India – highlights how contexts influence the gap between educational aspirations and attainment. In Ethiopia, for instance, girls' aspirations for university education increased as they aged through adolescence, reaching 80% at age 19; boys' aspirations, meanwhile, peaked at age 15 (83%) and then fell to 75% at age 19 [100]. Across the four Young Lives study sites, those with higher educational aspirations stayed in school longer [101]. The UDAYA study, which has engaged more than 20,000 adolescents in the Bihar and Uttar Pradesh states of India, has found substantial proportions of young people staying in school through adolescence and into young adulthood. Specifically, in each state, approximately 30% of young women ages 18–22 were still in school if they were not married at baseline, when they were 15–19 years old [102,103].

While the improvements in education are encouraging, advances have been uneven globally with significant wealth and geographic gaps. Specifically, while only about 3% of lower-secondary-school-age adolescents from the wealthiest quintile around the world are out of school, 23% of their peers from the poorest quintile never matriculate. So too, there are sections of Central and West Africa where approximately 70% of those from the poorest households never attend secondary school. These data do not reflect the impacts of the COVID-19 pandemic on either enrollment or educational attainment [96].

Employment and economic opportunity

Despite the noted gains in educational attainment, girls and young women (ages 15–24) are still much more likely to be not in education, employment, and training (NEET) than are boys and young men [29]. In some regions, including sub-Saharan Africa and Latin America, the female-male ratio of such disconnection exceeds 2:1 [104,105]. Researchers have pointed out that

a major driver of this is young women's greater involvement in domestic duties and childrearing [104]. In fact, survey data suggest that many girls still see their futures dominated by childrearing and domestic duties – although significant variation exists across cultures and settings. In Vietnam, among 19-year-old females who were not seeking work, 15% reported that this was due to domestic or care duties; in India and Peru, this proportion was twice that or more [106]. Within high-income countries, however, gender differences in NEET are smaller (11.6% of young women and 10.6% of young men), and decreases in this outcome since 2010 have been similar (1.6 percentage points and 1.8 percentage points, respectively). More recently, the COVID-19 pandemic has exacerbated youth disconnection from school and work. The International Labour Organization reports that in 2022 73 million young people were NEET compared with 67 million in 2019 [107].

Leveraging a 101-country dataset, researchers found that, beyond adolescence, female workers remain over-represented in informal or other work arrangements; however, increasing educational attainment and decreasing family sizes counteract this outcome [108]. Research in Latin America suggests that young women engaged in informal work experienced some of the highest levels of job loss, although informal work also rebounded rapidly during the pandemic recovery [109]. Today, the labor force participation rate of young women (32.1%) is approximately two-thirds that of young men (47.5%) globally, a ratio that shrinks to one-half among youth in lower-middle-income countries (22.8% and 44.3%, respectively) [107].

COVID-19

The COVID-19 pandemic has been and will continue to be a critical, formative experience for today's adolescents. As the pandemic progressed, experts called attention to the potential ways it could affect adolescent development and later life experiences [110]. While the physical impacts on adolescents were significantly less than what was experienced in other age groups, COVID-19 brought a wide range of harm to well-being and daily life of young people, spanning domains of health, social interaction, and economic security; and, as Ramaiya et al. [111] note, within the pandemic's many impacts, "there are disparities, with poor, marginalized and vulnerable populations being disproportionately affected." The impact of the pandemic on adolescent mental health has been the focus of significant research, with clear and consistent findings showing elevated psychological distress [112], often buffered by protective factors such as family connectedness and social supports [113,114].

The pandemic also increased economic and food insecurity. In Semarang, Indonesia, for example, roughly a quarter of adolescents surveyed reported losses of income in their families; and boys especially reported food insecurity in their households (43% of boys and 25% of girls) [115]. In a survey of young adolescents in Kinshasa, DRC, food insecurity during the pandemic was reported by three out of five adolescents [116]. COVID also appears to have had lasting impacts on adolescents' educational attainment. Roughly half of boys and one-fifth of girls surveyed in Kinshasa reported thinking they would complete less education due to COVID-19 [116]. Research with adolescents in Ethiopia found that postreopening attendance at school was roughly 25% lower than before the pandemic, with girls and rural students less likely than others to return to school [117].

School closings during the pandemic also led to social isolation among adolescents. During the middle months of 2020, for example, just one in eight surveyed adolescents in Mexico and Chile reported contact with their peers [118]. Such social isolation and COVID related stresses have been credited with exacerbating adolescent distress [119]. As suggested by de Figueiredo et al. [120], the pandemic disrupted peer interaction (and as a consequence, social/cognitive development), while simultaneously increasing screen-time – two factors that may contribute to psychological distress. While school connectedness has been observed as an effective buffer against negative mental health impacts of the pandemic, research in the United States indicates that strong connections to school were significantly less present among students receiving virtual instruction [121].

Discussion

The present manuscript presents a review of recent health and behavioral trends affecting adolescents' lives and well-being around the globe. There have been laudable successes, as well as frustrating challenges. Where there have been marked improvements, they have been concentrated in the domain of adolescent sexual and reproductive health; and within this domain, global and regional progress has been found in the issues for which there have been concerted, consistent, and persistent efforts: HIV, child marriage and adolescent child-bearing, and FGM/C. Where issues have not been the target of long-haul, coordinated global public health investment — for adolescents, these include non-HIV STIs, nutrition, and mental health — we see outcomes have been unchanged or exacerbated. This pattern is far from new [122,123]. Indeed, the findings of the present review largely serve as a reminder that achieving good adolescent health globally requires effort and investment across all facets of adolescent's lives, rather than in a few priority siloes. Moreover, efforts should recognize potential synergies and leverage them to maximize progress across domains. The connection between gains in girls' educational opportunities and reductions in child marriage serves as one example [124,125].

Where possible, we have attempted to provide some insight into the ways that such trends have improved or exacerbated disparities across lines of country or region, gender, economic status, or more. While it may not be reasonable to expect progress to be globally uniform, such divergencies point towards the continued need for equity-focused policy and investment. Regarding gender inequality, for instance, *gender-transformative* approaches explicitly challenge gender norms that have deleterious impacts on the health of male, female, and gender-diverse adolescents, and there is growing evidence for their effects not only in norms change, but also in improving well-being [126]. At the same time, norms change efforts must be complemented by macro-level and multisectoral efforts to expand opportunity, safety, and stability, especially among the most disadvantaged adolescents, if equity is to be achieved [127,128].

The same goes for adolescent health research. Over the past decade, the field has grown in its attempts to unpack diverging experiences and identities of young people by gender, ethnic background, cultural background, and other factors. However, more work remains. Future research must more consistently take an intersectional perspective [129], better representing and serving those with diverse gender identities, sexual orientations, ethnic, cultural and racial identities, and others who have historically been excluded including Indigenous populations, young

people with cognitive and physical disabilities, and out-of-home young people. In other words, the study of trends in global adolescent well-being remains limited until we are able to be inclusive of *all* adolescents. In the words of Baird and colleagues, this requires research frameworks “that can grasp how structural inequalities and truncated opportunities for political and economic participation interact with social norms about age and gender to produce exclusion” [130].

In the past few years, researchers have developed such frameworks to inform thinking around these topics, including on the relationships between structural racism and healthy development [131,132]. Frameworks such as these represent valuable tools in bringing an equity focus to adolescent health research. However, significant work remains; the review on racism and indigenous adolescent development by Uink et al. [133], for instance, identified just 32 studies on this topic. There are also structural factors that remain underexplored, particularly in the context of global adolescent health. Religious discrimination serves as one example. Despite high and mounting restrictions on religious freedom around the world [134], research on the impact of religious discrimination on adolescent health remains limited. Further research explicating structural inequalities, unaddressed injustices, and ongoing disparities is needed to better inform and evaluate policies that support adolescent well-being.

Strengths and limitations

This was a selective review of recent research across several domains of adolescent health and well-being. As previously stated, the areas covered in this review were far from exhaustive; important topics not included are tobacco, alcohol and other substance abuse; injury and violence, including domestic and interpersonal violence; suicidality; or food insecurity. In focusing on a selection of topics, we have taken the opportunity to go beyond global data on levels and trends to provide some insight into variation across different adolescent populations. As previously stated, such disaggregation is key in building a nuanced understanding of the lives of adolescents today. Wherever possible, the statistics discussed in this review have been the latest available at the time of publication, including presenting findings on adolescent health and well-being during not only the pandemic but also the postpandemic periods.

It is also important to note several limitations in this review. While, due to data availability, some statistics included the broader age groups of children (0–18) or youth (15–24), this review focused on the adolescent population wherever possible. The investigation of recent trends among these other age groups, including demographic and developmental changes, is worthwhile but out of scope for this review. While many of the statistics cited come from nationally representative or meta-analytic data sources, this is not possible in all instances. Additionally, nationally representative samples often under-report the most vulnerable sub-populations, and lack the granular information necessary to conduct an intersectional analysis [135]. While international studies such as the Global Early Adolescent Study and Gender and Adolescence: Global Evidence have made strides in gathering data on adolescent populations not previously covered, more data are needed. There is a particular need for global data systems supporting adolescent mental health and refinement of the measures used in this domain. Despite the recognition of adolescent mental health as a growing global

crisis, data coverage remains low, particularly in LMICs. Further, as Ali et al. [136] have noted in their systematic review of mental health screening tools in LMICs, “many of the best performing tools... were developed from scratch for specific populations in particular settings.” Adolescents must be prioritized in the development of better approaches to mental health measurement, particularly given their increased vulnerability to mental health issues in the wake of COVID-19.

Additionally, this review largely examined quantitative, survey-collected data, with relatively less representation of qualitative research. Participatory methods that prioritize adolescents’ perspectives and agency, for example, can also provide a worthy lens and new insight into issues of adolescent well-being, although recommendations for high-quality conduct of such research are still developing [137]. Adolescent health topics should also be considered using a broader set of epistemological approaches. To date, the vast preponderance of published research on adolescent health and development has been conducted using Western methodologies, epistemologies, and definitions of rigor. However, the continued privileging of these approaches by Western researchers and mainstream academic journals can promote deficit-based understandings of young people who exist outside of a dominant culture; it shrinks opportunities for Indigenous scholars, practitioners, and youth; and it constrains the depth and breadth of our knowledge about what helps young people thrive.

Conclusion

Since 2010, the lives of adolescents around the world have changed in complex ways. In some areas, such as HIV, FGM/C, child marriage and adolescent childbearing, and secondary school enrollment, progress has been noteworthy. Trends related to nutrition and non-HIV STIs remain a cause for concern. In some areas, such as mental health and social connection, already worrying developments have been exacerbated by the global COVID-19 pandemic. Further, the gains experienced by some adolescents have not been experienced by others; disparities by gender, geography, poverty, and other areas of marginalization remain. Moving forward, the adolescent health research community must strive for more intentionally inclusive approaches and interrogate the structures that create inequities in adolescent well-being.

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