The age of adolescence

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Adolescence is the phase of life stretching between childhood and adulthood, and its definition has long posed a conundrum. Adolescence encompasses elements of biological growth and major social role transitions, both of which have changed in the past century. Earlier puberty has accelerated the onset of adolescence in nearly all populations, while understanding of continued growth has lifted its endpoint age well into the 20s. In parallel, delayed timing of role transitions, including completion of education, marriage, and parenthood, continue to shift popular perceptions of when adulthood begins. Arguably, the transition period from childhood to adulthood now occupies a greater portion of the life course than ever before at a time when unprecedented social forces, including marketing and digital media, are affecting health and wellbeing across these years. An expanded and more inclusive definition of adolescence is essential for developmentally appropriate framing of laws, social policies, and service systems. Rather than age 10–19 years, a definition of 10–24 years corresponds more closely to adolescent growth and popular understandings of this life phase and would facilitate extended investments across a broader range of settings.

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Introduction

The word adolescence derives from the Latin *adolescere*—to grow up. However, defining the phase of life that stretches between childhood and adulthood has long posed a conundrum. At the start of the 20th century, G Stanley Hall loosely defined adolescence as the developmental period ranging from age 14 to 24 years in his treatise on adolescence.[1] More than 50 years ago, WHO proposed that adolescence spanned from 10 to 20 years of age, noting that although it commenced with puberty, the endpoint was less well defined.[2,3] The UN Convention on the Rights of the Child defines a child as an individual aged 0–18 years and, in time, the UN has come to formally define adolescence as the period between 10 and 19 years of age.[4] Across different countries, cultures, and contexts this definition continues to be met with surprise, both about when adolescence starts (the notion that a 10-year-old person is a child, not an adolescent) and when it ends (the belief that a 19-year-old person is already an adult).

Overlapping with adolescence, the term youth became popular about the time of the UN's first International Youth Year, in 1985. Although youth is now typically defined as the period between 15 and 24 years of age, the Barcelona Statement from the associated world congress defined youth as a social category, and the congress proceedings were remarkable because of the absence of age definitions.[5] Most definitions of the more recently introduced terms young adulthood and emerging adulthood range from about 18 to 26 years of age.[6–8] Given such variation, it is no wonder that the more generic term young people is so often used without definition.

Another challenge is raised by the non-mutually exclusive definitions for the developmental years, particularly adolescence, in which a 16-year-old individual is a child, adolescent, and youth at the same time (figure 1).[9] These words convey very different meanings: child suggests dependency, youth signals independence, and adolescence captures the notion of the growing individual who is able to take increasing responsibility, but who still needs more protection than an adult.

This Viewpoint outlines the extent to which the patterns of biological growth and social role transitions that define adolescence have changed over time. We aimed to consider how well the current definition of adolescence aligns with contemporary patterns of adolescent growth and popular understandings of this life phase, because how we conceptualise and define this life phase influences the scope and focus of laws, policies, and programmes intended to protect and empower adolescents.

Distinct phase of biological maturation

Homo sapiens evolved as a slow-maturing species with distinct growth phases, including a long period of dependency in infancy, an extended period of childhood growth, and a prepubertal juvenile phase followed by a delayed puberty.[10,11] The activation of the neuroendocrine hypothalamic–pituitary–gonadal axis has long been considered the biological event that marks the start of both puberty and adolescence, but patterns of growth have changed over time. Puberty now starts earlier, a change largely believed to reflect improved childhood health and

Key messages

- Adolescence encompasses elements of biological growth and major social role transitions, with the timing of these development patterns varying across time and place
- How we conceptualise and define adolescence influences the scope and focus of laws, policies, and programmes intended to protect and empower adolescents
- The definition of adolescence as 10–19 years of age dates from the mid-20th century, when patterns of adolescent growth and the timing of role transitions were very different to modern patterns in many places
- An expanded and more inclusive definition of adolescence as 10–24 years of age aligns more closely with contemporary patterns of adolescent growth and popular understandings of this life phase

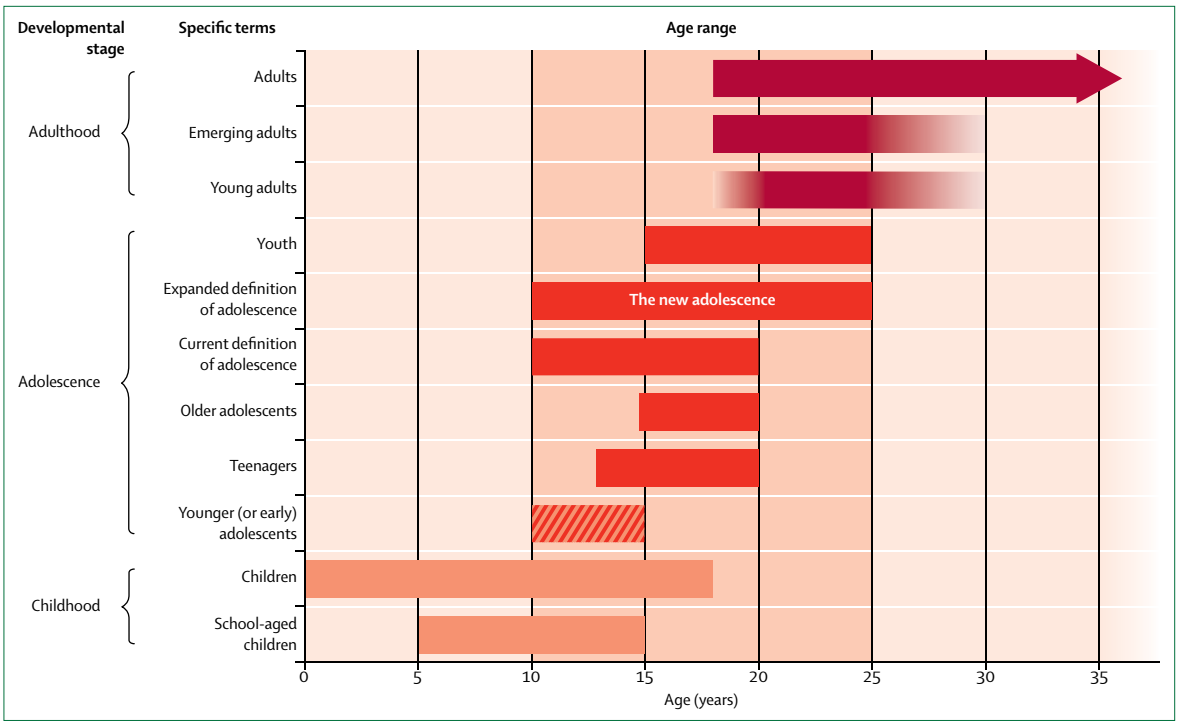

Figure 1: **Commonly used age definitions of specific terms of relevance for adolescence that span or overlap with the developmental periods of childhood, adolescence, and adulthood**

Colour shading highlights variation in the lower and upper age limits of the term. Stripes denote a term that sits within more than one developmental stage.

nutrition.[10] While the age of menarche has been reduced by 4 years in the past 150 years in early industrialised countries such as the UK,[12] these changes are occurring more quickly in newly industrialised countries. In China, the mean age of menarche has reduced by 4·5 months per decade in the past 25 years.[13]

Puberty consists of a series of distinct but interlinked hormonal cascades that consist of adrenarche (the activation of adrenal stress hormones that starts between 6 and 9 years of age), the growth spurt, and gonadarche (when pituitary gonadotropins trigger gonadal changes). In well nourished populations, the timing of peak height velocity occurs around age 11 years in girls and 13 years in boys.[14] 50% of girls have evidence of thelarche (breast budding) at age 10 years, and menarche (a late phase of pubertal maturation in girls) occurs around 12–13 years of age.[14] Those who believe that 10-year-old individuals are still children are, of course, correct, but the timing of biological maturation clearly signals entry into adolescence.

Biological growth and development has historically had less influence on the perception of when adolescence ends than when it starts. This is somewhat surprising because physical maturation continues into the third decade of life. For example, eruption of the third molars (so-called wisdom teeth) typically occurs in the mid-20s, similar to the age of ossification of the head of the clavicle.[15,16] Studies of brain development[17–24] have provided impetus to the view that biology might also help to frame the endpoint of adolescence. Although brain volume, regional functional specialisation, and cortical folding are largely similar to those of adults by mid-childhood,[17,18,19] the processes that underpin faster neuronal connections—including synaptic pruning, dendritic arborisation, and myelination—continue into the 20s.[20,21] White matter appears to mature hierarchically: basic sensorimotor and brainstem systems mature before executive systems do, while areas that support integration of executive and emotion systems are not fully mature until the late 20s.[22] After increasing from infancy to childhood, grey matter volume decreases throughout the second and third decades of life.[23,24] Refinements in brain structure and function continue across the third decade, paralleling the complex cognitive processing and socio-emotional regulation that strongly influence decision making, peer affiliation, behaviour, and wellbeing.[25] Therefore, although maturation of logical reasoning is considered complete from about age 16 years, the development of more mature affect regulation, social relationships, and executive functioning continues for at least another decade. Integrating these perspectives suggests that adolescence could be conceptualised as a phase of brain growth that begins before the visible signs of puberty (around 6–8 years of age) and continues for another two decades.[26]

Social role transitions

Historically, the end of adolescence was largely defined by social role transitions, especially those around marriage

and parenting. In the USA, the median age of marriage reached a nadir in the 1960s of 22 years for white men and 19 years for white women.[27] Since that time, the age of marriage has substantially risen in all but the poorest countries. In China, for example, the mean age of first marriage for women increased from 20·2 years in 1970 to 23·9 years in 2010, as did the mean age of first birth, which rose 5 years in the same period, from 21·7 years to 26·2 years.[28] Patterns of early marriage have also shifted. For example, in Indonesia, in 2002, the proportion of women who had married by age 15 years changed from 23% in 50–54-year-old women to 4% in 20–24-year-old women.[29] In many European countries, the age of first marriage now exceeds 30 years, cohabitation rather than marriage (including same-sex relationships) is increasingly normative, and the previous progression of transitions from education to employment, marriage, and parenting has become disrupted.[30] The upwards extension in the age at which many social milestones that previously denoted adulthood are now reached—such as partnering, parenting, and economic independence—reflects the changing expectations of education and training before employment, increased participation by women in the workforce, greater availability of and changing social norms around contraception, and difficulties in transitioning to economic independence. Apparent in all countries to varying degrees, the phase of semidependency that characterises adolescence as a social construct has expanded.

Great expectations

The upwards extension of the timing of role transitions to adulthood has been followed by shifts in the social environments in which adolescents are maturing. The social world in which adolescents are growing up is more urbanised, mobile, and globally networked than ever before. Notwithstanding the benefits of socially connecting with peers, peer influences are increasingly amplified by social media and exploited by industry in ways that undermine health and wellbeing. These powerful influences shape health and lifestyles well into the 20s, reflecting a need to think differently about the age focus of regulatory strategies.

A view of adolescence as a developmental phase for acquiring the assets for later health and wellbeing[6,31] resonates with the endeavours of adolescents who are actively shaping their environments through contributions as change agents and decision makers within communities. Policies that are designed to promote engagement and partnerships with adolescents through to the third decade of life are essential for adolescents to gain the social, emotional, cultural, and economic assets that will enrich their later lives and those of their children.

However, different views of adolescence mean that 15-year-olds can be old enough to be married in one country but too young to leave school in another. Although many adult legal privileges start at age 18 years, the adoption of adult roles and responsibilities generally occurs later. Laws have been used to both protect and empower adolescents, but the justification for different laws at different ages is not always apparent. Historically, many laws were primarily enacted to safeguard vulnerable children, such as laws denoting the minimum age for employment, military service, and marriage.[6] Consistent with the age of mature logical reasoning, various laws in different countries give particular legal rights and privileges of adulthood to citizens well before 18 years of age, such as when individuals can consult a doctor without parental consent. Other laws restrict full adult rights beyond 18 years of age, such as rights regarding alcohol purchase or in relation to driver's licences.

In 2016, New Zealand changed its child protection system to recognise its protective duty to people older than 18 years on leaving care as a result of their continued vulnerability.[32] Rather than the previous abrupt end to care at age 18 years, adolescents are given leaving care grants, and local authorities are required to provide housing support and other services during a transitional period from 18 to 25 years of age, as families generally do. Laws can also promote civic engagement and, in 2016, Japan reduced the voting age from 20 to 18 years with that intent.[33] Some Japanese commentators have urged similar age reductions in other laws, such as buying alcohol, which is legal from age 20 years, calling for consistency about the age of adulthood. Rather than consistency, a developmental approach to legislation would differentiate the objective of laws that aim to protect adolescents from harm (in which the legal age might be higher) from those that promote participation and empowerment (in which the age might be lower). Given the safety of voting, for example, Japan could do well to replicate legislation in Scotland that reduced the voting age to 16 years.

Lifetime success in negotiating high unemployment, changing labour markets, and new technologies can be facilitated by adolescents gaining attitudes and skills that support adaptability, entrepreneurship, and resilience. In the past century, public education in high-income countries was mandatory until age 14–16 years. However, education systems are rapidly expanding upwards in all places, notwithstanding continued differentials in the average years of education in high-income, middle-income, and low-income countries.[34] In countries that are members of the Organisation for Economic Co-operation and Development, the average proportion of 25–34-year-olds with tertiary education increased from 25·9% in 2000, to 43·1% in 2016.[35] Community values that support early school leaving, whether due to marriage for girls or unsafe employment for boys, are inconsistent with views of adolescence as the crucial time to gain the necessary educational and social assets for future employment, empowerment, health,

and wellbeing.[6] Given the increasing years of education that are required to enter the modern economy, a definition of adolescence that ends at 19 years of age is equally inconsistent with these views.

Lengthier schooling means that adolescents rely on families for longer periods. Many countries that have expanded mandatory schooling have not had a commensurate increase in the age at which poor families with dependent children can obtain financial support. In low-income and middle-income countries, cash transfers to students and families are intended to reset the balance between the costs of education and foregone income from adolescent employment in favour of continued schooling, especially for girls at risk of early marriage. Welfare policy also needs to keep pace. In Australia, people aged 16–21 years who are out of work are less supported by government unemployment benefits than older adults. Although intended to encourage education and training, the benefit is only two thirds of the minimum wage; adolescents without family support can rapidly become extremely vulnerable.

Disease burden and health risks rapidly change across puberty through to the mid-20s,[6,36] epitomised by emergent needs for sexual health, mental health, and substance abuse services. These changes place particular responsibility on the health-care system, which has yet to view adolescence as an important period in which healthy growth and development can be promoted, preventive actions instituted, and chronic health conditions managed. Specific clinical practices and funding models are required to deliver universal health coverage to adolescents. Too often, health practices and policies, including funding models, reinforce the role of parents as gatekeepers or, alternatively, expect adolescents to be fully independent. In high-income countries, health insurance that covers 18–24-year-olds on family policies is consistent with the benefit of families continuing to support adolescents who cannot afford health insurance. However, more attention is needed to truly guarantee confidentiality, and many insurance policies only cover adolescents who are studying full time. The fragmentation of health services, such as the separation of mental health and sexual health from other health systems, as seen in many parts of the world, limits the delivery of the comprehensive care that adolescents need. It is pleasing that national paediatric societies are increasingly lifting their upper age limit, as too many societies still define their upper age threshold around puberty. Few extend this limit as high as the American Academy of Pediatrics, which, with an upper age limit of 21 years, is better aligned with views of adolescence as a crucial time for maximising healthy growth and development.[37] Expanding adolescence upwards in age would give much needed impetus to accreditation bodies that are yet to ensure that these views influence contemporary training priorities and assessment practices for primary health and specialist services.

A major challenge is to shape a more globally comparable and comprehensive data collection system for adolescents than the available patchwork. During the Millennium Development Goals era, global approaches to monitoring adolescent health were ad hoc, consisting of various surveys that were not designed to measure the major contributors to the disease burden of adolescents and were highly variable in age (figure 2). Few surveys extend the age limit downwards to assess even the most fundamental aspects of growth and nutrition in early adolescence, and there are equally large deficits in the upper age of children's surveys that ostensibly measure adolescent health. Some adult surveys include adolescents as young as 15 years of age, yet too often do not present age-disaggregated data. Perhaps influenced by ethics committees, which require complex consent processes for legal minors, many globally relevant surveys only recruit adolescents that are 18 years or older, such as the World Mental Health survey. Some surveys that partly include adolescents report age-disaggregated data (eg, 20–24 years *vs* older ages within adult surveys,

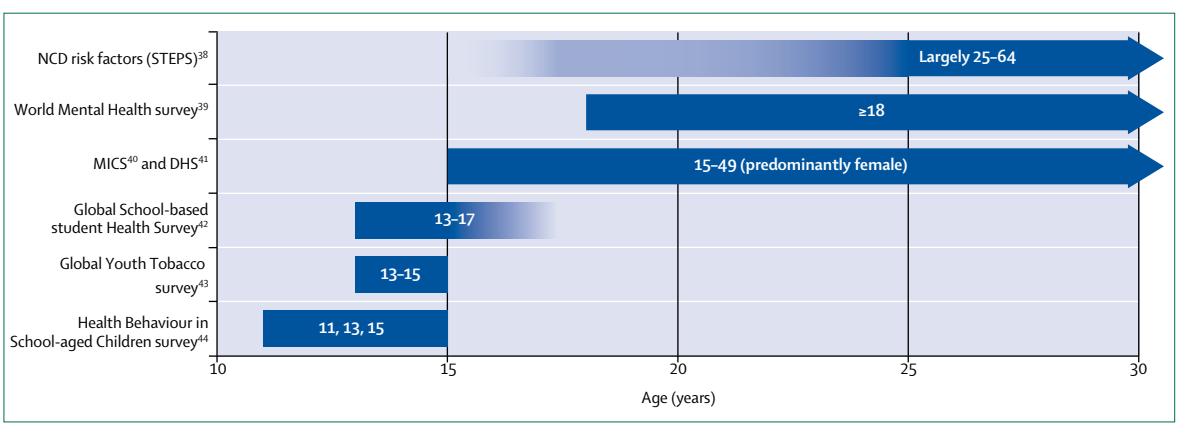

Figure 2: **Age ranges of globally relevant adolescent health surveys**
Colour shading highlights where there is variation in the lower and upper ages used in the surveys. NCD=non-communicable disease. STEPS=STEPwise approach to Surveillance. MICS=Multiple Indicator Cluster Survey. DHS=Demographic and Health Survey.

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or 10–14 years *vs* younger ages within child surveys), but such approaches are inconsistently practiced.

Naming the age of transformation

The new era of the Sustainable Development Goals and the Global Strategy for Women's, Children's and Adolescents' Health provides a timely opportunity to seriously tackle the challenge of implementing multisectoral investments for adolescents.[4,45,46] Given the increasing demands on adults in the workplace and family life, there is every reason to maximise investment across the transition from childhood to adulthood, which has been shown to yield substantial economic, social, and health returns.[47] However, how we conceptualise this transition ultimately frames the scope and duration of societal investments.[6]

Age definitions are always arbitrary, and chronological approaches to the definition of adolescence will continue to be shaped by culture and context. However, puberty marks a major point of discontinuity, with the next phase of growth and neurocognitive maturation continuing past 20 years of age. Tied to the widely spread postponement of role transitions to adulthood, our current definition of adolescence is overly restricted. The ages of 10–24 years are a better fit with the development of adolescents nowadays.

There are some potential downsides. Given the recent focus of global health policy on 10–19-year-olds, policy makers in low-income and middle-income countries might argue that expanding the age definition of adolescence to 24 years risks diluting already insufficient policy focus and funds. However, the existing piecemeal system is poorly coordinated and does not deal adequately with the needs of any adolescent age band. A more comprehensive definition of adolescence would facilitate greater efficiency and coordination and enable a greater focus on the crucial transitions beyond secondary education, including training and employment. Concerns about not expanding the definition upwards because of the proportion of 10–19-year-olds who are already parents also seem misplaced. Rather, extending the definition of adolescence could allow girls, in particular, to better fulfil their life chances by promoting opportunities for education, empowerment, and future employment.

Perhaps the greatest risk to expanding the age band of adolescence would be if adolescents are seen as incapable of full engagement in society and of assuming responsible roles. Such a view would risk disenfranchising adolescents and undermines their rights to fully participate in society. An emphasis on adolescence as a unique phase of energy and creativity, as well as some vulnerability, would allow society to both value the contributions of adolescents and ensure that optimal investments are made to support their healthy growth and development.

Contemporary patterns of human development have changed the developmental period of adolescence around the world. Old notions and static views risk limiting the duration of investments in the full scope of policies and programmes that can maximise adolescent growth, health, and wellbeing. When given the opportunities and resources to learn, explore, create, and discover, adolescence can be a transformative life phase in which to acquire the essential assets for the future functioning of the adults of tomorrow. *The Lancet* Commission on Adolescent Health and Wellbeing suggested that "this generation of adolescents and young adults can transform all of our futures".[6] Eschewing a narrow focus, an expanded view of adolescence will help to ensure that they have the time and resources to do so.

Contributors

SMS and PSA conceptualised this Viewpoint. SMS drafted the manuscript which all authors contributed to. All authors approved the final draft.

Declaration of interests

We declare no competing interests.

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