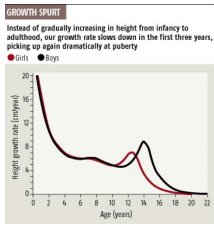


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By: Vlad Tarko, Senior Editor, Sci-Tech News



Adolescence

The troubled age

From around 11 years old to approximately 18, people live a very peculiar period of their life. Teenagers are known to be moody, insecure, argumentative, angst-ridden, impulsive, impressionable, reckless and rebellious, as well as having odd sleeping patterns, awkward growth spurts, acne and various unhealthy habits. Psychologists have long been intrigued by the existence of this phase in human lives especially as no other species experiences such a thing, developing rapidly from infancy to full adulthood. This was also true for our own ancestors. The teenager is a uniquely human phenomenon. Scientists once thought that the brain's internal structure was fixed at the end of childhood, and teenage behavior was to be blamed on hormones and a lack of experience. However, it was recently discovered that the brain undergoes significant changes during adolescence. These changes help explain the peculiarities of adolescence behavior, although it still remains unclear why humans developed to experience such a phase. What could be the benefit of the teenage phase? **Why does adolescence exist?** Some scientists believe that we need more time for our large brains to develop. Others suggest that a teenage phase allows children to learn about complex social behavior. Studies of the growth patterns (see picture above) show that the rate of growth decreases during childhood only to have another surge during adolescence. Whatever the benefits or "purpose" of this second "growth spurt", it is clear that what made it possible was an increase in life expectancy. Rachel Caspari of the University of Michigan has shown that an astonishing increase in longevity separates modern Homo sapiens from all other hominids, including [Neanderthals](#). She categorized adult fossils as old or young by assessing whether they had as much wear on their last molar, or wisdom tooth, as on other molars. "In modern humans we see a massive increase in the number of people surviving to be grandparents," she says. This happened around 30,000 years ago. This may be the time when adolescence appeared in the biological realm. However, it is interesting to note that nevertheless, for most of the human history (as recent as the 18th century), adolescence has remained an unrecognized phase of human existence. For example, the Princeton anthropologist Robert Darnton, has shown in his book 'The Great Cat Massacre and Other Episodes in French Cultural History' that in 18th century France or Germany teenagers were treated as young adults and had to engage in work activities and so on. The recognition of adolescence is a relatively recent discovery. **What happens in the teenagers' brains?** According to many recent studies, teen brains really are unique. Though many brain regions mature during childhood, others mature later. Among these are the frontal cortex and parietal lobes, responsible for planning and self-control. This is why teens often fail to see the consequences of their actions, act impulsively and take more risks. Abigail Baird, a cognitive scientist from Dartmouth College, and her colleague, Jonathan Fugelsang, created a test for determining the risk assessment capacity. Teenagers and adults were shown scenarios on a computer screen, such as eating a salad or swimming with sharks and then they had to judge whether each was safe or dangerous. The researchers found that it took longer for a person to label a situation "dangerous", than it took to label it "not dangerous". However, in case of adults the difference between "dangerous" and "not dangerous" was 1.6 seconds, while in case of teenagers it was 1.75 seconds. Brain scans taken during the test have also shown that teens used their prefrontal cortex more, suggesting they were making a greater effort to judge each situation. The adults had more basal ganglia activity, pointing to a more automatic response. A 2004 study has also showed that teens have less brain activity in areas responsible for motivation and risk assessment, perhaps explaining why they are

more likely to take part in risky activities. Other studies show that during adolescence there is a sudden increase in nerve connectivity, particularly in the prefrontal cortex. This has been correlated with teens' relative inability of reading social situations and other people's emotions. The brain scans showed that the brain's frontal cortex thickening just before puberty, then slowly shrinking back to normal during the teenage years. According to psychologists in California, the speed with which youngsters can read the emotional expressions on people faces dips suddenly at around the age of 11 or 12 and takes years to get back on track. This is caused by the fact that the intense nerve activity in the adolescent brain makes it hard to process basic information, rendering the teenagers emotionally and socially inept. Robert McGivern and his team of neuroscientists at San Diego State University, US, also found that as children enter puberty, their ability to quickly recognize other people's emotions plummets. This ability does not return to normal until they are around 18 years old. He and his team devised a study specifically to see whether the prefrontal cortex's ability to function is altered with age. Nearly 300 people between 10 and 22 were shown images containing faces or words, or a combination of the two. The researchers asked them to describe the emotion expressed, such as angry, happy, sad or neutral. The team found that the speed at which people could identify emotions dropped by up to 20 per cent at the age of 11. Reaction time gradually improved for each subsequent year, but only returned to normal at 18. "During adolescence, social interactions become the dominant influence on our behavior, says McGivern. "But at just the time teenagers are being exposed to a greater variety of social situations, their brains are going through a temporary 'remodeling'. As a result, they can find emotional situations more confusing, leading to the petulant, huffy behavior for which adolescents are notorious. **When does it end?** It is not known exactly what marks the transition from adolescence to adulthood. The end of puberty, or sexual maturation, is well defined. It is the point when bones stop growing, at around age 16 for girls and 17.5 for boys. But for adolescence, the transition from childhood to adulthood, there is no clear endpoint. "I don't know of any markers for it," says Till Roenneberg of the Centre for Chronobiology at the University of Munich in Germany. "Everyone talks about it but no one knows when adolescence ends. It is seen as a mixed bag of physical, psychological and sociological factors." **How many teenagers are there?** Today's teenage generation is the biggest the world has ever seen, according to UN reports. One in five people on Earth are adolescents between 10 and 19 (about 1.2 billion of the world's 6.3 billion people), and about half the world's population is under 25. Almost 90 per cent of teenagers live in the developing world. The youthfulness of the world's population carries dangers, the report warns. Teenagers are the most vulnerable to HIV/AIDS, the health impacts of poverty, drugs, discrimination, violence and sexual trafficking. However, today's youth also poses a unique "demographic window" and "economic opportunity", says the report. "Countries can mobilize their young people's potential, and launch an economic and social transformation. Provided education and health care is available, the teenagers could become in their twenties a productive engine and will drive development as they did in the Asian Tiger economies." **Case study: The health of British teenagers** Adolescence sure is a difficult period and parents, schools, and society as a whole apparently don't really understand it. This cannot lead to anything good, as the reactions toward teenagers are largely improper or off-track. In one case, the awareness of this fact has reached the surface of public opinion as the British Medical Association (BMA) presented its analysis of teenage health in the UK: under-age sex, binge-drinking, drug abuse, smoking and poor diet are contributing to epidemics of obesity, ill-health and sexually transmitted diseases. Nearly one in five 15-year-olds are overweight or obese. Psychological problems such as depression and anorexia now afflict one fifth of adolescents, says the report. These problems are being fuelled by an increasingly impoverished diet, insufficient exercise, excessive alcohol and drug consumption, and tobacco smoking. According to the BMA, less than 15 per cent of girls aged 13 to 15 eat the recommended amount of fruit and vegetables. Almost a quarter of 15 and 16-year-olds will have smoked cigarettes in the past

week, and a fifth will have taken an illegal drug in the last month, says the document. Sexual health in adolescents is also deteriorating. One in ten young women aged 16 to 19 may be infected with Chlamydia, which can lead to infertility and ectopic pregnancy. The rate of teenage pregnancy is also high - but stable - at around 3 per cent. "It seems that adolescents are the only group whose health is getting worse," says Russell Viner, consultant in adolescent medicine at Great Ormond Street Hospital in London. "Better drugs are protecting older people from disease and vaccinations have brought huge improvements for infants. But for people in their teens there are social health problems which mean worrying rates of accidents, suicide, drug use, pregnancy and sexually transmitted diseases." The BMA is calling for a comprehensive plan to tackle the root causes of deteriorating teenage health. It recommends a ban on alcohol advertising and an increase in the price of cigarettes to reduce their affordability to teenagers. It says mental health can be improved by teaching teenagers basic social skills and through anti-bullying policies in schools. Sexual health can be improved by enhancing sex education and through easier access to contraception and confidential advice. Vivienne Nathanson, the BMA's head of science and ethics, says: "Services targeting the needs of adolescents are almost non-existent. We must invest properly in sexual health and provide services that young people feel comfortable using if we are to reduce the burgeoning levels of sexually transmitted diseases." *Image credits: Mark Paris* **RESURSE** [Siblings' Bad Habits Are 'Contagious'](#) [Underage Youths Drink More Alcohol When 'Flooded' by Ads](#)