

## background

Report # 79

Understanding Adolescent Behavior

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# A Tumultuous Stage In Children's Lives

*Looking beyond biology and puberty to understand adolescent behavior*

Adolescents can be a puzzle, a tinderbox of emotion prone to impulsive, erratic behavior. Ask a parent why this is, and raging hormones are often mentioned. But scientists are learning that such simple explanations belie the complexity of this tumultuous stage, when the seeds of life-long problems are sown for some and others choose paths that take them to the height of their potential.

"Adolescence is not simply biological changes or brain changes," says Ronald E. Dahl, MD, Staunton Professor of Psychiatry and Pediatrics at the University of Pittsburgh's Western Psychiatric Institute and Clinic. "We also have to think of it in terms of social context."

As a developmental stage, the adolescent years are relatively understudied and not well understood. Yet it is a critical time in the lives of children.

Death and disability rates double from the period of early school age into late adolescence and early adulthood. Trouble controlling behavior and emotion, in large part, drive the higher rates of accidents, suicide, homicide, violence, health problems related to risky sexual behavior, and other troubling outcomes seen among adolescents.

Many adults who smoke had their first cigarette as an adolescent. Many alcoholics took their first drink as an adolescent. Many adults who struggle with chronic depression experienced their first episode during adolescence. An increase in the prevalence of other behaviors is also seen, including social anxiety, eating disorders, and psychosis.

While these behaviors do not lead to long-term problems in most adoles-

cents, they do for some. "It is the entering point for patterns of behaviors that are going to have long term consequences," said Dr. Dahl. "There is a need to understand how these begin in adolescence."

## No Simple Answers

A barrier to understanding adolescence is the complexity of this developmental stage. Puberty, for example, is accompanied by physical changes and the onset of sexual maturity. It also sparks new drives, impulses, emotions, motivations, changes in arousal, and behaviors and experiences that challenge an adolescent's self-regulation abilities.

Dr. Dahl and a diverse group of colleagues at the University of Pittsburgh take a broad, interdisciplinary approach to their research, embracing a model that links the development of psychopathology in adolescence to specific factors that converge during those

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*Understanding adolescence is critical to public policy. For example, when is an adolescent fully responsible for his or her behavior? The answer is central to issues ranging from the drinking age to the debate over applying the death penalty to adolescent offenders.*

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years, including biological and cognitive factors, and those related to an adolescent's everyday environment, such as family, peers, and community.

They are particularly interested in the relationships between adolescent behavior and self-regulation. A key issue is how changes in arousal and motivation outpace more slowly-developing self-regulation abilities – a situation scientists liken to starting the engine of a car with an inexperienced and unskilled driver behind the wheel.

Brain development is another important factor. While much of the brain develops during the first few years of life, shaped by both biology and experience, it doesn't stop there. Recent research suggests that several key regions of the brain, including areas of the frontal cortex and the cerebellum, undergo remodeling during adolescence.

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the brain development during adolescence occurs in the regions and systems that play critical roles in regulating behavior and emotion and in perceiving and evaluating risk.

**The Importance Of Context**

Central to understanding adolescent behavior is the context in which all of the physical, emotional, motivational, and cognitive developments occur. This includes considering the influence of peers, family, school, work, media, romantic relationships, culture, a child's community, and society in general.

Several aspects of contemporary adolescence are particularly important. One is the onset of puberty, which occurs much earlier today in industrialized societies — girls typically reach menarche, a late event in female puberty, before age 13. The earlier adolescents reach puberty, the earlier they face the many changes that come with it.

Today's adolescents are often confronted with more decisions, more complex decisions, a much wider range of options, and greater challenges to their self-control than in other eras. Meanwhile, their parents' jobs, high rates of divorce and separation, and other factors have led to diminished adult supervision and less time with family, giving young adolescents fewer resources to draw upon when dealing with the changes they experience.

One example of how biological changes of adolescence and the context in which they occur might converge to create difficulties can be seen in disrupted sleep patterns. In puberty, the need for sleep increases a bit, while a shift in the circadian clock results in a slight tendency to stay up longer.

These biological changes are subtle enough that most adolescents in a highly-structured environment will not have trouble going to sleep early and

getting up early. But for some, a little freedom and the distractions of contemporary adolescence can be a recipe for problems. Once sleep patterns shift, resetting them can be difficult.

"They are not reading by candlelight anymore," Dr. Dahl said. "They have a multitude of stimulating things going on: They are often immersed in the cyber world with 12 friends IMing [computer instant messaging], text messages coming in on their cell phones, several windows open on the computer, listening to music on their iPod, and what they say they are doing is working on their homework. That's a lot of arousal."

During the summer and on weekends it is easier and more tempting to stay up late and sleep later. Parents who don't enforce limits on going to bed can also be a factor. "You begin to see how the convergence of individual differences — some of which may be genetic and some that are social — and the developmental change of puberty begin to play out in an adolescent who is chronically sleep-deprived," Dr. Dahl said.

Most adolescents struggle with sleep to some degree. But for a few, this becomes a time when things unravel. Imagine an adolescent with a genetic vulnerability to being depressed, or who already has mood problems or is unpopular and not well

adjusted to school. "Then he or she breaks up with a girlfriend or a boyfriend and everyone says that was the event that caused the adolescent to become depressed," said Dr. Dahl. "Maybe. But there were probably many other things that were unraveling the system."

His group is also studying what happens during puberty that influences emotions and motivation. For example, it might be that part of the reward anticipation system is more intense at puberty. "This idea that kids think they are invulnerable, I think, is fundamentally wrong," Dr. Dahl said. "In fact, being scared is half of the thrill. With adolescents who get into problems by being thrill-seekers, the fear becomes something larger that they start to enjoy. It doesn't immediately stop their behavior. It can feel sort of good."

A deeper understanding of such issues and of adolescent behavior in general has its benefits. Scientists hope to better define pathways to depression, alcoholism, and other problems; identify at-risk adolescents; and inform interventions. Understanding adolescent behavior is also critical to public policy. For example, when are adolescents fully responsible for their behavior? The answer is central to policies ranging from the legal drinking age to applying the death penalty to adolescent offenders.




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## references

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## contacts

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