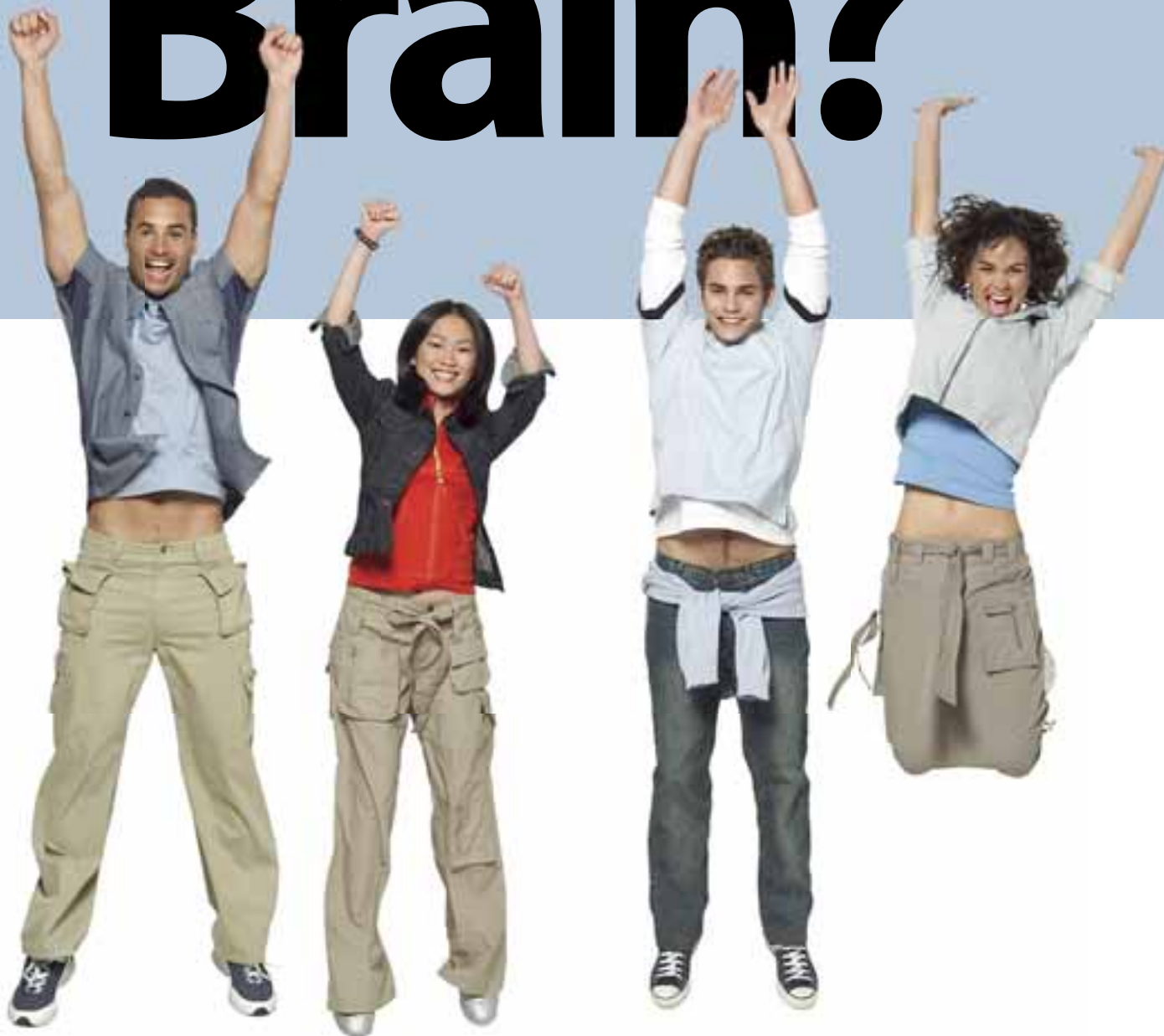


What's Going On in the Teenage Brain?



Teenagers are at a point in their lives when they're eager to test their independence, experience their emotions more fully, explore their developing sexual nature, plan for the future, and — often — question all of the above, sometimes explosively.

By Keith Ferrell

A child's body goes through physical changes that are obvious to all parents. Less obvious are the vital changes taking place in a child's brain, particularly as she enters her teenage years. The brain, after all, is part of the body and, more importantly, is the organ that controls — or tries to control — the body's activities.

Teenagers confront challenges, pressures, stresses, temptations, and risks in brains that are not yet fully developed. It's not just that teenagers haven't had the time and experience to acquire a wide sense of the world; quite simply, their brains just haven't physically matured yet.

Dealing with pressure and stress is no small challenge for a fully mature brain, much less one that's in transition from childhood to adulthood and in transition from concrete to abstract thinking. That is why it's even more important for parents to understand what their children's brains are going through as parents monitor — and often worry about — their children's social, academic, and emotional challenges.

Growing a Brain

Like their bodies, different children's brains develop at different speeds. "The important concept here is that the adolescent brain is still developing and not yet fully mature," says Andrew Garner, M.D., FAAP, member of the American Academy of Pediatrics Committee on Psychosocial Aspects of Child and Family Health.

Not only that, brain scans show that parts of the brain don't grow the same.

"Scans of normal kids have revealed that different parts of the brain mature at different rates," he says. "In fact, some parts of the brain — such as the prefrontal cortex (PFC) that sits right behind the eyes — do not appear fully mature until 24 years old! Other parts of the brain, like the walnut-shaped amygdala (AMG) that sits deep in the brain, appear to be fully mature much earlier. Many neuroscientists think that this mismatch in brain maturity may explain a lot of adolescent behavior."

Understanding what those mismatches can mean is one of the challenges facing scientists studying adolescent brain development.

"For example," says Dr. Garner, "the PFC is thought to play an important role in regulating mood, attention, impulse control, and the ability to think abstractly — which includes both the ability to plan ahead and see the consequences of one's behavior."

"The AMG, on the other hand, is thought to play a role in emotion, aggression, and instinctual, almost reflexive responses," Dr. Garner says. "Neuroscientists have long thought that the mature PFC regulates the AMG, putting a break on emotional, aggressive, or instinctual outbursts. The realization that the AMG matures, or comes 'online,' sooner than the PFC suggests that a mismatch may be contributing to the emotionality and impulsivity of adolescence."

Beyond Brain Growth

What sorts of behavior and emotional responses could indicate that a mismatch is affecting the child's nature? Garner says that research into the nature and effects of possible mismatches is still taking place, reminding parents of their responsibility to address behavior problems as well as "diagnose" them.

"While adolescents might tend to be more moody and impulsive — and we now have some reason to believe that this might be reflecting a 'normal' part of brain development — our job as parents is to get them to slow down and help them think through what they are doing," he says.

But not everything can be blamed (or should be blamed) on brain development. "It is important to note that the PFC is still functioning in adolescence. But, because it isn't completely mature, it simply isn't working as fast as it will when it matures," he says.

That difference can have tragic consequences, Dr. Garner explains.

"If you ask a teenager whether it is a good idea to get into a car with friends who are drunk, most would say 'no way.' That's the PFC talking. In calmer moments, the relatively slow PFC is able to think abstractly and see the potentially dire consequences of driving when drunk. But, in the heat of the moment, the relatively more developed AMG screams 'just do it' before the PFC knows what happened. The same process might play a role in teen violence, substance abuse, and even suicide."

Managing the Extremes

Extreme behavior and emotions are clearly matters that call for medical and professional attention and counseling. But it's also true that all adolescents exhibit at least occasional outbursts or episodes of misjudgment. Teenagers are human, after all — and so are their brains.

How can parents best assure themselves that their child's brain is developing normally? What can teenagers do to help their brains make the transition to adulthood? Dr. Garner's advice aims at helping teens and parents focus on the future.

"I usually counsel teenagers to have a plan for after high school because a future orientation is a good predictor of transitioning through adolescence well," he says. "It is likely to be a good marker for PFC functioning and the ability to handle abstract thought."

Garner also reminds parents to be alert to the warning signs of emotional problems — whether or not those problems are directly related to brain development.

"As long as teenagers are social, eating and sleeping well, and working towards the fulfillment of their plan (for most, good grades leading to college), then I'm happy and their parents should be happy, too. If, on the other hand, they are withdrawn or acting out, not eating or sleeping regularly, or are letting their grades or dreams pass them by, then I encourage the parents to sound the alarm and get some help." •