

Chapter 17

The Adolescent Period: Challenges and Opportunities

What is happening in the adolescent brain? Adolescence is a time of unique possibilities and challenges in development. Recent research has highlighted some dramatic transformations in the adolescent brain that bear directly on education (Blakemore & Frith, 2005). In adolescence, these changes mainly occur in the frontal and parietal cortices, which are the site of executive functions, a general term used to describe higher-order cognitive processes (Blakemore & Choudhury, 2006). Myelination of the frontal cortex, which allows for smooth and efficient processing of information, proceeds continuously over the course of adolescence but is not complete until early adulthood. During adolescence, the creation and myelination of new synaptic connections occur, as well as the pruning of unused, unpracticed connections. These activities are most pronounced in the prefrontal cortex, located right behind the forehead—which plays a role in self-control, judgment, and emotion regulation—and in the temporal lobes, serving language functions and contributing to emotion regulation (Sawyer et al., 2012; Casey, Giedd, & Thomas, 2000; Sowell, Thompson, & Toga, 2007).

Because the adolescent brain is, in many ways, rewiring itself depending on what is learned and experienced, this stage of synaptic reorganization may be particularly sensitive to inner and outer experiences related to emotions and social relationships (Blakemore, 2008). In the case of learning, mild stress can enhance memory, but chronic or excessive stress can result in damage to parts of the brain that are critical for new learning and memory consolidation (Sapolsky, 2004).

Concurrently, adolescents' risk-taking behavior is at an all-time high. However, the propensity toward risky behavior is not sufficiently kept in check by a well-functioning internal monitor (prefrontal cortex), a situation described by Dahl (2004) as "turbo-charging the engines of a fully mature car belonging to an unskilled driver." Thus, the pattern of neurobiological changes that occurs in adolescence may make adolescents especially sensitive to distress during this period (Walker, 2002), and many researchers now consider adolescence to be

a *stress-sensitive period* of development (Steinberg, 2008). Compared to other stages of the life span, the changes in hormone levels that occur during adolescence are the most rapid (Fatahdi et al., 1999). In addition to increases in pubertal sex hormones, greater activation of the HPA axis has also been demonstrated. Recent longitudinal studies have found that levels of cortisol rise gradually through middle childhood and increase rapidly around age thirteen (Walker & Bollini, 2002). Studies of adults have consistently linked increases in HPA reactivity, as measured by cortisol increases, with unipolar and bipolar disorders, schizophrenia, and post-traumatic stress disorder (Müller, Holsboer, & Keck, 2002; Post, 2007; Walker & Diforio, 1997). Some evidence suggests a similar pattern for adolescent disorders, notably depression (Birmaher & Heydl, 2001; Goodyer, Park, Netherton, & Herbert, 2001). Although all of the mechanisms are not completely understood, both hormonal changes and maturation of the HPA axis appear to influence how the brain gets reorganized (Romer & Walker, 2007; Walker, Sabuwalla, & Huot, 2004).

What is happening in the environment during adolescence? Contemporary adolescents also face a host of environmental challenges that can threaten their social and emotional well-being, including the poor fit between developmental needs and the structure and curricula of schools (Eccles, 2004), a decline in academic orientation and motivation starting in the early adolescent years (Gutman, Sameroff, & Cole, 2003), increasing psychological separation from parents (Darling, Cumsille, & Martinez, 2008), increasing susceptibility to peer influence (Sim & Koh, 2003), pressures of romantic relationships (Collins, 2003), participation in antisocial or risky behaviors (Reyna & Farley, 2006), and heavy exposure to media. Media messages serve as standards for social comparison that may undermine self-esteem, mold expectations for normative behavior, and amplify values that may be at odds with those of families and communities (Comstock & Scharrer, 2006). Increases in feelings of distress in early adolescence are largely attributable to increases in depressed mood (Garber, Keiley, & Martin, 2002; Hammen & Rudolph, 2003) and conflicts with parents (Larson & Richards, 1994; Laursen & Collins, 1994). Declines in positive emotionality have also been reported in adolescence (Collins & Steinberg, 2006), and the onset of depression is occurring at younger and younger ages (Cross-National Collaborative Group, 1992). A 1993 report by the American Academy of Pediatrics Committee on Psychosocial Aspects of Child and Family Health (2001) that provides a list of threats to adolescent well-being was recently updated to include the following items: school problems (including learning disabilities and attention difficulties), mood and anxiety disorders, adolescent suicide and homicide, firearms in the home, school violence, drug and alcohol abuse, HIV, and AIDS; and the effects of media on violence, obesity, and sexual activity were called the "new morbidities."

Why should we pay attention to adolescents' health and stress? The sheer number of challenges that adolescents face in navigating this developmental stage may overwhelm their available cognitive and emotional resources, especially for those who have experienced

less-than-optimal conditions in infancy and childhood. One implication is that adolescence is a sensitive period for emotional development (Casey et al., 2008; Walker et al., 2004). "This developmentally normative mismatch between strong affective and behavioral impulses, and the adolescents' still-limited capacity to regulate them, and reduced adult monitoring, means that early-to-middle adolescence is a period of heightened vulnerability to problems associated with poor regulation of affect and behavior" (Yap, Allen, & Sheeber, 2007). The onset of many mental health problems, such as depression, anxiety, eating disorders, substance abuse, and schizophrenia, during adolescence highlights the need to take the well-being of youth very seriously (Paus, Keshavan, & Giedd, 2008). Although research suggests that the adolescent brain is vulnerable to permanent stress-related alterations in the context of pubertal neuroplasticity, this period also can be a time for "interventions and opportunities to reduce or reverse the adverse effects accumulated from earlier insults" (Romeo & McEwen, 2006).

