

# **ADOLESCENT SEXUAL DEVELOPMENT AND SEXUALITY**

## **Assessment and Interventions**

**Editors:**

**Donna A. Gaffney, R.N., D.N.Sc., F.A.A.N.**

**Carol Roye, R.N., Ed.D., C.P.N.P.**



**Civic Research Institute**

4478 U.S. Route 27 • P.O. Box 585 • Kingston, NJ 08528

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# Chapter 2

## The Adolescent Brain and Cognitive Development

Donna A. Gaffney, R.N., D.N.Sc., F.A.A.N.

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### INTRODUCTION

Appreciating the adolescent's ability to think, reason, and make decisions requires an understanding of brain development and cognitive functioning. For a clinician to effectively communicate with teens, assess their ability to make decisions, and evaluate their risk-taking behaviors, the clinician has to be aware of the nuances of adolescent thinking and how it differs from the cognitive abilities typical in childhood and adulthood.

### ADOLESCENT BRAIN DEVELOPMENT

The advent of new imaging techniques has resulted in recent studies that have identified major changes in brain development during adolescence. The etiology of these alterations is not yet determined, but it appears that there are periods of accelerated neuron growth alternating with periods during which there is a loss of neurons (pruning). Although discussion regarding the effects of genetics and environment on brain maturation has always existed, the actual influence of experience is not well understood and the question remains, does experience help create new neurons and synapses, and does adolescence provide increased opportunities for such experiences?

Magnetic resonance imaging (MRI) studies have paved the way for

researchers attempting to answer questions previous studies could not, and advancements in MRI image analysis are providing new insights into how the brain develops. Early studies revealed that the brain overproduces neurons for a brief period in early development, beginning in utero and continuing for the first eighteen months of life. After the period of heightened neuron growth, a period of “pruning” occurs. Essentially, unnecessary neurons are eliminated, making the brain more efficient. Giedd et al. (1999) found a second surge in the neuron development in the cortex of the brain, followed again by pruning, immediately preceding puberty. It seems that the adolescent’s neuron development increases and decreases in different parts of the brain at different times. Just prior to puberty, the overproduction of neurons seems to be far more dominant in the frontal lobe, which is the center of the cognitive skills of planning, impulse control and reasoning.

Researchers using MRI technology have targeted nerve bundles in the brain as key indicators in the differences between the adolescent and adult brain. This research may offer a new way of viewing teen cognitive functioning. Although an adolescent seems to have mature language and spatial functions, the areas of the brain that control the executive functions, such as decision making and risk assessment, may not fully mature until young adulthood. This research is so new it is difficult to predict or even correlate teens’ cognitive processing and decision making with the structural changes in the brain. However, it is important to recognize that in the years ahead there may be significant findings related to brain function and highly charged emotional choices and difficult decisions (i.e. sexual intimacy).

Myelination is the process whereby a protective, fatty material called myelin wraps around nerve cells located in the peripheral and central nervous systems. Myelin protects the nerve fibers and makes them more efficient, much like insulation wrapped around electrical wiring, improving its conductivity. Although the process can take up to ten years to reach completion, the bulk of myelination occurs during the fetal and infancy stages. Thompson et al. (2000) analyzed data collected from brain scans and created time-lapse animations of children’s brain development. The researchers found that a surge of myelination begins at the front of the brain in early childhood, and extends to the back of the brain, receding after puberty. There are other growth spurts noted from the ages of 6 to 13 years in brain regions specialized for language and understanding spatial relations within the temporal and parietal lobes.

In another study, Sowell, Thompson, Holmes, Jernigan, and Toga (1999) compared MRI scans of young adults ages 23 to 30 with those of adolescents, ages 12 to 16 years. The researchers looked for areas of myelination in both groups of subjects. Areas of the frontal lobe showed the greatest differences between young adults and adolescents. The adult group showed increased myelination in the frontal cortex suggesting a maturation of cognitive processing and other “executive” functions. In the adolescent brain, the parietal

and temporal areas (the areas that mediate spatial, sensory, auditory, and language functions) appeared mature with full myelination.

Baird et al. (1999) addressed the relationship between brain development and emotions. The researchers scanned subjects' brain activities as they identified emotions displayed in facial images on a computer monitor. Although young teens did not accurately identify emotions on the faces, the MRI scans revealed that the amygdala, a structure in the brain that mediates fear and other emotional responses, was far more activated than the frontal lobe during the process. With older teens the brain activity tended to increase in the frontal lobe, ostensibly leading to more reasoned perceptions and improved performance. The researchers also found that as teens got older, the frontal lobe became more activated (as opposed to the temporal lobe) during a language skills task.

## **COGNITIVE DEVELOPMENT**

### **Stages of Development**

Jean Piaget (1952) was among the first to conceptualize how children and adolescents process information and conceptualize their world. He identified specific stages of children's cognitive development. Toddlers and preschoolers learn language and recognize objects in the world around them during the sensorimotor stage. Between the ages of 6 and 12 years (the stage of concrete operations) children think in a concrete manner. They learn how to combine and separate numbers and objects (addition, subtraction, and division), form categories (as when children alphabetize and group objects, words, and letters), and understand the process of reversibility, the skill a child uses to retrace the steps from point B back to point A. As children move through the latter part of the concrete operational stage and into formal operations their ability to cognitively process information in the world around them also matures.

A number of authors theorized that experience could influence both the content of and acquisition of stages (Laurendeau & Pinard, 1962; Piaget, 1972). In other words, the acquisition of stage-related skills can be accelerated by the nature and frequency of the phenomena observed. For example, a child interested in baseball may have more advanced cognitive skills in that particular area than a child uninterested in the sport. Piaget's work has always been hotly debated, particularly regarding the issue of his somewhat prescriptive nature of stage acquisition. Flavell (1970) suggested that the transition between stages is more often a gradual process rather than an abrupt departure from one stage to the next. During the transition periods a child is likely to exhibit cognitive skills representative of the previous stage as well as the present stage.

Adolescence parallels the beginning of the period of formal operations, marked by increasingly complex thinking including abstract reasoning, inductive

and deductive reasoning, the ability to consider multiple viewpoints while weighing various criteria in debate, and expression of opinions. It is also a time during which the adolescent is capable of developing philosophical views and thinks about his or her own thinking.

### **Ability to Use Reasoning Skills**

Although adolescents have the ability to conduct higher-order reasoning, the question remains, Are they able to use these sophisticated skills of reasoning when they are confronted with complex, emotionally laden problems in day-to-day life? DiSessa (1988) stated that adolescents demonstrate an inadequate level of critical thinking when asked to perform certain tasks. Keating (1990) suggested that adolescent thinking in everyday situations is not always as orderly and reasonable as that elicited by problems presented to subjects in the laboratory setting. In other words, it is possible that adolescents' real-world reasoning relies less on abstract thinking and formal logic than on down-to-earth thinking which is based on the teen's own prior experiences (Koslowski, Okagaki, Lorenz, & Umbach, 1990).

Although children move from concrete operations to formal operations at about the same age, there are individual differences among young adolescents (Overton & Byrnes, 1991). Not every teen achieves the same skills at the same age. Strahan (1983) found that only one-third of the eighth-grader subjects and almost half of the college student subjects consistently used hypothetical-deductive analysis when reasoning was measured using Piagetian tasks. In addition, there is even variation within individual adolescents. A teen will be able to demonstrate skills consistent with abstract thinking in one area (e.g., math) but not necessarily in other areas (e.g., understanding causes of health and illness) (Gaffney, 1986). As mentioned earlier, the nature of the content may possibly influence how effective the adolescent is in making decisions and reasoning. During adolescence, especially, reasoning skills are inconsistent. Reasoning concerning one topic might be at a mature level, but that maturity may not be transferred to other issues or subjects (Byrnes, 1988). Case (1997) and Glaser (1984) offer that adolescents are more likely to use a higher-level reasoning in areas in which they have meaningful experience.

Piaget predicted that the most sophisticated reasoning would occur during early adolescence with minimal growth afterwards; however, there is strong evidence that differences in thinking ability in early and later adolescence are fairly significant. During the idealistic years of young adolescence, anything seems possible. With age, adolescents develop a more complex level of reasoning. They are able to recognize that although there may be a number of possible solutions to a problem, not all the solutions are appropriate. They begin to see that some solutions may have positive outcomes whereas others may have negative outcomes and thus can be eliminated. Changes related to critical reasoning and

exploration of choices and consequences may continue well into late adolescence and adulthood (Labouvie-Vief, 1994; Perry, 1981).

### **Cognitive Developmental Changes During Adolescence**

Some common indicators of a progression from simple to complex cognitive development are described in the following sections.

#### ***Early Adolescence***

During early adolescence, the use of more complex thinking is focused on decision making that is personal. Choices and decisions about home, school, peers, and intimate relationships will begin to surface.

- The young adolescent begins to demonstrate use of formal logical operations in schoolwork.
- The young adolescent begins to question authority and society standards.
- The young adolescent begins to form and verbalize his or her own thoughts and views on a variety of topics, usually more related to his or her own life. In terms of sexuality and intimate relationships these issues can focus on initiating romantic attachments and activities:
  - Identification of groups or peers that are more appealing;
  - Determination of personal dress and appearance as desirable or attractive;
  - Assessment of parental rules/restrictions related to dating, clothing; and
  - Activities as acceptable or not.

#### ***Middle Adolescence***

During middle adolescence there is a surge in complex thinking processes. The focus of middle adolescence begins to expand beyond individual concerns and moves toward more philosophical and futuristic concerns, including:

- Increased challenging and analysis of issues and concerns;
- Initiation of an individual code of ethical behavior;
- Awareness of different possibilities for the development of individual identity (including gender orientation); and
- Recognition of future goals and plans that may lead toward these goals (but although the middle adolescent begins to think in the long

term, there are still choices and decisions that reflect urgency and impulsivity).

In this period, systematic thinking begins to influence an adolescent's relationships with others. This is often characterized by in-depth discussion of all relationships in the teen's life.

### *Late Adolescence*

During late adolescence, complex thinking processes are used to focus on less self-centered concepts as well as personal decision making, this includes:

- Increased thoughts about more global concepts such as justice, history, politics, and patriotism;
- Development of idealistic views on specific topics or concerns, which can include issues related to the characteristics of the ideal partner, and what constitutes the ideal relationship;
- Engaging in debate with peers as well as parents and developing intolerance of opposing views;
- Focusing thinking on making career decisions; and
- Recognition of one's emerging role in adult society, often including sexual relationships.

## **ENSURING COMPREHENSION OF REPRODUCTIVE HEALTH CARE NEEDS**

As adolescents develop more mature cognitive skills and an enhanced capacity to process complex, abstract situations, it is important to remember that issues related to sexuality are among the most personal and the most emotionally charged. Thus it is crucial to address sexual anatomy and physiology, sexuality, and sexual decision making from the earliest interaction with the young adolescent to later sessions with older adolescents. Do not assume a one-time approach will prepare the adolescent to adequately deal with future decisions and their consequences.

The following approaches will help clinicians and therapists facilitate a positive, working relationship with the adolescent patient and allow ease in exploring issues related to sexuality:

- Include adolescents in decision making and planning for every health care session. At the outset identify what will be included in the session identify reasons for each procedure/action/question and ask if they have any specific requests/questions.



- Offer open discussion on a variety of topics relating to sexuality. Discussion may extend beyond the traditional concerns about symptoms and prevention issues and focus on types of sexual behaviors, satisfaction, questions about performance, and sexual response.
- Informally encourage adolescents to share ideas and thoughts with you. Allow time for the adolescent to think about what you have said, and then ask about his or her thoughts, questions, or concerns.
- Allow and encourage adolescents to think independently. Let them identify their own ideas for solutions to problems and concerns, and help them think of a variety of options available to them at any time.
- Assist adolescents in setting their own sexual health care goals.
- Recognize and praise adolescents for well-thought-out, responsible decisions in the past as well as for the future.
- Assist adolescents in reevaluating decisions that have negative consequences (“Would this work for you again?” “How would you do this differently?”).

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