Understanding ADHD in Adults: A Guide for Primary Care Providers

by Russell A. Barkley, Ph.D.

Transcript from webcast from Adults with ADHD: Making Exam Room Decisions

Understanding ADHD in Adults: A Guide for Primary Care Providers

Welcome to Understanding ADHD in Adults, a Guide for the Primary Care Provider. I am Dr. Russell Barkley, and I am a Clinical Professor of Psychiatry at the Medical University of South Carolina in Charleston. I’m also a Research Professor of Psychiatry at the SUNY Upstate Medical University in Syracuse, New York. Here are my disclosures.

Faculty Disclosure
- Board of Directors, American Board of Professional Psychology
- Speaking Fees: University of California, Los Angeles, 2009
- Speaking Fees: University of California, San Francisco, 2009
- Speaking Fees: University of Illinois, Chicago, 2009

Learning Objectives
After completing this module, participants will be able to:
- review the diagnostic criteria for ADHD and modifications that may be needed to extend their use to adults
- briefly review the neurological and genetic factors associated with ADHD
- note the psychiatric disorders likely to be comorbid with adult ADHD
- briefly highlight the major life activities at risk for being impaired in adults with ADHD
- present executive function deficits typically associated with adult ADHD

Faculty Disclosure
- Bachelor of Science, Psychology
- Law Degree, University of Southern California, 1973
- Doctor of Psychology, University of California, Los Angeles, 1978
- University of California, San Diego, 1982

Learning Objectives
The objectives of this presentation are to review the diagnostic criteria for ADHD and the modifications that may be needed to extend their use to adults. I also hope to briefly review the neurological and genetic factors that contribute to ADHD. I will also note the psychiatric disorders that are commonly comorbid with adult ADHD, and then I am going to briefly highlight some of the impairments in major life activities that are associated with the disorder in adults. Finally, I’d like to briefly mention some of the research on executive functioning deficits that have been found to be typically associated with adults with ADHD.

DSM-IV Criteria:
6 of 9 Inattentive Symptoms
- fails to give close attention to details
- difficulty sustaining attention
- does not seem to listen
- does not follow through on instructions
- difficulty organizing tasks or activities
- avoids tasks requiring sustained mental effort
- loses things necessary for tasks
- easily distracted
- forgetful in daily activities

DSM-IV Criteria:
6 of 9 Hyperactive-Impulsive
- fidgets with hands or feet or squirms in seat
- leaves seat in classroom inappropriately
- runs about or climbs excessively
- has difficulty playing quietly
- is “on the go” or “driven by a motor”
- talks excessively
- blurts out answers before questions are completed
- has difficulty awaiting turn
- interrupts or intrudes on others

Additional DSM-IV Criteria
- Developmentally Inappropriate Symptoms
- Childhood Onset (Symptoms - Impairment)
- Unless acquired secondary to neurological injury
- Cross-setting Occurrence of Symptoms
- Significant Impairment in Major Life Activities
- Exclusion of Other Disorders
- Subtyping into Inattentive, Hyperactive, or Combined Types

DM-IV - Problems for Adults
- Inattention list needs to be broadened
- Includes executive functioning weaknesses
- Symptoms are not developmentally referenced
- Need more appropriate items for adults (see next slide)
- Cutoffs are not developmentally referenced
- May have to adjust threshold downward (15 yrs to 6 yrs per 1 point)
- Age of onset of 7 has no validity (use childhood <6 yrs)
- Developmental variance undefined (suggest 93%)
- No requirement for corroboration by others
- This is a cluster, especially for items and adults under 35
- Risk of impairment needs to be clarified as to reference group
- More major life activities need to be listed for adults
- Subtyping has no validity – subtypes are contaminated with each other

Copyright© 2010. National Association for Continuing Education. All rights reserved.
DSM-IV requires that these symptoms be present before 7 years of age. Research shows that this criteria has no scientific basis, and it will therefore be jettisoned from the upcoming DSM-V criteria in favor of an onset by at least 12 to perhaps 16 years of age. The DSM-IV also does not require corroboration of the symptoms as reported by the patient through someone else who knows them well such as a parent, sibling, spouse, or cohabiting partner. This is a mistake because research indicates that ADHD in adults is often under reported in adults below 30 years of age, and that the younger the individual the more likely is the report to be inaccurate. Therefore, it is useful for the clinician to corrobate what they hear from the patient through someone who knows the patient well, at least for individuals below 30 years of age. I would recommend that this just be standard practice for any age group.

The impairment requirement in DSM-IV needs to be more clearly defined. Currently it does not have an operational definition to tell us what impairment means, and it does not specify who the reference group should be. For instance the courts have decided that under the Americans with Disabilities Act, impairment refers to the normal population, that is, the average person in the population. In order to be impaired an individual must be significantly below the functioning of the average person in the population for impairment to be judged as present. This would be a useful standard to extend into the DSM criteria, but for now the definition of impairment remains relatively vague. Also the DSM includes only three major life activities, home, school, and peer relationships, or in the case of adults work. We know that there are many more major life activities in which adults have to engage and some of these should also be included in the DSM criteria.

Now finally the subtyping offered in the DSM-IV has been shown to have no validity. Indeed, the subtypes are in fact contaminated with each other. For instance we may find that an individual is classified as the hyperactive type in the preschool years. As they get older 90 percent of those individuals will move up to have the combined type of ADHD by entry into school, but then as they grow older and the hyperactivity declines with age they may wind up being reclassified yet again into the inattentive type by adulthood. As a result of these and other problems, it appears the DSM-V is likely to abandon this approach to subtyping in favor of others that may be scientifically and clinically useful.

**Prevalence**

- **Varies by sex, age, social class, & urban-rural demographics**
- 4-5% of adult US population (All Types)
- 2-4% worldwide prevalence
- 2:1 male-to-female ratio in adults
- Need more international studies
- Only 1 in 10 adults with ADHD is being treated for it; only 1 in 4 are receiving any treatment for a mental disorder

Overall it appears that adult ADHD occurs at a rate of about 4.1% percent in the U.S. population, and slightly less than this, at a rate of 3.3% percent, in studies of worldwide prevalence. Now while ADHD in children occurs at a rate of between 3 to 6 times more often in boys than in girls, by adulthood this sex ratio has fallen to somewhat less then 2 to 1 in favor of males to females — the reason for this is unclear. We also need to have more international studies of the demographic factors to make sure that they are universal but so far it appears that ADHD, in fact, is a universally occurring disorder across countries and cultures.

Research has shown that in the United States ADHD is a vastly under-diagnosed and under-treated disorder. For instance only 1 in every 10 adults with ADHD is ever treated for their ADHD, and only 1 in 4 is ever diagnosed and treated for any associated mental disorder. So one of the biggest problems we have in the U.S. is under-diagnosis and undertreatment of adults with ADHD.

**Heredity – Family Studies**

- **Family Aggregation of Disorder:**
  - 25-35% of siblings
  - 78-92% of identical twins
  - 15-20% of mothers
  - 25-30% of fathers
  - If parent is ADHD, 20-54% of offspring

Among their mothers and fathers. If we ascertain individuals with adult ADHD and look at their offspring we find that 20 to 50 percent of their children are likely to be diagnosed with the disorder as well. The average is about 40 to 50 percent – making ADHD a high genetically predisposed condition. Indeed one of the best factors for predicting risk to a child of having ADHD in knowing that their parent has been diagnosed with the condition as well.

**Heredity – Twin Studies**

- **Heredability (Genetic contribution):**
  - 57.07% of individual differences (Mean 80%)
  - (81-100% using DSM criteria)
  - **Shared Environment (common to all siblings):**
    - 0-10% (Not significant in any study to date)
  - **Unique Environment (events that happen only to one person in a family):**
    - 0-20% of individual differences
    - (but includes unreliability of measure used to assess ADHD)

Heredity indicates that ADHD is a highly biologically influenced disorder. Most of the research has focused on neurology and on genetic factors. Neuroimaging studies, both using structural and functional MRI have routinely indicated that there are at least five brain regions associated with this disorder. The first of these is the orbital-frontal cortex, particularly the dorsal-lateral cortex on the right side of the brain. The second area is the basal ganglia to which the dorsal-lateral cortex projects. Both of these regions are between 4 and 10 percent smaller typically in people with ADHD compared to the general population. But there are other regions in the brain that appear to be smaller as well. For instance we know that the cerebellum particularly on the right central area known as the vermis is so much smaller in ADHD individuals as is the anterior cingulate which occurs at the midline in the pretfrontal cortex. The anterior cingulate is the gateway for the frontal cortex to regulate the amygdalas specifically, and the limbic system or emotional brain more generally which may help to account for some of the emotional findings that we see in adults with ADHD. The corpus callosum is also somewhat smaller particularly in the frontal area of the brain. Finally, a recent study suggests that the thalamus may also be smaller but this is just one study and needs to be replicated. Overall there is clear and convincing evidence that brain development is delayed in individuals with ADHD, that these areas are about 4 to 10 percent smaller, and that they are anywhere from 10 to 20 percent or more less active then they should be.

Research also shows that these areas directly correlate with the degree of ADHD symptoms expressed in the individual. Now we’ve believed that these areas of the brain may be smaller because of genetic factors that build and operate these parts of the brain.

**Neuro-Imaging Findings**

- **Smaller, Less Active, Less Developed Brain Regions:**
  - Orbital-Frontal Cortex (primarily right side)\(^1\)\(^2\)\(^3\)
  - Basal Ganglia (mainly striatum & globus pallidus)\(^1\)\(^2\)\(^3\)
  - Cerebellum (central vermis area, more on right side)\(^1\)\(^2\)\(^3\)
  - Anterior cingulate cortex\(^1\)\(^2\)\(^3\)
  - Corpus callosum (primarily anterior splenium)\(^1\)\(^2\)\(^3\)
  - Thalamus\(^1\)\(^2\)\(^3\)

These studies also indicate that there is minimal contribution of the family or rearing environment known as the shared environment in twin studies. On the other hand there does appear to be a small but significant contribution to variation in these traits from unique events that happen to the individual that are not shared by other individuals in their family. These may be exposures to infection, to toxins such as the mother smoking during her pregnancy, to the rate of infections she may have experienced, to prematurity, to lead poisoning, and so on. So there does appear to be a small but significant contribution of the environment particularly the biological environment to the expression of ADHD traits.

Molecular Genetics

Now given the high heritability of ADHD it is not surprising that researchers have gone on to pursue molecular genetic studies of ADHD in an effort to identify which genes may be contributing to the disorder. And indeed we have now seen published several genome-wide scans of ADHD individuals and their family members. These genome-wide scans suggest that there are probably 20 to 25 sites in the human genome that are contributing risk genes to the expression of the phenotype of ADHD in the population. There appear to be at least 7 genes that have been reliably identified across most studies in molecular genetics. Most of these genes deal with the regulation of dopamine in the brain. But some of them may have to do with norepinephrine and serotonin and other neurotransmitters.

We are also finding that these genes interact with certain environmental biohazards to increase risks of ADHD. For instance a study conducted by Richard Todd showed that if some of these risk genes are present in the baby and the mother also engages in smoking, the risk to that child is 8 times greater for having ADHD than either the genetic factor or the maternal smoking in isolation. We expect to see other such interactions of biohazards, infections and other environmental factors with risk genes in research in the future of ADHD.

Also we have found a few genes that appear to contribute to the individuals likelihood of responding to intervention, particularly to the medications that we now use for ADHD. This offers the promise in the future that we may be able to genotype patients in order to help identify which medication they are most likely to respond to.

Adaptive Impairments in Adult ADHD

Now lets turn for a moment to the major life activities that research has shown are likely to be impaired in adults with ADHD. My own research published in my textbook on adult ADHD indicates that ADHD is more impairing of major life activities and impairs more domains of major life activities than does most other outpatient psychiatric disorders. For instance, starting early in life we have identified limited educational success in children with ADHD followed to adulthood. In other words they are likely to obtain less education, to do more poorly in school, and are three times more likely to drop out of school before finishing high school than are other individuals. So education is a major area that ADHD is likely to produce an adverse effect. That’s often followed by difficulties in relationships with other individuals both inside and outside the family producing incredible amounts of family stress, and interfering with peer relationships in more than 50 to 70 percent of ADHD individuals followed to adulthood.

By adolescents we see a spike in the increase in antisocial activity by individuals with ADHD particularly those who may be diagnosed with conduct disorder before 15 years of age. This is often followed by an increase in the risk for substance abuse both for legal substances such as tobacco and alcohol, and illegal substances such as marijuana and cocaine. Indeed ADHD appears to produce a specific risk for increased likelihood of smoking and becoming dependent on nicotine. Its not clear whether this is the result of self medication because nicotine does appear to produce a modest positive benefit in managing ADHD symptoms. But nevertheless ADHD alone is a risk factor for excessive use of alcohol, nicotine, and marijuana. If conduct disorder is present with ADHD then there is an increased risk for the use of illegal substances as well such as cocaine, crack, and illegal use of prescription drugs.

Now my own studies along with those of the Pittsburgh Longitudinal Study show that individuals with ADHD, when they become sexually active do not have more sexual disorders. What they do have is a much greater incidence of risky sexual activity. They spend less time in their relationships with other individuals, they may start having sexual intercourse earlier than others, but most importantly they are less likely to use contraception. Now as a consequence of this we have documented a tenfold increase in the risk for teen pregnancies in individuals. On average 38 percent of the people I have followed to adulthood in my Milwaukee study had a baby before they were 19 years of age. This rate was even higher among women with ADHD than it was men fathering ADHD children. But nevertheless despite these sex differences overall there is an increasingly increased risk for teen pregnancy and also for sexually transmitted diseases.

Research indicates that individuals with ADHD are accident-prone. We’ve known this about child ADHD, but research now documents that this extends up into the adolescent and adult years of the ADHD patient particularly when it comes to driving. Other studies document the adverse effects of ADHD in the workplace. We know that people with ADHD not only have more accidents on the job, they’re more likely to file for workman’s compensation claims. They also have more time off the job, often unexcused, and even when they’re working they often require more supervision in order to accomplish the amount of work that other people can do with much less supervision. Overall there is an adverse effect of ADHD in the workplace.

Studies by myself, and Kevin Murphy have documented that ADHD has an adverse affect on financial management, such as increase use of impulse buying with credit cards, poor payment of utility bills, and poor payment of debts. We also find a greater likelihood of having a poor credit rating by adulthood.

Our studies of adults show that ADHD interferes with the health and lifestyle of the individual by adulthood. Where there is a greater likelihood that the individual is not only smoking and drinking, they’re likely to be exercising less, engaging in self-improvement less, and engaging in risky behaviors that would lead to increased Cardiovascular Disease and possibly cancer. All of this suggests though it does not prove that ADHD may also be associated with a reduced life expectancy.

Psychiatric Comorbidity

Now I’ve mentioned the increase risk that adults with ADHD have for comorbid psychiatric disorders and you’ll see a few of these on the next two slides. There is an increased risk for mood disorders, particularly for Dysthymia and Major Depression, and also for Anxiety Disorders, which my own Longitudinal Study indicated the risk increases with age. By age 30 more than a third of the adults with ADHD have developed an anxiety disorder along with their ADHD. Now the link of ADHD to Bipolar Disorder is controversial, but my own take on the literature is this represents a one-way comorbidity in which ADHD does not predispose to a risk for Bipolar Disorder. But if an individual is going to develop Bipolar Disorder there is an incredible risk for an association with ADHD and that risk increases the earlier the onset of the Bipolar Diagnosis. For instance if the onset is in childhood the comorbidity is at about 25 percent, but if the onset is in childhood below age 12, 80 to 97 percent of those children who develop Bipolar Disorder are likely to have ADHD as a comorbidity.

We have known for years that ADHD is associated with learning disabilities with nearly half of children with ADHD, and up to 25 to 35 percent of adults with ADHD also having comorbid learning problems extending into their adult years.
ADHD, most commonly these are deficits in inhibition, particularly in nonverbal working memory. There are also documented deficits in verbal working memory, in emotion regulation, particularly self-regulation, as well as in the ability to plan and problem solve toward goals, which is the very definition of executive functioning.

If testing were done on an adult with ADHD, research indicates that only about 1/3 to 1/2 of them would fall in the impaired range on executive function tests or test batteries. On the other hand if one uses rating scales of executive functioning such as my own Deficits on Executive Functioning Scale or the Behavior Rating Inventory of Executive Functioning, then the rate of impairment is 89 to 98 percent of adults with ADHD fall in the impaired range on these rating scales. Thus these rating scales may actually be a better method of assessing executive function deficits in adults with ADHD than any traditional neuropsychological tests. Certainly all of this has shown that the executive function deficits associated with adult ADHD are likely to be predictive of many areas of impairment in major life activity.

More on Comorbidity

• These deficits are relatively specific to and characteristic of adults with ADHD compared to other outpatient psychiatric disorders

• Such deficits in cognition, behavior, comorbidity, major life activities, and health maintenance provide useful targets for various medical and psychosocial treatments

• ADHD is a highly treatable psychiatric disorder

Conclusions

To conclude this presentation I hope that I have shown you that ADHD in adults is a relatively prevalent disorder; and, that the symptoms of adult ADHD are somewhat different than we see in childhood. In particular we find that adult ADHD is more likely to impair executive functioning, time management, planning and problem solving, emotional self regulation, and in general the ability of the individual to plan and organize their life over time than is the case in children. We know that these executive deficits along with the traditional ADHD symptoms are likely to be predictive of impairment in nearly all major life activities that have been studied to date such as work, education, family relationships, driving, financial management, antisocial activity, and so on.