


Dr. Russell Barkley on AD/HD

Excerpts from his lecture in San Francisco, CA on June 17, 2000

It's difficult when we talk about AD/HD—on the one hand to emphasize the seriousness of this problem and to go through all of the compelling information that legitimizes it as a real and substantial psychiatric or developmental disability, and yet on the other hand to also balance that off with the necessary optimism that is very important for approaching these cases.

On the one hand I need to talk about the impairments, the risks, the developmental complications that this disorder can create in order to contradict our critics who believe that there is no such disorder or that it's just a bunch of benignly energetic little children who we're labeling in order to psychiatrically medicate them. The fact is, it's a serious and substantial problem. But on the other hand, we also want to emphasize that there is no better time in the history of this disorder to have it, because we know much more now than we have ever known about this disorder. We have more treatments available for AD/HD than have ever been the case in the history of this disorder, and that is only going to get better in the next five to ten years as the research progresses and it is progressing at an alarming pace. Thirty articles a month in scientific journals are appearing on this disorder. That is 300-400 a year—very difficult for someone like myself to keep up with how rapidly this field is moving.

My job today is to try to bring you as up to date as possible about the more than 6,000 published articles that exist in the scientific literature on AD/HD and the countless books and other findings that speak to this disorder. It is a balancing act to emphasize the seriousness but at the same time to emphasize the optimism about all of the things that we can do to manage this disorder, so that people with this disorder can lead relatively successful lives. And that's our job today.

This morning we're going to err on the side of seriousness. We're going to talk about the disorder, how it's diagnosed, its developmental complications, its life course, and what we know about the causes of AD/HD. I will then take you into a framework from which to understand this disorder better as you go about approaching its management. And then we will discuss the management approaches themselves. So that's the structure of our day. People tell me that this is the most information-intensive program that they have taken from a mental health provider like myself. So fasten your seatbelts, warp factor speed, Mr. Zulu, we are about to move ahead.

Is AD/HD a Real Disorder?

We're going to start with a simple yet very important question, and I am asked this question repeatedly by journalists, all the time. Is it [AD/HD] a real disorder? That appears in the media. It appears on television. Many of you may have come in with this very question. Most of you, however, have already accepted that it's a real disorder, but the important issue here is most critics who ask this question have no idea what would constitute a real disorder. Many of them approach it with political agendas such as the Church of Scientology and its Citizens Commission on Human Rights. They don't care whether this is a real disorder or not, because they deny that there are any psychiatric disorders, period. That's their political agenda. But we in science do have criteria for what constitutes a real disorder. And if a disorder meets those criteria it is in fact a legitimate mental illness or developmental disability.

Criteria for Diagnosing AD/HD

And the criteria that we employ and have been employing for over a decade now are elegant in their simplicity. Two words: harmful dysfunction. Is there evidence in the scientific literature that that disorder is a harmful dysfunction? Now let's take those two words and very quickly tease them apart. First, we start with the word dysfunction. For there to be a legitimate, valid disorder, there must be hard scientific evidence that there is a failure or a deficiency in some mechanism that is universal to human beings, a physical mechanism like a heart, a liver, a stomach, a brain. But it can also be a mental mechanism such as language, such as the ability to engage in motor coordination, visual spatial skills, long-term and short-term memory, behavioral inhibition.

These are mental mechanisms. They are universal to every human being. They are not cultural constructions. They are not simply things that you learn through pedagogy or education. Disorders of pedagogy are not mental disorders. Mental disorders are failures or serious deficiencies in mental mechanisms that are universal to the design of this species. Every human being develops language. If language fails, and there is evidence in the scientific literature that children with language disabilities are not acquiring language as they should, that is a dysfunction, because every human gets language. We have an instinct to symbolize, and although the language you may learn is culturally constructed, that you can acquire a language rapidly in childhood has absolutely nothing to do with learning. It is an instinct that this species acquired over two million years of its evolution.

Is there evidence for a dysfunction in AD/HD? There are over 200 studies in our literature that AD/HD is associated with a dramatic failure in the development of behavioral inhibition, the capacity to stop a response from occurring. We will see why that is important later on this afternoon. But more than any other deficit that AD/HD individuals have, that is the core of this disorder. There is a failure in the development of inhibition—motor inhibition, response inhibition. It is measurable. It is documentable. It is an issue of scientific fact. This has nothing to do with your culture. It has nothing to do with your political agenda. We can establish through science that people with this disorder have a failure in a mental mechanism, and it is unequivocal. More than any other mental disorder, AD/HD has more evidence for its dysfunction than any other childhood condition that we know of, including learning disabilities.

Second, does AD/HD produce harm to the individual? Does it produce impairment in major life activities? Now that of course is going to be culturally relative because it depends on the demands that the culture makes on that mental mechanism. Learning disabilities is a case in point. Children with learning disabilities do have a failure in mental mechanisms, but it may not produce any harm if you happen to grow up in a culture where there is no universal education. If your culture does not read, as is the case in Aboriginal Australia, then having a phonetic decoding deficit does not produce harm. And therefore, it is not a disorder if you are in an Aboriginal tribe. But if you are in a Western culture where children must acquire reading to succeed and be effective in their culture, and you have a phonetic decoding problem, you will then have a mental disorder, because it will produce impairment in a major life activity, several in fact.

So let's move on. We have a real disorder. Now, what is this disorder? Well, we have a set of criteria that are published. They're called the DSM IV Criteria (*Diagnostic and Statistical Manual of Mental Disorders*, 4th Edition), that mental health providers have to use. You should be familiar with these criteria. I'm not going to go over them in a great deal of detail, but let me just highlight the nature of this. And I highlight this to make two points. One, to make sure that you know these criteria, but also to illustrate that the criteria involve multiple stages. Having a single symptom of this disorder does not mean you have this disorder. It means you have a personality, for God's sake. You must meet all conditions on these criteria. I say that because Scientologists and others love to open the DSM, read a

single symptom off the list of more than 24 criteria for this disorder, and then say, “See, don’t normal children skip from one uncompleted activity to another sometimes? That’s what they’re calling AD/HD?” How misleading. How deceitful.

There are **multiple criteria that must be met** before you will be diagnosed with this disorder. The criteria are quite straightforward. First, you must have at least six out of nine symptoms off of a list of inattention symptoms that were developed through a large-scale research study on which symptoms are the most defining of this disorder. We didn’t just pull these out of thin air. This is a researched-base set of criteria. Why six out of nine? Because that means you are developmentally deviant for your age group. If you have six out of nine symptoms, you are not normal. That is why that number was chosen, because normal people do not show that many symptoms at that particular age.

Second, you must have six out of nine symptoms on the list of hyperactive impulses, and depending on which of these two lists you meet will depend on which subtype of AD/HD you have. There’s an Inattentive type, there’s a Hyperactive/Impulsive type, and there is the garden variety Combined type, which is what most children have. Developmentally inappropriate—that’s a very important line. Your symptoms must be far in excess of that which we see in other people of your age, a convenient criteria that is overlooked by many critics of this disorder. You have to have had these for at least six to twelve months. They have to have developed by the time you were seven years of age. They have to occur across multiple situations. And they must be producing impairment in major life activities. Harm to the individual. And then finally we have to rule out other possible causes, other disorders that might more parsimoniously explain why the child is showing problems with inattention. For instance, many children who are mentally retarded are inattentive at school. Is it better explained by intellectual delay than by AD/HD? So, if you meet all of these criteria, there’s a very, very good probability that you really do have this disorder.

Difficulties with Official Diagnostic Criteria

Now the DSM is not perfect. One of the problems with the DSM is that this list of symptoms of inattention, these nine symptoms that we review with people, has a major problem and that is the name of that list. Although we continue to refer to these symptoms as symptoms of inattentiveness, the evidence in science is that there is no attention deficit in this disorder. If what you mean by attention is the following: the ability to perceive, detect, filter, and process information.

In other words, if we think of the brain very simplistically as an input-output device—information comes in, decisions get made, output is produced—most forms of attention are on the input side of the brain. There is no evidence that AD/HD in any way affects information processing. And yet that’s what we use to think about attention—information processing. And there is no evidence that AD/HD interferes with that aspect of brain function. All the evidence is on the output side of the brain, the way behavior is being organized, inhibited, planned, and executed and protected from disruption. It’s an output disorder, not an input disorder. That means that the name is wrong. There is no real attention deficit here. These symptoms are real, but one of the things that we’re going to have to find out is what are they. They’re there. They’re real. What do they represent? What is the underlying mental mechanism that is failing that gives rise to this list of symptoms?

Because that word [Attention Deficit] can’t be used. We’ve known this for 10 years. The DSM IV committee was going to rename this disorder Behavioral Inhibition Disorder, recognizing that that’s where the compelling evidence points to as to the core deficit. These symptoms are arising somehow out of that one. But what are these symptoms? Is it language? Well, let’s look. Has difficulty following through on rules and instructions. Is there a problem with memory, forgetful in daily activities? Inhibition, easily distractible. What is this list? But that is why the very name for this disorder is misleading. There is no attention deficit here. We need to find out today what is this deficit.

The second one [hyperactivity] is for real. This list of hyperactive impulsive symptoms is also very common in people with AD/HD, but who wants to walk around using a hyphenated term all day long? So we're going to reduce this to one word. The word is borrowed from neuropsychology: disinhibition. A failure to develop appropriate inhibition for your age group: disinhibition. That's what that list represents. Now if you have symptoms off of either of these lists and most children have symptoms on both of them, and you meet all the other criteria, and you can't explain them by any other means, you have this disorder, and that's how the diagnosis is made.

Now there are some problems with the DSM. No set of criteria is perfect. It was based on a study of 4- to 16-year-old children, which means that that number applies only to 4- to 16-year-old children, and cannot be generalized across the lifespan.

Why not? Because as is the case in any other area of development, kids are changing. When they move from preschool to school age to adolescence to adulthood, these symptoms are changing. So that you can't use a single number across the lifespan. The number must be age-adjusted. That's how you diagnose a developmental disability. If I want to know if you're mentally retarded, I'll give you an intelligence test and an adaptive behavior inventory and what will I do then? Compare you to other children of your age group. If I want to diagnose you as dyslexic, I'll give you a test of reading and I will do what? Compare you to your age group. The DSM makes no age comparisons. It gives you a single number. That's a problem. You cannot diagnose a developmental disability without using age-adjusted criteria. So bear in mind the DSM is great for working with 4- to 16-year-olds. It is not so hot outside of those age groups, and we are now exploring what the better threshold would be.

So, you must do two things. One, you must create a longer list of age appropriate symptoms, reflecting the disorder at its different stages of development. Second, you must use age-adjusted cut-off scores. DSM V is going to have to do both of those in order to improve the use of these criteria across the lifespan. For now, they're very good criteria for children and adolescents. They're lousy criteria for adults.

But no set of criteria for any disorder, including medical disorders, is perfect. This is another problem. There were very few girls in the field trial, so the DSM is based largely on males, about 84 percent male. Why is that a problem? Every study of children shows that boys show these symptoms more than girls do, which means that if you're going to diagnose somebody as having a disability, you need to compare them to their gender, not to the general population. Girls should be compared to girls, boys to boys. We do that when we score IQ tests. We do that when we score reading tests. We need to do it when we look at AD/HD as well. So we don't need to make just age comparisons. We need to make gender comparisons. Otherwise, you are asking that a girl meet a male criterion. So we need to make some gender adjustments, which we will be doing hopefully in the future. We need to make sure that the symptoms have been around a long time. Six months is too short. Double it. Go up to a year.

Age 7. Is that a good age of onset for this disorder? Well, for the majority of children who are hyperactive or who have the Combined type it's not bad. But, we get into problems with this other group of children who seem to only have trouble with paying attention, and aren't problems with hyperactive and impulsive behavior. They have a somewhat later onset, somewhat later age of referral. But in any case, my point is this. The number seven was pulled out of thin air when the DSM was written. There was never any study that came up with that number. And therefore, in DSM V, it will be removed, I'm almost sure of it, because there's no scientific validity to it. AD/HD is a disorder with its onset in childhood, broadly interpreted to be before the onset of puberty, and that's your criteria, not some precise number of age 7.

All right, the DSM says you have to be developmentally inappropriate. We want that to be at least the 93rd percentile on a well-standardized rating scale that measures AD/HD symptoms and there are several such rating scales. I happen to prefer George DuPaul's because it's the best normed; it's known as the AD/HD Rating Scale Four, meaning it's a DSM IV-based rating scale. It has the best norms for 5- to 18-year-olds in the United States. You could also use the Connor Scales.

All right, the DSM does not say that parents and teachers have to agree with each other. And yet I see this all the time as a big problem for professionals. I interviewed the mother; she gave me a lot of symptoms. I interviewed the teacher; he came up one short. Who do I believe? Well this happens a lot. Which one is telling the truth? Both of them are. The DSM does not say parents and teachers must agree on the number of symptoms. The DSM says there must be evidence of symptoms producing impairment across settings. And so you can bet in DSM V we're going to qualify that by saying: in the history. People seem to ignore that. Evidence in the history of impairment across settings. Which means I don't care what this week's teacher tells me. If there is evidence in the school folder of problems in school: the child was retained in first grade. The child has been referred three times for an IEP meeting, even though this week's teacher in the second week of September only gives me five inattention symptoms, that's a hit. That's a diagnosis. There is evidence by history of impairment in the school setting. Not that today's teacher gave me six symptoms. It's evidence by history, not agreement between people.

Now you may think that I am hairsplitting, but that's a very important issue, because whenever parents and teachers are asked to describe children on any dimension of behavior, the correlation is .3, which means that they disagree most of the time on children's behavior. And that is because the home and school settings are so different that children's behavior is markedly different in one than the other. There must be evidence in the history of problems in both environments, and that's what that criteria is all about.

Is Inattentive AD/HD Really Another Type of Disorder?

Now, if you will take the DSM, and use it with those modifications, you'll be doing a damn good job of diagnosis. Now I want to come back to this group that we call Inattentive AD/HD. We used to call them ADD without Hyperactivity. These days some people are just using the term ADD for them. I don't like that. Part of the problem with using that term is that that was the old term for AD/HD over 10 years ago, so it creates a lot of labeling confusion. ADD and AD/HD are the same thing. ADD is the earlier, 1987 term—goes all the way back to 1980, in fact, whereas AD/HD is the more recent label. So let's talk about this Inattentive type: the kids who come to see us who don't show problems with hyperactivity, who aren't impulsive. What do we know about that subtype? We know enough that several of us in the research community have taken to arguing that this is a different disorder. This does not belong in AD/HD. This is not AD/HD. This is a real attention disorder with real information processing deficits, and it has little in common with the other two kinds of AD/HD. The Hyperactive type of AD/HD and the Combined type of AD/HD are the same disorder. You're just catching it at different developmental stages. Kids start out with Hyperactivity; the attention deficits come within a few years after that, and then they move into being the Combined type. But these children, on the other hand, are a different story all together.

Why do I think this is a different disorder? Why do some of my colleagues agree with it? Why do the rest of my scientific colleagues certainly agree that this is a qualitatively different group of children? Whether you view them as a different subtype or as an entirely different disorder is less of concern to me than that you understand these are not the same kids. They do not have the same risk, the same co-morbidities, the same causes and the same outcome, and it is likely that they do not respond to the same treatments the same way. But we will not know any more about treatment if we don't view them differently, because everyone will assume as you may do, quite naively, that the treatments for one

apply to all the subtypes, and they don't. We have discovered a new disorder and it does not belong here. It needs its own name and its own criteria and it needs to get out of this category known as the disruptive behavior disorders, because it has no affinity for them. So let me show you why many of my colleagues are now slowly coming around to an idea that 10 years ago I argued for. This is a different disorder.

Why do I think it's a different disorder? Because these children come in with the opposite symptoms. Instead of being hyperactive, intrusive, distractable, they're lethargic, slow-moving, hypoactive, spacey, daydreamy, quiet, passive, withdrawn, confused, in a fog. They are the polar opposite of the AD/HD child in their clinical presentation. This is not an impulsive, disruptive, intrusive, aggressive, emotional, naive child. This is a kid who is staring, daydreaming, confused, and not processing information accurately. This is a real attention deficit, if attention means information processing. These kids have a processing deficit. AD/HD children do not. Do not confuse these two groups. They do not have the same problems with paying attention.

Other things we see in these children: when we bring them into the clinic, and we run them through a battery of neuropsychological tests, they have deficits in an area we call selective attention. Selective attention is how quickly you can deduce what's important from unimportant in a spatial array of information, how fast you accurately process information coming at you. AD/HD children have no trouble with selective attention. And by the way, let's put an end then, to this metaphor for AD/HD that it's a filtering problem. Because it isn't. Real AD/HD has no trouble with filtering, selecting information. AD/HD children perceive the world exactly as everybody else does. These children don't.

These kids have a selective attention problem, which by the way explains something that we have found in about six different studies. These kids make more mistakes in academic work than AD/HD children do, many more mistakes. The problem that AD/HD children have is with productivity; number of problems attempted. The problem with these kids is accuracy: the number of errors made. These kids have a real problem with input coming into the brain, how quickly they can handle it, how accurately they can select it out, and deal with it. These children have memory problems. AD/HD children do not. These children have trouble with getting information out of short-term and long-term memory and doing it correctly. It's especially so for long-term memory, so that they show a very erratic recall of information. AD/HD children, if they have a memory problem, it's going to be in a very unusual form of memory we're going to talk about later today. But this is traditional long-term storage, and these children have some trouble with that, probably for the same reason. They're not getting information out of memory any more accurately than they're processing information coming into the brain. There are problems with selection, with filtering, with focusing their attention. These children have a very different social profile.

The traditional AD/HD child is often a rejected child, because they're immature and emotional and hotheaded and demanding and controlling and impulsive and often aggressive, so that when we compute a social profile of the AD/HD children they often wind up as being the least liked, the least popular and most likely to fight. That is their peer group profile. That is what Ken Dodge and his profile of peer acceptance views as the rejected child. And 50 percent or more of AD/HD children are utterly rejected by their peer group; these [inattentive] children, very different picture. These children are overlooked. In Ken Dodge's taxonomy of social problems, they're neglected. Why? Because they're passive, uninvolved. They're staring, daydreaming, hypoactive, absent-minded, passive. Unengaged is a better term for them. They're not disliked by the other kids. They're not rejected by them. The other kids just don't know them. They're not engaging. They're not out there participating. They're just kind of passive kids. They have more friends than AD/HD children have, actually. These kids tend to be neglected, not rejected. It's a very different social profile.

Other differences: there is no affinity of this disorder for Oppositional (Defiant) or Conduct Disorder that we can tell. They basically have the same base rates as the normal population. But many AD/HD children are likely to go on to develop Oppositional Disorder and Conduct Disorder. Forty-five to 55 percent of AD/HD children develop Oppositional Disorder by age 7, and another 25-45 percent move up to Conduct Disorder by ages 8 to 12. AD/HD goes with Oppositional and Conduct Disorder. The inattentive group does not. You see another reason why they don't belong in this group? Those three disorders—AD/HD, ODD, and CD—are all part of a larger category we call the disruptive disorders. The inattentive group isn't and it shouldn't be there.

Other differences that we see: by definition, of course, these kids are not impulsive. They don't have any difficulties with inhibition. These children do not respond to stimulants anywhere near as well as AD/HD hyperactive, impulsive children do. Only about one in five of these children will show a sufficiently therapeutic response to maintain them on medication after an initial period of titration. Oh, you'll find that about two-thirds of them show mild improvement, but those improvements are not enough to justify calling them clinical responders, therapeutic responders. Ninety-two percent of AD/HD children respond to stimulants. Twenty percent of these children respond to stimulants. And the dosing is different. AD/HD children tend to be better on moderate to high doses. Inattentive children, if they're going to respond at all, it's at very light doses, small doses.

So **the drug response is different**. And that's all we know. [At this time] there are no other studies of treatment of this group—none. The only studies are five involving medication and mine was the only one that tested multiple doses with a placebo control.

There are only two pages in my parents' book, *Taking Charge of ADHD*, on this group, and it tells you what I just told you. This is what we know. These are different kids. This is a different disorder. Stay tuned. We don't know what to do with them. It's up to you. You're just going to have to cobble together some help any way you can and hope that it works, because there is no science beyond what I just told you.

They may have different causes. They certainly have different family histories. Those children tend to come from families where there are more anxiety disorders and learning disabilities. AD/HD children come from families where there's more AD/HD, Conduct Disorder, antisocial behavior, and substance abuse. The family histories of these two groups are not the same.

Now, we have to be careful here, because the Inattentive group, it turns out, is rather a wastebasket group of kids. First of all, in that group are the true Inattentive kids. But also in that group are AD/HD children who came in one symptom short of being in the Combined group, right? They've got six inattention and five hyperactive symptoms, and according to the DSM, if they don't have six, they're not in the Combined type. Well, yes they are, and you should think of them as being Combined type children, even if they come up one symptom short. Don't put those kids into the Inattentive group. The Inattentive group in our clinic is for kids with three symptoms or fewer off of that Hyperactive-Impulsive list. Any more than three and you're better off thinking of them as what we call sub-threshold Combined type children.

There's another group, the group that starts out being in the Combined type and by adolescence or adulthood are no longer so hyperactive, but they meet the criteria on the Hyperactive list. Now you would flip them over into the Inattentive type. Don't do it. You always think of them as Combined type. So, bottom line is this: If any point in your history there was a whiff of problems with inhibition and impulse control, you're a traditional AD/HD Combined type kid, and it shouldn't matter what the DSM is telling you about cut-off scores. Clinically that's how you would approach that child. That's a Combined type kid. And you reserve this Inattentive group for kids who have never in their lives had trouble with inhibition. Those are the spacey, daydreamy, confused, in a fog, sluggish, hypoactive,

slow-moving group. And as long as you conceptualize them that way, you won't make any clinical mistakes. But if you follow the DSM as it's written—perhaps you have OCD and you just have to follow all those criteria, just as they're written—then you're going to get yourself into some trouble. Because remember, the DSM was not chiseled in stone in Israel. It's a set of guidelines developed to help make clinical decisions, but it's to be used with clinical judgment and understanding of the criteria.

Okay, that's just to resolve some confusion. And by the way, I said the Inattentive group was a wastebasket. Why did I say that? Inattention is nonspecific. Inattention is unhelpful in defining what disorder you have, because most mental disorders produce inattention. So if somebody walks into your clinic and says, you know, I'm having a lot of trouble concentrating, can't pay attention, can't finish work, you have no idea what they have. You don't automatically say, oh, that's AD/HD, I've heard about that. This could be a psychotic. This person could be a substance abuser. This person could have a generalized anxiety disorder or panic attacks or major depression or bipolar illness. How the hell do you know what they have?

For now, just know that the Inattentive type of AD/HD is a real wastebasket category of really inattentive children, along with children who have other disorders that are producing their inattention. There really is an Inattentive group out there, but they have a different disorder, and it's not AD/HD.

Appropriate Assessment for AD/HD

All right, if you're going to do an evaluation, what should a clinician be doing? Some parents come in and they say, well, I went to this particular clinic and he gave my child the TOVA (Test of Variables of Attention) and he said that based on that instrument, which is a computerized continuous performance test for measuring attention span and impulse control, he concluded that my child had AD/HD. Or, I went to this other clinic and they gave him the Gordon CPT or I went to this other clinic and they gave him a huge neuropsychological test battery and said that the child has AD/HD. Is that a good evaluation? The answer to all three questions is no. None of those tests are useful for the diagnosis of AD/HD, not in a clinical sense, because they're not very accurate. Diagnosis is driven by the issues, not by the instruments. Assessment of an AD/HD child is not driven by the methods, it's driven by the questions.

Once you ask the questions, the methods for answering the questions will fall in place. Here are the issues. What's the history of these problems? How long have they been around? Are they chronic or periodic? AD/HD is a chronic, unremitting disorder. Bipolar is an episodic disorder. So we need to know the history. We need to know your current concerns. We need to know if they map onto the symptom list in the DSM or not, which means we have to review the DSM. We also need to establish that your level of symptoms is inappropriate for your age group. We're going to have to do that not only by seeing if you have it at least six out of nine of those symptoms, but we're going to have to use that well-standardized rating scale to measure how deviant your symptoms are and to compare you to other people of the same age and the same sex to make the diagnosis.

Okay, so right now what do we have? Interviews and rating scales and reviewing the DSM criteria. You must establish impairment. No impairment, no disorder. I don't care how many symptoms of AD/HD you have, you do not have this disorder if it is not producing impairment in a major life activity, and let's be very clear. Taking the SATs is not a major life activity. Just because you have failed the SATs three times and otherwise were valedictorian of your class, you do not have AD/HD.

All right, we also need to find out what other disorders you have. Why? Because co-morbidity is common among mental disorders. Very few people have a single disorder. Only 25 percent of all children referred for AD/HD only have AD/HD. The other three-quarters of them will have at least one or two other disorders. That means you not only have to go over the symptoms of AD/HD from the DSM, you have to go over the symptoms and diagnostic criteria for other disorders, too, like major depression, anxiety disorder, the learning disabilities, ODD, Conduct Disorder. So notice the evaluation is a differential

diagnosis, not just a review of AD/HD and then we're done. Finally, you have to rule out other possible explanations. Is this a retarded child? Is that why they're failing at school and not paying attention? Is it low IQ? You need to do a quick screen for IQ, whether it's using the Wechsler shortscale or using the Kaufman Brief Intelligence Test.

Second, **50 percent of AD/HD children have a learning disability.** You better screen for reading, math, and spelling and see whether this child has a learning disorder. That doesn't mean that the learning disability explains their problem, because it may not. These are two separate disorders that co-exist very frequently. But you need to screen for it because many AD/HD children have a learning disability along with their AD/HD.

Finally, if you're seeing teenagers and adults, is it possible that they're smoking dope before they go into school? So you may want to do a review of substance use, and if you don't trust them, even a urine panel to see whether or not they're really using drugs. Bear in mind, 18-20 percent of AD/HD teens are substance abusers. So, don't you want to know that? Is that where the inattention comes from? Or is that exacerbating the symptoms that they already have? Is there more impairment here because of that?

So notice, the evaluation of an AD/HD child then would include the following five methods because these are the things you have to do to answer those questions. One, a clinical interview with the individual and people who know them well. Two, you must review the DSM criteria for this and other major disorders. Three, you're going to have to use a rating scale to measure how deviant the symptoms are. Four, you need to screen out low IQ and developmental delay. Five, you need to screen for learning disabilities to see if they're co-morbid because they will be in 50 percent of all cases. And if you want to add a sixth, it would be get the records from the school and all past evaluations on this individual. And then you can make a diagnosis. No testing. There's nothing on an intelligence test that will diagnose AD/HD. There is nothing on a computer test. There is nothing in a neuropsych battery that can reliably diagnose this disorder. You're just wasting time and money.

How Prevalent is AD/HD?

How prevalent is the disorder? Well, before we invented that inattentive type, it was around 1-3 percent. When we invented that type, we more than doubled the prevalence up to at least 7 percent or more of the population, in some cases even higher than that. Notice, by the way, that the disorder is not equi-prevalent, meaning equally prevalent across all populations. So that for somebody to come in and say, "Oh, I have a school district that I consult with and we have 10 percent of the kids in that school district with AD/HD; is that too much?" What's your population? Do you service a military base? Why do military dependents have twice the prevalence of AD/HD? We'll answer that later.

Okay, does it occur in adults? Three to 5 percent of the adult population meets those criteria. What's the prevalence? Depends on the type of the disorder as to the gender ratio, by the way. It's around 3-4:1 males to females for the real AD/HD. That's the Combined and Hyperactive [types]. It's only 2:1 for the Inattentive type. So that females are more likely to be represented in that Inattentive type, more males tend to be in the Hyperactive-Impulsive type. You can see females with the Hyperactive or Combined type. But it's not as much, so it's about 4:1 that of Combined type. Put it together, you wind up with about 3:1.

Are we the only country that has it [AD/HD]? Absolutely not. Every country, every study in the world has AD/HD, so let's get over this we have more AD/HD than anybody else in the world. No, that is not true. We identify and diagnose more than the rest of the world, because our population is more aware of this disorder and people get referred earlier and they get better assistance over here than elsewhere in the world. But the prevalence of the disorder is approximately the same around the world. It varies,

to some extent, depending upon which version of the DSM you're using and how you diagnose it. But there is no country in which AD/HD does not exist. So this idea that you may have read in the media (e.g., in *Newsweek*) that we have more AD/HD than the rest of the world is false. We diagnose it more often than the rest of the world.

People around the world with money who have relatives with mental illnesses bring them here. Why? Because we know more and do more research on mental illness than any other country. I'm tired of apologizing for what the United States does based on what the rest of the world does. It's just possible that the rest of the world is not as advanced as we are in the way we treat children's mental illness.

AD/HD with Comorbid Disorders

Are there other disorders you will see with AD/HD? You betcha. Three-quarters of AD/HD children have at least one other disorder. They're no more likely to be psychotic or schizophrenic, but they may well have other disorders. That's why we put them all together, the disruptive disorders are AD/HD, ODD, and CD. They co-occur very frequently. And by the way, delinquency is just stage three Oppositional Disorder. And Antisocial Personality is just stage four. You go from being Oppositional to Conduct Disorder to delinquent to Antisocial Personality. So that these are not unrelated disorders. They are a developmental pathway, each reflecting a more severe condition, stages in a more severe process. They're related to each other.

Anxiety disorders. That's a very interesting relationship. Twenty-five percent of the kids who come to clinics have an anxiety disorder with AD/HD. We've discovered two things about that. First, much of that is a referral bias. Why? Because to get through the managed care gatekeeping you have to have multiple disorders before you get to see a psychiatrist, which means that if you studied populations in psychiatry clinics, they tend to have more disorders than the general population. But that's an artifact of managed care and gatekeeping.

The second thing that we've learned about studying AD/HD kids who do have anxiety disorder is that they're not real anxiety disorders. They're not fearful, phobic, withdrawn, which is the essence of a real anxiety disorder. Instead, what we find is that parents are over-estimating anxiety because the children are more emotional generally. AD/HD predisposes to greater emotionality, greater affectivity, especially negative affectivity, greater hostility, greater anger, all emotions are shown more by an AD/HD child than by a normal child. And that tends to create a bias in parents' reports. So that parents tend to endorse these symptoms, but when we bring the kids in and study them, they're not fear-based, they're not phobic. They're driven by just being emotional, negative, immature. So even the kind of anxiety disorder is a bit different here.

Major depression is quite common, around 27 percent. In my follow-up study the statistics from other studies place it between 25 and 30 percent. Why the overlap? It's real. If there's depression in your family, there'll be AD/HD. If there's AD/HD in your family, there'll be depression. The two disorders tend to go together. Why? They seem to share an underlying genetic vulnerability. The genes for one disorder are probably contributing to the genes for the other disorder, and that is why they tend to run in families.

So consequently, you see those two going together. But why then don't all AD/HD children get depression? Because depression is an interesting disorder. The genetics create vulnerability to depression. It requires exposure to environmental traumatic events and then you are more likely to get depressed than someone else would, but absent the environmental, social, turmoil, trauma disruption, you're not going to get depressed, even though you are vulnerable to depression. Depression requires two causes: the genetic vulnerability and the environmental disruption. And now you know something that researchers only recently discovered, which is why AD/HD, when it goes with depression, is also

associated with Conduct Disorder. Because Conduct Disorder is highly associated with social turmoil, family disruption, and adversity in your life. Broken homes, divorces, multiple moves, low social class, exposure to environmental and physical trauma—both of these disorders will tend to occur where there is environmental adversity in the life of the individual. And now you know why. The vulnerability to depression is brought out by the social adversity and the social adversity sets the stage for the development of Conduct Disorder as well.

All right, there's a big deal about **bipolar illness** among children. People think we over-diagnose it. Some of the estimates have said anywhere from 20-25 percent or more of AD/HD children have bipolar disorder. I don't think so. I think we're getting ourselves into trouble there because we are changing the criteria for children when we diagnose mania. If real criteria for mania are used it's only around 1-6 percent. That's still fairly high. The base rate in the population is well below 1 percent. But it's nowhere near the one in four AD/HD children that were originally proclaimed to be manic children. We don't quite know what the relationship is with bipolar disorder, but no follow-up study has ever found AD/HD children prone to bipolar illness, and the largest study ever done of AD/HD children, just published this past year [1999] known as the MTA study (<http://www.nimh.nih.gov/childhp/mtaqa.cfm>), also found no higher incidence of bipolar disorder. But I would be generous enough to say maybe 1-6 percent.

Learning disabilities. We said that up to 50 percent of AD/HD kids have a learning disability. Why is that? Is one causing the other? Does AD/HD predispose to a learning disability? No. Does LD predispose to AD/HD? No. Then how come kids tend to get both? And the answer may shock you—shouldn't, but it often does: non-random mating in adults. Adults with LDs are more likely to breed with AD/HD adults, and adults with AD/HD are more likely to marry and breed with LD adults, which is why the child gets both disorders, even though they don't generally occur together. There's no genetic relationship between them. But people with one are more likely to seek out and have children with people with the other disorder.

Now you might say, "Well why is that?" You're more likely to select a mate out of your social group and social groups tend to coalesce around level of education. Why? Because level of education is a very good proxy for intelligence, and people tend to hang around with people of like intellectual levels and to mate with people of like intellectual levels. That's why we see co-morbidity. Co-morbidity is very important because it means that the kids you are seeing have multiple disorders and are going to need multiple treatments. No single treatment will address all of those problems.

Okay, other impairments that we see as AD/HD kids grow up? School performance problems in a vast majority of them tends to be under-productivity. Their achievement skills start to fall because they're not learning as much as other kids in school. Their IQ will start to fall by about seven to ten points by the time they reach high school, and that is because they're not keeping pace with their peers in the acquisition of knowledge. We've already mentioned over half of them have peer relationship problems. We've mentioned the fact that AD/HD predisposes to problems with emotion regulation. This one has been around for 25 years—AD/HD predisposes to motor clumsiness and coordination disorder and makes children accident-prone. The most accident-prone group of children are AD/HD children with Oppositional Disorder.

Now, if we can subgroup our AD/HD children on the basis of the second disorder they have, we might get some more useful information out of that. And this just very quickly is how as a clinician we will be sub-grouping children in our mind as we evaluate a child. If you have AD/HD with Oppositional or Conduct Disorder, what does that tell me as a professional? It tells me all this and more. That of all AD/HD children you have the worst prognosis. Of all AD/HD kids you're the one who is going to be much more prone to criminal activity, Conduct Disorder, substance experimentation, possible substance

abuse, and later Antisocial Personality Disorder. Doesn't guarantee you'll get them. Just makes you a higher risk for them than children who don't have ODD or CD. This is going to be the toughest group to treat. They're going to need multiple treatments and they're going to need treatment across developmental years. In other words, as long as that kid is in the home growing up, your treatments are going to have to be in place. Multiple treatments over time as opposed to one treatment solving the problems.

What Causes AD/HD?

All right, what causes AD/HD? Well, a lot of things. Multiple causes, but there is a final common pathway. There is a particular part of the brain that if any cause impinges on that pathway, it can produce AD/HD as a consequence. Let's start with neurology because that's where most of our evidence is.

Is there evidence that AD/HD is in the head? Overwhelming. Do we know where in the head it is? Yes, in the last four years we've pretty much nailed it down. In fact, we're getting right down to cellular activity at the moment. So let me walk you through the possible causes.

We know that about 10-15 percent of AD/HD seems to arise as a result of prenatal injuries to the development of the prefrontal cortex of the human brain. What are the most common injuries? They are multiple pregnancy complications, premature birth with minor brain hemorrhaging associated with it, cigarette smoking, and alcohol during pregnancy. Those are the big four. Those four will predispose to this disorder. So notice they create what we call acquired AD/HD. This is a normal child with a normal brain whose brain has been injured because of what's happened in fetal development.

Second, post-natal brain damage, about 3-5 percent. What are the most common causes? Trauma, head injury—you whack the front part of your brain hard enough, you're going to start getting symptoms of this disorder. Second one: streptococcal infections. There are some individuals with genetically prone AD/HD or maybe not even prone to AD/HD who when they get a strep infection—which may, by the way, lead them to have cardiac abnormalities as well—that if they get a strep infection, a small percentage of the population has an auto-immune response to the strep bacteria, and that auto-immune response attacks the basal ganglia and the prefrontal cortex, but especially the basal ganglia. That was just discovered two months ago [in 2000] at Yale University.

So can you acquire AD/HD? Yes. About one in five AD/HD children is an acquired case. If you put those statistics together they tend to be mostly boys. Why is that? Because the male brain is more prone to injury, both prenatally and post-natally than the female brain. Most girls with AD/HD have genetic type. Twenty percent of boys with AD/HD have the non-genetic, acquired type. The other 80 percent are genetic. Is it a neurochemical problem in the brain for most AD/HD? We think so, but it's not definitive. Of the more than 70 neurochemicals in the brain, we've narrowed it down to two. And they are dopamine and norepinephrine, but we're still trying to work out which one. It may turn out that different subtypes of AD/HD involve different balances between those two. We're not sure yet. But we're certainly down at that level of brain functioning now. Is it just an immature brain? If you give it an extra year of kindergarten, will it grow up? No.

So what regions of the brain are involved? Here are the three structures we've identified as being responsible for this disorder: the orbital prefrontal cortex; the structure back inside the brain known as the striatum, part of the basal ganglia; and the largest part of the striatum known as the caudate. Why is that involved? Because that's where this cortex goes back to. Cells from the prefrontal cortex project back onto that structure.

Now what has been fascinating over the last few years is to find that these brain structures are not only less developed than they should be, they tend to be more on the right side than the left, so that AD/HD may be arising out of some problem with brain asymmetry or some cause that addresses that right prefrontal striatal circuit. That is the brain's behavioral inhibition system, by the way. We've known that. We can demonstrate that the size of those regions is directly correlated with how uninhibited you are.

So, we're getting very close to where in the brain is it. Why are those structures not as big as they should be, leaving the person with an underdeveloped behavioral inhibition system? The answer to that comes from genetics. Because what builds the brain? During fetal development, what is it that is building the brain to specified size? Your genes. You want to know why the brain is underdeveloped? Go back to fetal development. Go back to embryology. Go back to genetics. The genes that are building these structures are going to be very informative about the genes for AD/HD.

A Highly Inheritable Condition

Twenty-five or 30 years ago, research by [the late] Denny Cantwell at UCLA, research by Morrison and Stewart and others at Iowa clearly showed that AD/HD runs in families, markedly so, a highly inheritable condition. The most recent studies and the best done and the largest studies indicate these are the percentages. If you have a child with AD/HD, what's the likelihood that a brother or sister is going to have the disorder? Twenty-five to 35 percent, depending upon gender. What's the likelihood that if they have a twin they're going to have the disorder? Fifty-five to 92 percent and if you use the DSM criteria, which you should be, it's 92 percent, if they're identical twins. If they're fraternal twins, the risks are the same as siblings, because fraternal twins are no more alike than siblings are alike.

That means we should look back at the parents, right, because where did the kids get these genes? And here's what we find. What are the odds that it's the mother with adult AD/HD? About 20 percent. What are the odds that it's the father? Twenty-five to 30 percent. Put those two statistics together. There is a 45-50 percent chance that one of the parents sitting across your desk right now is an adult with AD/HD telling you about their child, which means what? You will screen all parents of all AD/HD children for this disorder. And why would you want to do that? Because these are the people you're asking to carry out the treatment plan for this child. Don't you want to know this? Isn't it just possible that a large percentage of treatment failures are because you missed the fact that the adult has the same disorder as the kid and can't carry out the treatment as recommended because of the same impulsive, emotional problems, problems with organization, with planning, with time management? Of course. We're now realizing that part of our treatment failures are because the adults went untreated.

If the adult is the diagnosed individual and you look at their offspring, what are the odds they're going to have an AD/HD child? According to the last two studies, 52-54 percent. So if the adult is the diagnosed person, the odds go up.

If it's genetic we should be able to do twin studies and we should be able to calculate how much of the trait is genetic. Now twin studies are very informative, not just because of the genetic information we get, but twin studies also tell us how much the trait is due to environmental effects. Let's say you had a theory of AD/HD like John Rosemond has where he has declared that AD/HD is due to too much television and video game playing by children. Or let's say that you are Peter Breggin and you've written a book, *Talking Back to Ritalin*, and you've declared in this book that most AD/HD is due to a lack of love within the family toward the AD/HD child. Both of these are environmental explanations of AD/HD. That means that we can test them. We can go out and do a study and see: Is there an environmental contribution to this trait? Because if Peter Breggin and John Rosemond and these other critics are correct, we should see very little heritability, genetic effects on the trait.

Okay, we're going to take thousands of twins, which we have done, in the United States, Norway, London, every twin in Australia has participated in a study because Australia has a twin registry, where all twins born are registered and they become available for scientific research. So that you can, with permission, of course, measure AD/HD among all of these twins. We're going to compare fraternal twins to identical twins and maybe if we can find some twins reared together and twins reared apart because of adoption, we're going to do all those studies, and out of those studies we're going to be able to calculate three numbers mathematically. The first number is known as heritability. How much does genetics contribute to the trait? The second number is called rearing environment, shared environment. How much of the trait is due to the common environment shared by the twins and siblings you're studying? And number three, how much is due to unique environment, environmental effects that have affected only one twin and not the other? One twin had a different peer group. One twin went to a different school. One twin ate lead paint. One twin fell off their bike. Notice, environments can also be biological hazards. The term environment in twin studies refers to non-genetic. It can be biological as well.

All right, what do we find in studies? Well for comparison, let me give you some statistics. The genetic contribution to IQ is .55. The genetic contribution to human height is .81. The genetic contribution to AD/HD is .80 to .97. The smaller number is from studies done back in the '70s that didn't use DSM criteria. If you use the DSM list of criteria, the heritability of AD/HD is 97 percent. This trait is more inherited than human height. This trait is more inherited than any dimension of human personality. This trait is more inherited than any other psychiatric disorder. The only other disorder that is this genetically affected is autism.

Now, we can then go out and calculate the shared environment. If Rosemond is right, if Breggin is right, if Scientologists are right that there is no disorder here, it is all due to environment, if the dietitians are right that's it all due to sugar being eaten by the child, because that's an environmental explanation, we should see huge numbers associated with the environmental calculations. Zip. None. Rearing environment makes no contribution to this disorder. So let's just get over this idea that AD/HD comes out of the family, and you didn't raise your child properly and you didn't teach them self-control, and you're a bad mother, and you let him watch too much television, and you fed him too much sugar.

The Role of Genetics

So, if you have a trait that is that inherited, wouldn't you want to go find the genes for it? After all, we're mapping the human genome. There are now 18 teams around the world that are racing to find the genes for this disorder. We found two. In fact, we may have found a third just within the last month. It will turn out to be multiple genes, maybe six, eight, ten or more. Why? Because complex human traits are determined by multiple genes. No one gene builds your brain. It will take multiple genes. And by the way, these are not going to be genes for a disease. They're going to be genes that build brain structures, and different versions of the gene build the brain a little differently and that's what we're studying, different versions of normal genes and what do those versions do? The two genes that we found so far are DRD4 and the dopamine transporter gene. Once you find a gene you can, within a matter of months, determine what that gene does in the brain, because you can knock it out of mice and then breed those mice and then look at what's different in their brain by not having that version of that gene. So that we can tell right down to the nerve cell what a gene is doing in the brain.

Let me tell you what these two genes do. The dopamine transporter gene builds that pump inside dopamine neurons and that pump takes that neuron chemical back up after it's been released. When this nerve cell fires, it releases dopamine into the synapse, that dopamine goes on to the next nerve and fires that nerve. That pump then sucks the dopamine back up in the nerve cell so it doesn't stay in

that cleft and keep firing that neuron too much. AD/HD individuals have a very unusual version of the DAT1 gene that most other people don't have—the dopamine transporter gene—and it makes that pump hyperactive and it builds too many of them, so that people with that version of the dopamine transporter gene have overactive dopamine pumps that are sucking up dopamine too fast and not leaving it in the synapse long enough.

Here's something that is fascinating. We discovered two years ago that that's where methylphenidate works. It slows down the dopamine transporter pump, leaving more dopamine in the synapse. Dexedrine increases how much dopamine is built in that nerve cell and released. Methylphenidate slows up the dopamine pump. Now what's kind of interesting about that is that it suggests that people with that particular gene may actually be the better methylphenidate responders. Do you see how drug response may map onto genetics? Which genes you have may tell us which drugs work for you. That's where we're moving with our research. That's just speculative, but isn't it fascinating that one of the genes for AD/HD is building the mechanism where methylphenidate works in the brain?

The second gene is a gene that builds the surface of a [nerve cell] membrane, and it determines how sensitive the nerve cell is to the dopamine that's poured onto it. And people with AD/HD have a version of the D4 gene that is different, longer than normal. And what does that do? It makes that nerve cell less sensitive to dopamine. Notice how both genes do the same thing. They leave you in a hypo-dopaminergic state. This gene [dopamine transporter] does it by sucking up too much dopamine too fast. This gene [DRD4] does it by making the nerve cell less sensitive to the dopamine that's there. The other gene we just found in my own lab is known as DBH, which breaks dopamine down into norepinephrine, or is part of that chemical process.

So, multiple genes acting in concert to produce a disorder. What are we going to learn when we map out the genes for AD/HD? What do we expect to see? We expect to find four things that will be helpful to us in this profession. Number one, we will have even more evidence, another nail in the coffin of this idea that AD/HD is due to sugar and bad parents. Number two, we are going to discover that there are subtypes of AD/HD that we did not understand, that all AD/HD children did not get that way by the same genes. Why is that going to be helpful? Because different genotypes for AD/HD may have different risks, life courses, and responses to treatment, so that we may be able to tailor-make your treatment and we may be able to understand your development much better by understanding which type of AD/HD genes you have.

Third thing it's going to tell us is it's going to help us with genetic testing. We may finally have objective lab measures for this disorder once we have the genes for the disorder mapped out. And finally, as I've already mentioned, once you know what a gene does in the brain, you can then design a new drug that changes only that process and therefore gives you a much more specific treatment with fewer side effects for your type of AD/HD than we've ever had before. The next few years I think are going to be very exciting. Stay tuned.

There is no question that the next few years are going to be an extraordinary, fascinating time in the field of molecular genetics and the mapping of the human genome. There is no comparable time in human history to the time we are living in. There has never, ever been a time when a species decoded its own DNA and therefore gave it the opportunity to literally engineer itself. Those are historic proportions that can't be measured on any scale.

External Causes of AD/HD

What about toxins or allergens in the environment? Although diet, particularly a high level of food additives, may exacerbate behavior in less than one in twenty preschool AD/HD children—you see how small that is? It plays no part in most AD/HD and certainly is not a first cause of this disorder. And sugar has no effect on child behavior and learning. So let's just get over that one.

If you have a child with epilepsy and they're taking either of these drugs (Phenobarbital or Dilantin) to control their seizures, they may develop side effects that look like AD/HD symptoms. Those are temporary. They are side effects to the medication, but very few AD/HD children have seizures. And most children with seizures who are taking these drugs don't get AD/HD as a side effect, but about 10-35 percent of kids on these drugs experience an exacerbation of their hyperactivity and inattentiveness.

Lead poisoning can lead to AD/HD at very high doses, not at very low doses. And we've already talked about prenatal exposure to alcohol and tobacco as being two of the largest contributors prenatally to acquired cases of AD/HD, and the really sad part of this is that smoking is on the increase among women in the United States. It's a preventable cause.

Okay, what about psycho-social explanations? You've already heard that. The twin studies rule them out. You cannot come up with a theory of AD/HD that uses psycho-social causes as a centerpiece. So what about this idea that it's too much TV and video games? No evidence. Cultural tempo, fast-paced society, no evidence. What about family stress? What about lousy upbringing? What about poor discipline? What about bad parents? Well those things can easily give rise to Oppositional Disorder and Conduct Disorder, and along with it, as we said, risk for major depression, but not AD/HD.

The Developmental Course of AD/HD

So notice that family adversity, psycho-social stressors, and traumas and turmoil and so forth are linked to Oppositional and Conduct Disorder and to some extent mood disorders, but they are not part of AD/HD. These we can pretty much dismiss outright.

All right, the developmental course of AD/HD. Very quickly, do they [kids] outgrow it? Most of them don't. Here are the statistics from my follow-up study. If you were diagnosed with AD/HD in childhood, 80 percent of you would have it in adolescence, 67 percent of you will have it in adulthood. So it's about two thirds persistence. Does that mean that the other 33 percent have outgrown it? No. It means they don't meet all the criteria for the disorder. They have high levels of symptoms. They may remain impaired. They have residual AD/HD, but not enough to get a full diagnosis of the disorder. My follow-up study suggests that no more than 10-20 percent of AD/HD kids are fully unimpaired, normal, indistinguishable from the population in adulthood. The vast majority remain impaired to some extent, and two-thirds of them seem to have the full disorder in adulthood.

We tend to see as kids grow up a developmental curve. The development of inhibition and self-regulation that goes with it tends to show this kind of curve. So here's what we see in normal kids. You'd see a curve somewhat similar to that in AD/HD kids, and notice at any age you study them, AD/HD kids are behind. That's evidence that AD/HD is a developmental disability. Just as retardation would show that curve, just as learning disabilities all show these curves. They are developmental lags, but lag does not mean catching up. It means a chronic developmental lag in the development of that trait, so that at any age you study them they are not where they should be, but they are better than where they were before. So that AD/HD kids do get more inhibition, do get more self-control, do get more ability to manage themselves. But, it's never what it should be because other kids are improving, too. It's like two cars going down a highway. One's going 80, that's the normal kid; another one's going 50, that's the kid with AD/HD. What's going to happen? They're both going to get there, but the gap between them is going to get wider and wider and wider. That's what you tend to see.

So how much is this gap? We can measure it. It's roughly 30-40 percent. AD/HD therefore is producing about a 30 percent lag in the development of self-control and inhibition. Now we can take that to the bank. As teachers, as parents, as clinicians we can use that. How can we use that? Because it tells you what your expectations have a right to be and no more. It tells you what you can expect this child to do and no more.

For instance, you have a 12- or 13-year-old girl with AD/HD who's just taken the Red Cross babysitting class at the YWCA and wants to babysit. She wants extra summer money. You have a neighbor with a three-month-old. They know that your daughter has her certificate for babysitting. They want her to babysit. Do you do this? No. Why? Reduce her age by 30 percent. That is where she is functioning in terms of self-control, emotional control, her inhibition. You do not let children with emotional control of an eight-year-old babysit a three-month-old child unattended. That is irresponsible.

Do you see what this curve lets you do? Subtract 30 percent from their age and ask the question again. Age 16, what do you let people do in this state? [Drive.] All right, subtract 30 percent from their age. You just gave an 11-year-old an automobile. And you said be nice, follow the rules, pay attention, show self-control, and organize your driving. What would you expect to see if you gave 11-year-olds cars? Well I can tell you, we have now finished our fifth study of AD/HD; there are also two others in the literature for a total of seven. They all show the same thing. AD/HD is the worst disorder you can have when it comes to driving. The worst drivers on the road are AD/HD teenagers. And add Conduct Disorder to that and you magnify it even more. So as you will see in a little bit, the risks are as follows. They have four times the auto accidents, three and a half times the speeding tickets, two and a half times the dollar damage.

So what does it mean? It means that you do not let 16-year-old teenagers with AD/HD drive independently. That is what it means. It means that you will keep them under a learner's permit longer. You will do a staggered licensing program. What the state of Michigan is doing for all teenagers, you will do for these kids. But you will monitor their driving far more closely than you would do with another teenager. This kid could kill somebody, including themselves. So do you see what this curve is telling you? They are not ready to be doing things at the age that other people are doing them, and knowing that, can't you then use that information? Of course you can.

You have one of the few 18-year-old teens with AD/HD that wants to go to college, because very few of them will ever go to college, right? You've got one who does. You're sending a 12-year-old to college. If that were true, what adjustments, what accommodations would need to be in place in a university environment for any 12-year-old to succeed in that environment? Would you send them to UCLA? With class sizes that run several thousand in the introductory freshman classes? Absolutely not. Very small college, very small classes, with a learning disabilities program and accommodations, so that you would be tailoring that environment to that individual with a smaller course load, hand-picked professors, a lot of assistance, curriculum, video tapes, study groups, other people there to assist them through the LD resource program, and twelve to fourteen kids in a class. You're going to look for a very tiny liberal arts college that does a lot of LD accommodations, and then maybe this kid will get a college degree. You drop this kid into a state university, he will not finish that first semester.

Our research is informative, because it tells you what adjustments you need to make given the developmental lag that you're dealing with. What I hear is, "He should be normal. He should be doing what those other kids are doing," which of course is ridiculous. That's like expecting a retarded child to act normal.

Okay, we've already talked about the psychiatric disorders that AD/HD predisposes to. I just want to show you that as they grow up there are several others that begin to enter the picture because they're adult disorders. Those are the personality disorders—Antisocial Personality, Passive-Aggressive, Histrionic, and Borderline—and then, of course, substance use disorders, which is what SUD stands for. But the rest of these we've already dealt with.

AD/HD has its biggest toll in any domain of functioning in the **educational environment**, and these statistics just simply bear that out. Thirty-five to 40 percent of the normal population gets a college degree. Only 5 percent of these kids will do it. Here's another one, very telling. Nine percent of

teenagers do not finish high school. Thirty-seven percent of the teens in my follow-up study with AD/HD never finish high school, even though special education is available to them. So it's education where AD/HD really takes a toll.

What's the second-most common one [domain impacted by AD/HD]? **Interpersonal relationships**, as you might guess. You've got a hot-headed, emotional, immature, impulsive individual who says what's on their mind. Not good. Not going to make a lot of friends. Here's the third one [domain]: the **occupational environment**. AD/HD individuals change jobs more often, are seven times more likely to be fired from the job, and will not rise up the economic or employment ladder as quickly as other people without the disorder from the same neighborhood of the same IQ and the same educational level.

All right, this one you might not be aware of. Mine is the only follow-up study that's looking at **sexual activity**. And it's also the only follow-up study that's looking at **life expectancy**. We are evaluating all AD/HD children who are now in their late 20s and early 30s in the Milwaukee follow-up study on life insurance tables. We are going to be looking at their blood, at their urine, at their physical health, because we believe that AD/HD has enough evidence to suggest that it shortens life expectancy. We will see.

But here's something that we noticed at the last follow-up when the kids were 20 years of age and we went back and reviewed their sexual history. This is what we found. They started having sex about a year earlier, they have more partners, they spend less time with each, they don't use contraception. Put those all together and you get these three statistics. High rate of teenage pregnancies. Forty-two babies born to the AD/HD kids. By the way, there's only 150 kids in the study. And one [baby born] to the control group. The control group is doing exactly what the population is doing, delaying childbirth until the late 20s to early 30s. Not the AD/HD individuals. They're having pregnancies as teenagers.

How many of them have custody of the babies that they gave birth to? Not many. Why? It's a teen pregnancy, right. It's teenagers not ready to raise an offspring so that those kids tend to be put up for adoption or raised by grandparents. Of course, what would you expect if you're not using contraception? Sexually transmitted disease. So, AD/HD predisposes to sexual risks, not just traffic accidents and employment problems and under-education and so forth.

Okay, the group that's at risk for **criminal activity**, and AD/HD kids are not by virtue of being AD/HD at risk for criminal activity, it's the Conduct Disordered group that is, as I've already mentioned. If you have AD/HD and you already are showing a lot of lying and stealing and fighting in childhood, then you will be much more prone to engage in these behaviors in adulthood.

So AD/HD predisposes to a lot of developmental risks. On the other hand, most AD/HD children don't have those risks. Most AD/HD children do graduate high school. Most AD/HD children do go on and get a job and move away from home and get married and have children. But, they're a high risk group for various outcomes. Okay, that's what we know about developmental course.

A New View of AD/HD

Let's move on and talk about a new view of AD/HD. So far we have looked at AD/HD as if it involved problems with attention, inhibition, and hyperactivity, so that if you were to look at a consensus view of AD/HD these days—pick up any parents' book, any professional manual—you would be told that AD/HD is comprised of this constellation. And as I said, what our research is telling us is that whatever that problem is that we're calling inattention is not inattention. It's not a problem with processing information coming into the brain. That's that inattentive group we're going to split off and look at as having a separate disorder entirely. So, the consensus view has it that AD/HD involves these three

things. But our research is telling us that that view is simplistic, naïve. That referring to AD/HD as a problem with attention is like referring to autism as a problem with hand-flapping. You are dealing with one of the most superficial symptoms of this disorder.

What's the other problem with the current view that we've had for the last 90 to 100 years? It's not a theory. It's just a description. Descriptions are fine. Any time a new field of science begins, it starts at the level of description. It describes the phenomena it's interested in. We have had 98 years of description. We have 6,000 articles that describe this disorder. But that's not a theory of a disorder. Theories tell you why that description is the way it is, why it develops the way it does. But a good theory also does a few other things that a description cannot do.

First of all, a theory makes predictions you didn't expect. It tells you something about the disorder you didn't know, and those predictions become hypotheses that we test in research to see if the theory is true. Einstein's theory of relativity made predictions that were never even thought about before, and then we went and tested them to see if the theory was correct and they proved to be true. A good theory gives you insight you didn't have, and that is how you test a theory for its validity. Scientific theory is not just some idea you got Monday morning. It is a profound piece of information that reorganizes the way you think about something and makes testable predictions. Any theory of AD/HD like any theory has to be testable, falsifiable. You need to be able to test it through experimentation, hold its feet to the fire, see if it works—as opposed to just storytelling about AD/HD.

Here's storytelling about AD/HD. AD/HD children are just leftover hunters from the Pleistocene era of human evolution and there's really nothing wrong with them. They're just the good old hunters from our caveman days being forced to live in a world of farmers and education. That is one view of AD/HD that became very popular over the last decade and that is not a theory. That is a silly little idea for building self-esteem in AD/HD children, and I don't happen to believe that you should be building self-esteem by lying to people, by practicing small deceptions, by creating little stories about the origin of a disorder so that you can act as if it wasn't a disorder. From that view, there's nothing wrong with AD/HD. It's the environment that's the problem. AD/HD is just a mismatch between little hunters where hunting is no longer needed by the environment. Let me tell you something. The last person I ever want to go hunting with is an AD/HD individual off their medication.

A theory tells you what treatments will be needed and why those treatments are necessary, and we don't have that right now. Do you know that every treatment for AD/HD, just like every treatment for learning disabilities, was discovered by accident? Not by design, but by accident. The stimulants were discovered because they were used to treat headache in 1937 in a bunch of kids hospitalized in Rhode Island, and lo and behold, it made their schoolwork better, it made them less hyperactive. But it was given to treat headache. Behavior modification? Do you know why we do behavioral treatment? Because we stole it from mental retardation. It started out as a treatment for mentally retarded children and it worked so well helping them, we just extrapolated it to everybody else.

Here are some other reasons why we need a theory. The inhibitory problems are what defines this disorder, not the attention deficits, and they emerge first in development. We need some explanation of why they come first and why these problems with inattention or whatever the hell that is comes second. Also, we need a theory that addresses that Combined type of AD/HD. Remember what I said. The Inattentive type has a very different problem with attention. They have a real attention disorder. They have a problem with processing information. But traditional AD/HD children do not. They're two different disorders and you shouldn't put them together.

We have known for years that motor coordination deficits are part of AD/HD. They're just not some co-morbid learning disability. They are part of this disorder. Why does AD/HD interfere with fine motor sequencing, which it does? Why? That's as much a part of AD/HD as the impulsiveness is.

And yet there's no mention of it in the DSM, in the books. It's just some throwaway little sentence. AD/HD kids seem to be more clumsy. Ho hum. Why is that there? It's mainly sequencing. Sequencing of novel, complex fine motor gestures. What is it about this disorder that is disrupting complex fine motor sequencing? AD/HD fluctuates markedly across settings. Why? Sometimes you see it; sometimes it goes away. Why? All as a function of the task, and the setting and who they're with.

Also over the last decade we've identified a number of neuropsychological deficits that go with AD/HD. Why are they there? Let's just take one, for example. Seven studies document that AD/HD delays the internalization of speech. Why do you care? Well, this is why you should care. The internalization of speech is unique to humans. There is no other species that takes a form of communication and turns it on itself and makes it internal. We do that. AD/HD delays that. Why? The internalization of language, as Vygotsky taught us many years ago when he started describing this developmental sequence, does three things for us that are crucial for a group of living social species. First, it is the origin of verbal thinking. The internalization of speech is where verbal thought originates, and AD/HD is delaying that sequence by 30-40 percent. AD/HD is delaying verbal thinking.

Next, the internalization of speech is the means by which you socialize a child into a culture. What does that tell you about AD/HD? They're going to be very hard to socialize into the rules of a culture. The internalization of language is the basis for moral behavior, the moral guidance of behavior by rules of the community. You now know something about AD/HD. You would predict that it would delay moral development. That is a **profound** finding in the literature about AD/HD. That is far more important than any stupid attention deficit is ever going to be. That the internalization of language is delayed by this disorder allows us to make predictions about these kids; that verbal thinking is delayed, that socialization will be harder, that they will be more prone to antisocial behavior, that moral behavior will be delayed as well. All from that one sentence. And why is it there? This is what a theory would do. It would tell you why that's there. The current view of AD/HD is oh, it's just an attention deficit, as though that explains all of this. That is so trivial, so superficial, so undignified that it doesn't deserve any more comment. There is more to this disorder than just, "Oh, he can't concentrate."

So here's a theory. We're going to approach this disorder from an evolutionary framework. We're going to go back and ask ourselves how do you get from a primate brain to a human brain, because most of the differences between primates and humans took place in the three structures that are responsible for AD/HD. The vast majority of changes in a primate brain that led to the human brain are in those three structures, so we're going to take a look about what it tells us about humans, about what it tells us about normal development, and then we're going to see where AD/HD causes it to go awry. Because one thing that a good theory of a disorder has to do is it has to tell you what is the normal process and where does it go awry to produce the disorder.

The Role of Executive Function

We need a theory that starts out with what do normal children go through during their development and what is AD/HD doing to that process to screw it up? The ability to inhibit your behavior is not just one of many mental abilities. It is the foundation. It is the foundation to all things you consider uniquely human about human mental activity. This is the foundation, the ability to wait, the ability to stop responding and not respond to an event. All other species are stimulus responders to their environment. Humans are not. Humans build in a pause between the stimulus and the decision to respond. And in that gap come all of our uniquely human attributes. **Inhibition is not just another mental ability; it is the foundation upon which the human executive system is built.** Neuropsychologists refer to this as the executive system because it gives you self-control, self-regulation. If inhibition fails, the executive system is going to fall apart.

So we start out with inhibition, the ability to wait and not respond to the world around us. During that period of waiting, we will see four executive functions emerge in the course of a child's development.

Each one of them giving you a form of self-control not given by the other, all of them contributing to self-regulation, so that **by adulthood humans are using in concert four different executive functions to manage their behavior, and they use them together interactively like a symphony.** But there are four of them and they start out with inhibition first. And they develop in a stage-wise sequence. Each one needs the one before it before it can develop properly, and inhibition is the foundation. Each of these executive functions, each of these forms of self-control, start out by a common process. They all start out being observable behavior to others, and then the child in development turns it on himself and starts to use that behavior on himself, but you can still observe it. And then as that child matures, it becomes less and less observable. It goes from being overt to covert, public to private, physical to mental.

So that is what humans do—take a behavior they are using to control other people and they turn it on themselves, and then they start to suppress the public display of the behavior, so that as you grow up you are capable of doing more and more things to yourself that other people cannot see you do. You call this internalization. I don't like the word. It implies that something is going from out there to in here, and the only thing in here is flesh. The word privatization is a much better term, because what you're doing is taking an observable behavior, turning it on yourself, and suppressing it so that other people can't see you do it. This is the origin of thinking in humans. All thinking is private behavior to yourself, and I can't see you do it.

Now you know how you get from a chimpanzee brain to a human brain. There is no huge leap in thinking. What there is is a gradual transition in taking behavior and turning it on yourself and then making it private, and we are experts at privatizing behavior.

All right, what does it do for us? It does these four things. **Each executive function contributes to a change in what is controlling your behavior.** As a normal child develops—as these executive functions start to appear—you will start to see a change, from external to internal, from other's control to self-management, from control by the moment and only the now, to anticipating the future and having it manage your behavior, and from immediate gratification to deferred gratification. Why is that important? All education requires this. Now you know why AD/HD has its greatest impact on education. Because AD/HD is destroying this.

AD/HD delays the development of inhibition, which means that it delays the onset of the four executive functions, which means that it delays what those executive functions are doing for the individual, which leaves the person with AD/HD more under the control of external events and other people around them and the temporal now and immediate gratification, when people of their age are moving in this direction, to being controlled by mental representations about time and the future, which gives them a sense of control over themselves. They don't need other people to manage them, thank you. They can do it themselves and they are constantly working to maximize the future over the moment. And the person with AD/HD is stuck right here, living in the temporal now, only concerned with the immediate consequences and much more under the influence of the environment and others when other people are moving to more mature levels of self-management.

This disorder creates as much of a deficit as autism does, but it does it to the executive system. What AD/HD is is no deficit in attention. It is a deficit in inhibition that disrupts the development of the executive functions so that the individual cannot be guided by mental representations about time and the future. These people live in the now, are controlled by the moment, and by immediate gratification. And now you know why parents worry so much about these kids, because although they cannot articulate it, they can see where this is going and they worry about this kid's ability to ever successfully function independently from them. Because self-management is not developing the way it should in this child. That's the theory.

Now we're going to go back and take it [the theory] apart. We're going to start with inhibition, because this is crucial. Inhibition is a foundation. There are three kinds of inhibition that humans develop. We're just going to lump them all into one type of inhibition, right here. But the most important is step one, **motor inhibition**. Can you stop the urge to act, the dominant response, the response that would get you the immediate rewards?

As that develops, you'll develop a second type of inhibition. Once a behavior is under way and you're monitoring what you're doing, can you stop it dead in its tracks if it's proving ineffective? We refer to this in psychology as a **sensitivity to error**. As you are engaged in a sequence of behaviors, can you change that sequence if what you are doing is proving to be a mistake? How flexible are you in the course of human activity in changing the course of your behavior to be increasingly effective?

Finally, the third kind of inhibition develops. We call it **interference control**. When you are engaged in thinking, when you are using your executive functions, when you are using these private behaviors to yourself, you have to protect them from being disrupted from the environment. And if you can't do that, it will destroy your thinking. It will disrupt your executive functioning. It will destroy your ability to manage yourself. This tells us that people with AD/HD are not distractible all the time under all conditions by everything, but that distractions will only hurt them when executive functioning is needed in that task. When thinking is needed. When planful, thoughtful behavior is crucial, distractions will devastate them. But as long as they're doing things that don't involve executive functioning, distractions will not hurt them any more than anybody else. This is why they can play Nintendo for hours but you put them at homework where executive functioning is crucial and distractions will destroy them. And remember, it's a developmental delay, not an absence. They can do this. They cannot do it as well as they should for their age, for their level of development.

Inhibition shuts down your motor system to keep you from responding to the world around you. Why is that necessary? Because over millions of years of evolution, your nervous system evolved to respond to immediate events. Humans evolved [inhibition] to shut [this system] down. We have an inhibition system at the front part of our forehead that reaches back into that brain through the striatum and shuts that system off. So that behavior is not released into the environment. If you create a lesion in that system, it goes about doing what it has done for millions and millions of years. It is a renegade motor system responding to the now and events that enter the sensory fields. That is a classic description of a frontal lobe injured patient and it is a classic description of somebody with AD/HD whose system is not being regulated, and therefore they're under the control of the moment. Inhibition shuts that down, creating a delay, a pause, waiting. During the waiting, four executive functions will develop. Each executive function is a form of behavior to others that gets turned on the self and made covert, private. By the time you reach your early thirties, which is when this system has maxed out in its development, all four are up and running and give you human adult self-management for the future, and they take over the motor system. So that as you grow up, what is increasingly deciding your behavior for you is not the environment, but those [executive functions.]

What are the Four Executive Functions?

What are the executive functions? The first executive function—neuropsychologists gave it a fancy name: **nonverbal working memory**. What is it? Sensing to yourself. The first thing that the young child does in human development is they take their sensory motor behavior and make it private. What's the most important human sense? Vision. Second, hearing. What do humans turn on themselves and make covert? Vision and hearing. You are capable of visual imagery and private audition, and in fact you are capable of taking every sense and making it private and using it in your head. You can see to yourself, hear to yourself, touch to yourself, taste to yourself, smell to yourself. I can taste the merlot I had last night with a New York strip steak. I can re-savor that moment, I can hear the conversation with the waitress, I can replay the restaurant, I can draw you a map of that restaurant downstairs through

visual imagery. No other species does this with two exceptions—dolphins and chimpanzees may have a nonverbal system.

Humans start with this visual imagery, private audition, sensing to yourself. This is what you call mental activity, the capacity to re-sense an event and hold it in mind because you're going to use that to control your behavior. It's a two-step process: re-sensing the past event and using it to plan a future response; looking back to look ahead. You know this as hindsight and foresight, and the word "sight" is no mistake, because among all of the senses, it is visual imagery we use the most. And second to that, private hearing. We can do it all together, sense to ourselves. We start doing this during the first three months of life. By age twelve months, the human infant and toddler are more capable of this than any other species on this planet.

Notice the list of everything that is given you by a nonverbal system. You can sense to yourself all of these becoming possible, because all of these come out of sensing to the self. There can be no imitation without this system. Because what are you imitating? Not the behavior of the other. You're imitating a visual image of the behavior of the other person. There can be no imitation unless there is a nonverbal working memory system, which is why very few species imitate and only humans do vicarious learning. Vicarious learning is not where I do what you do, it's where I do the opposite. I watch your mistakes and it immediately changes my behavior. Imitation is mimicry, doing what you do. Crank it up a notch and do the opposite. I don't need to make the same mistakes. I learn from yours. Humans are the only species that shows vicarious learning. There are a few other species that imitate and they are the ones I've already told you about, which is why we think they have a nonverbal system.

This one you probably didn't think about, the psychological sense of time that comes out of this executive function, your ability to sense the passage of time. Why do we have this? To anticipate and get ready for the future. Without this system, by the way, there would be no past tense or any future tense in language, because what are you referring to? When you use past and future tense you are referring to images of the past and anticipation of the future.

So, here's a prediction, never attempted by any theory of AD/HD. AD/HD delays all of this. Well does it? Do people with AD/HD have problems with sense of time? You're damn right they do. Do people with AD/HD have trouble anticipating the future? You bet. They live in the now. Like Dennis the Menace, isn't it always now? Don't talk to me about tomorrow. Don't talk to me about next week. Doesn't matter. Now, now, now.

Here's an interesting prediction: I predict that if you study young preschool AD/HD children, they will not develop past and future tense in language as early as other children. If my theory is wrong, you won't find any differences, and that part of the theory is dead. But I will bet you it's true. I've actually already tested it through interviews with parents about AD/HD children. They do not refer to time, the past and future in language as much as other children do. Other children start talking about tomorrow, next week, next month much earlier than AD/HD kids do. AD/HD adults have a terrible sense of time. We have now finished our fifth study of sense of time. AD/HD destroys it, right down to intervals as short as 10 seconds. Time escapes them.

Now, let's juxtapose that finding with this finding. Modern human culture worships time. The best-selling books in nonfiction section of bookstores are time management books, and you have a disorder that destroys the sense of time. AD/HD is the consummate disorder of time management. We start out living in the now as preschoolers. As we get older, this window opens. Looking back, to look ahead, and it gets wider and wider and wider, until in our early 30s this window is 8-12 weeks out. Most of the decisions you and I are making are for events that lie about 8-12 weeks out. We can anticipate further out, but that's our average fore-period for decision-making. AD/HD slams that window shut. AD/HD makes you live in the now. What does that mean? It means you will not get ready for the future until it's here.

So, let me give you another name for AD/HD: time blindness. AD/HD creates a nearsightedness to the future, a temporal myopia, so that the individual is always waiting until the event is here, imminent, before they do anything to get ready. That is a fascinating insight into this disorder, that people with AD/HD have a temporal neglect syndrome. They cannot anticipate events that lie ahead and use it to guide their behavior, and it doesn't matter how much you talk about the future. They will not get ready for an event until it crosses their time horizon, and their time horizon is right here, smack in front of them. Now you know why everything is left to the last minute all the time, always late, never ready, never prepared, never has materials, right? Do you see how devastating AD/HD in a modern culture would be?

Time-blindness alone would devastate you. That would be a serious disability in the adult population, but it's only one, and there are three more. Here's the second one: **internalization of speech**. Indeed, you can't develop speech without the first one, because what are symbols? Words are simply arbitrary noises that we associate with visual images and other events. Language doesn't develop until the working memory system is underway. Internalization of speech comes next. My theory predicts that people with AD/HD will be delayed in all of these. It's an easy prediction because there are already seven studies that show that this is true. But here would be the implications. Do you see where some of the inattention symptoms are coming from? Forgetful in daily activities, can't follow through on rules and instructions, skips from one uncompleted activity to another—behavior is not being guided by internal language. Now you know why they don't follow through with rules and instructions. Now you know why it doesn't matter what rules you give them. It isn't going to control them. Language is not controlling the motor system as early as it should.

So go ahead, teach him to talk to himself. Do cognitive therapy. Now you know why cognitive therapy fails for AD/HD, because cognitive therapy assumes internalized speech. And in AD/HD you cannot assume that. They are 40 percent delayed in the internalization of language. You can't comprehend what you read if you can't read silently to yourself and hold it in mind and convert it to its meaning, its images. So now you know why AD/HD adults are going to have reading comprehension deficits. But it's not a reading problem. It's a working memory problem. They can't hold the information in mind to get the meaning out of it, so they have to read, and reread and reread and halfway down the page they forget what was at the top of the page and have to go back to the top again.

The third behavior that humans make private is emotion. Emotion to others becomes emotion to myself, becomes private emotion that you can't see. Every once in a while I catch you doing it; every once in a while you laugh out loud at a joke you're telling yourself and don't suppress the laughter. Every once in a while tears well up in your eyes as hard as you try to fight showing those signs of emotional arousal. Humans are capable of private emotion to themselves. We appear to be the only species that does this one. We take emotions to others, turn it on ourselves, and make it private. So that by the time you grow up, you are capable of a whole range of covert emotions that other people can't see. I can't measure them. I could measure your respiration, your heart rate, your skin conductance, and I could see whether you're in the midst of an emotion, but I won't see the muscle movements, the covert part of the emotion. I'll just see what are called the autonomic nervous system signs of it.

If an event happens that causes us to have an emotion, as we get older, we use another emotion to counteract it. Suppose you make me angry? What do I do? Take a positive emotion, juxtapose it on the negative one to try to get myself over it. Count to 10, think positive thoughts, say nice things to yourself, move on. What are the most important emotions to control if you live in a group? Is it the positive emotions? Is it love, humor, affection? Nope. Showing those won't cost you too much. It's the negative ones. If you live in a group, you've got to be able to control the negative emotions.

What does my theory say? AD/HD children will display their emotions more, and it will be the negative ones that cost them dearly in their peer relationships, because even though they are more silly, even though they may be more demonstrative, more passionate than other children, it's the inability to

regulate the negative ones that they're going to pay a heavy social price for. This theory says that AD/HD children can't keep their emotions to themselves. And cannot use other emotions to moderate them. **AD/HD children are delayed in emotional self-regulation.**

Most of you already know that people with AD/HD seem more emotional, but now you know why. They're no more emotional than you are. They're more demonstrative of their emotions than you are. You keep that emotion to yourself. They don't. They impulsively show the emotion when it occurs.

This is the definition of an emotion in psychology: It's a motivational state. If you can't internalize emotion, you can't internalize motivation. **The third executive function is the source of intrinsic motivation.** Let me give you a few words that laypeople use for intrinsic motivation: persistence, determination, ambition, drive, willpower. AD/HD children are not inattentive; they're impersistent. AD/HD children don't have an attention deficit; they have a motivation deficit. And the motivation deficit is an intrinsic motivation. They cannot generate the [internalized] motivation to get to the future. All future-directed behavior, all goal-directed behavior, all planned, thoughtful behavior requires intrinsic motivation. Why is that? Because the future hasn't happened yet. How can it motivate you? You have to generate the motivation yourself. And if you can't do this, you will not get to your goals, finish your projects, follow through on things, pay attention when things are boring. You will not be able to persist.

Now notice what this tells you. AD/HD individuals do not have difficulty when the motivation is provided in the environment. As long as you reward them for everything they do, they will do it. The problem they have is when there's no reinforcement. And what's a classic example of tasks that do not involve reinforcement? Schoolwork. Homework. Now you know why they can play Nintendo but not do their homework. Nintendo provides the motivation, the immediate consequences for everything you do. Homework does nothing. It just lays there. Solve a problem, no bells, no whistles, no coins, no flags, no sound effects, nothing, that's it. Problem solved, right? To do homework you must have intrinsic motivation. To play Nintendo, you don't.

So now you know why they can't persist. Why they have a motivation deficit. One last thing, by the way. Part of motivation is level of arousal, which means they can't regulate arousal either. It may be why they fall asleep, get bored, fade out in boring situations.

The final executive function is: play to yourself. I bet you thought play was just something kids do for fun. It isn't. It is an absolutely crucial human developmental stage: play. Because humans take play with the physical world and make it mental play and make it covert. As a young child, I have to touch everything in sight. Play with it, take it apart, move it around, see what happens. But as I get older, I internalize it, so that I don't need to touch the world around me anymore. I can play with the world in my head and never touch it. I could take that slide projector apart right now if I needed to. Because I've done it so many times before.

So, play to the self. This is the source of all innovation. This is the source of creative problem-solving. This is where we come up with new plans to solve old problems and get to our goals. This is not artistic or musical creativity. This is goal-directed creativity. The ability to problem-solve on the fly as we're going towards the future whenever we encounter obstacles that get in our way, things that disrupt our plans. This is goal-directed, future-oriented innovation, and all cultural innovation came out of this.

We can probably determine when in human evolution this module emerged, because it will be the beginning of rapid cultural change. When did it start? About 60,000 years ago. Prior to that time, humans were not particularly innovative. By the way, when did the first executive function appear in anthropology? Well, let me give you an example. No art would be possible without it. You cannot paint an image in a cave if there is no mental image to paint from. Look for the emergence of art in human evolution and you may see where the first executive function got started.

All right, these are all the things that you get from this executive function. One of them you may not have thought about is **verbal fluency**, because this is the module that takes old behavior apart and puts it together to form new sequences and to do it very fast. Now you know why AD/HD kids cannot do novel, complex motor sequences as fast as other children, because the module that does it is delayed. And they cannot speak as clearly as other children. If you put them on the spot, their language goes down. That's fascinating about AD/HD. Why do AD/HD children talk so much until you ask them a question about their homework? AD/HD children talk more than other children; why? The second executive function; their language is not internalizing. They don't talk more than other kids. They talk out loud more than other children.

But then why is it when you ask them a question about homework, they don't generate anywhere near as much language as other children? Because the fourth executive function is delayed; they cannot put their ideas together quickly into a sequence to explain what they read, and so they will appear disfluent, and you will see three things that are fascinating about AD/HD. First, you will find they don't generate as much language as other people when asked a question. Second, you will find that they mention only concrete specifics and miss the overarching theme of the assignment. And third, they will get the items out of sequence. They will get the temporal order wrong. We have only started to look at this, but the first three studies have demonstrated that is exactly what you see from AD/HD individuals.

There is one treatment that will normalize that system. It is stimulant medication. It will normalize it for 55 percent of all AD/HD children. It will improve it for 80-92 percent. **Stimulant medication doesn't just make you less hyperactive, it also improves your executive functions.**

So the children on stimulant medication, if it is effective, will have a better working memory system, a better sense of the past, a better sense of the future, will be able to talk to themselves and their speech will become instantly internalized. They will not need your tokens and motivation as much as they need it off their medication because they can motivate themselves. You should see them become more verbally fluent, their handwriting should improve, they should organize their thoughts better, and they should be fully capable of explaining their homework assignment on medication. Stop the medication, these all go back to being impaired, because these are not the problem. That's the problem; these are secondary.

I hope you've gained some insight about AD/HD. I hope you can see that AD/HD is not some silly attention disorder. It's a problem with inhibition, self-regulation, and time.

AD/HD and the Point of Performance

What does it all mean? What does this model do for you? Compared to the attention-deficit view of AD/HD, what would this view do for understanding and for treatment? First and foremost it tells you something absolutely essential to understanding this disorder and its management. **AD/HD does not interfere with knowledge. It is not a skill deficit. It is not a learning disability. AD/HD disrupts the performance of knowledge, not the knowledge itself.**

Why is that important? It's important for this reason: You do not do skill training to help people with AD/HD. Stop treating them as if they're stupid. Stop treating them as if they don't know anything. "Oh, you can't sit still? I'll teach you. Oh you can't do time management? I'll teach you. Oh, you

don't have any friends? We'll do social skills training. Listen to how we approach this disorder. We view it as a deficit and I can correct it by teaching you the right things to do." That's pedagogy. That's knowledge. AD/HD has nothing to do with that. You can teach them all you want to. They won't use what you teach them. Because that is where the failure lies. The executive system doesn't acquire knowledge. It applies it. It takes what you know and uses it in getting along with other people for your social effectiveness.

So **AD/HD is a disorder of doing what you know, not of knowing what to do.** It's a disorder of performance, and that raises a very important phrase. The point of performance. Where is the point of performance for that particular behavior you're trying to change? If an AD/HD child is friendless, does it mean you put him in a social skills group on Saturday morning at your private practice with eight other kids he's never going to see again the rest of his life? Is that the point of performance for a social skill? No. It's every day at that school with that peer group he has to live with. This model makes it very clear. Treatment must be at the point of performance or it doesn't work.

Millions of federal dollars have gone down the toilet to learn that one. You can do skill training all you want to, but you have done nothing for these people, because you assumed that they were stupid, and that's the assumption. Naiveté—they just didn't know. They just didn't learn. "He just doesn't know how to share with the other kids, so I'll teach him how to share." And what really pisses you off is when you teach him and he still doesn't do it. He still goes out there and takes things from the other kids and doesn't follow the rules and wants to take over the game, and that really makes you angry.

Now you start to interpret it from a moral stance. He's choosing to misbehave. I taught him how to get along with those other children, and he is now turning around and not doing what I taught him. That's a choice. This kid is willfully disobedient and he deserves every damn thing he gets.

One of the things this theory points out is that the mental mechanism that takes what you know and allows you to apply it where you should at a point of performance isn't working. This is why you can have a kid with 150 IQ with AD/HD who will never finish high school. Because IQ is simply a measure of what you know. It is not a measure of what you do. Which is why IQ is a lousy predictor of occupational success. The best predictor of occupational success is executive functioning. Taking what you know and wringing every ounce of useful behavior out of it, self-regulation to the future is what this life is all about. And that is what is being stolen from them. Stop focusing on skills. You miss the point.

Now that does not mean that there are some AD/HD children you're going to encounter who by virtue of coming from a war-torn Eastern European country have not had an opportunity to learn social skills, in which case you may have to do social skills training. Or they're coming from inner-city downtown Los Angeles and they may have come out of poverty and maybe they haven't learned social skills. But notice, the social skills deficits there have nothing to do with their AD/HD. It has to do with the inopportunity to learn social skills. So there may be a subset of AD/HD children where you will have to do social skills training, but it has nothing to do with their AD/HD.

Here's another thing this theory tells you. Unlike any other species, humans have two kinds of sustained attention, persistence. Just like all other species, they can maintain their behavior if the environment reinforces them. Externally maintained attention—they will stay at it as long as you pay them. All species with a nervous system can do that one. But only humans do the second one, internally guided, self-motivated persistence toward the future, which is why only human behavior is intentional, purposive, goal-directed. We are capable of the second. People with AD/HD do the first just fine. They will persist, they will sustain their attention as long as the environment is paying them. But the minute it stops, they can't.

Behavior Modification and Motivation

There are two purposes for which you might do behavior modification with someone. One, to teach them a new skill. That's exactly why we used it for retarded children. But it's the second reason we use it for AD/HD, motivation. Not to teach, but to motivate; not to give them anything new, but to help them show what they know. **Behavior modification is a form of artificial motivation, putting motivation in the environment at the point of performance where it normally doesn't occur in order to motivate them to show what they know, to use the behavior that is in their repertoire.**

Why is that important, then, that you understand that distinction between using behavior therapy to learn and using it to motivate? Because if you use it for learning, you can stop and the person's learned the ability and will carry it on their way and they won't need you any more. But if you're using behavior modification for its motivational properties, you can't stop it. Because if you do, the motivation goes away, too.

That tells you something very important. Intervention must be maintained for anybody with AD/HD. You cannot get in and do short-term training and then say, "Well, I'll do this token system for six weeks and I'll reward him for all the work he does in the classroom and then eventually he'll internalize all of that and I can pull the token system; he'll go on working up at grade level just like he did with the token system." No, he won't. What this theory tells you is this. You pull that token system, you pull the motivation. That child will stop working for you the day you stop the token system, because you weren't using it to teach anything. You were using it to motivate somebody.

And when you use behavior therapy for motivation, you must keep it there. You cannot get rid of it. You can thin it out over time, but you can't get rid of it, because behavior modification is like a prosthesis. It's like an artificial limb to an amputee or a hearing aid to someone who is going deaf. It is a substitute form of motivation. It's a prosthesis. Token systems are the prostheses of AD/HD. You must put motivation in the task or they won't do it. They can't do it. It's not a choice; can't. You must make it a win-win situation and if you don't, they won't.

That's why parents will often tell you, "Why do I always have to put something in it for him before he listens? Why won't he just do it because he's part of the family unit and these are his obligations as part of our family?" Are you out of your mind? Even normal children don't do their chores for that purpose. So watch out for this. If you want to know where they are going to be at their worst, it's where the environment demands that they motivate themselves. And they're not going to be able to do it.

Here are some other implications. Time is the enemy of anybody with this disorder. The more you give them a task that involves organizing over time, the more you disable them. You need to think about AD/HD and about life in general as a three-part system. There are events, there are responses to the events, and there are the outcomes that occur as a result of those responses. ERO, and here is what my theory says. As long as the E and the R and the O are right next to each other in time, AD/HD kids act normal. The minute you put a time lag between the E and the R and the R and the O, you disable them. And that time lag can be as much as or short as 10 seconds, 12 seconds. But what do we do? We put hours and days between those.

Case in point: "Tommy, I want you to do a book report on *Catcher in the Rye*. It's going to be due in three weeks. It's going to take me two weeks to grade all the papers before I can tell you how you did." I just put three weeks between and E and an R and two weeks between and R and an O. And there is no AD/HD kid in this planet who will do that book report, not on his own, not without a lot of help.

So this theory tells you something very important. Get those E's and R's and O's as close as possible. Take the time out of the equation, or minimize it as much as you can. How could you have approached that book report? You could have said this. "I want you to sit down right now. I want you to read three pages right now. Then write me two sentences right now. You will earn 15 points for doing so." I just put the E and the R and the O right next to each other. I took the long future task, I split it up into tiny little daily E, R, O's—little steps across the gap in time, and I solved the problem. But I can't solve it by bitching, by whining, by moaning and appealing. "You got a book report due in a week and a half. You better start your reading. Oh, that book report's just three days away and you haven't been doing your reading."

Listen to what we do. We whine, we appeal, we cajole, we plead. When instead what you should have done all along is to split it up into daily units and do a step across time every day. That is what we mean by bridging time, doing little bits of the future all along the way, so when the future gets here, you're ready. As opposed to expecting them to do all of that on their own with no assistance. Remember, if there is one purpose to this front part of your brain that is so uniquely us, it is the organization of behavior across time to meet the future—cross temporal behavior—and they can't do that very well.

Now let's go back to the question I asked before. There were nine symptoms on that DSM attention list, which we said you had to have six out of the nine to be called AD/HD. And I told you, you could not call that list a list of attention symptoms because there's no evidence that it's attention that's the problem. AD/HD kids pay attention to the environment just fine. What are they not paying attention to? The future. Time in the future. Future-directed behavior is called intentional behavior. And if AD/HD kids are not paying attention to the future, they don't have an attention deficit, they have an intention deficit. **AD/HD is an intention deficit disorder.** They are inattentive to the future, to where they should be going as opposed to where they are now. That's what that list of symptoms is all about. Can't follow through with rules and instructions. Forgetful in daily activities. Skips from one incompleting activity to another. If they're inattentive, it's inattentive to the future.

Accountability and AD/HD

Now if you were an attorney, you could make a very strong case that AD/HD is a form of diminished capacity, and therefore people with the disorder should not be held responsible for their actions. Just like psychotics, just like bipolar individuals in the height of their manic episodes, the person with AD/HD is mentally ill and should be excused from the consequences of their actions, and many calls come into my office, say, "Will you testify in this case? Will you fly down to Texas if the kid is going to be expelled from school because he brought a weapon in and he's AD/HD." Does he have AD/HD? Yes. Are we going to excuse it? Not on your life. Because if you think this theory of mine excuses accountability, you just missed a very big point. My theory says the opposite. **If you want to help somebody with this disorder, you don't excuse the consequences. You move them up as close as possible to the behavior you're trying to control. You increase accountability, not decrease it, not dismiss it.** That is the worst thing you could do for anybody with AD/HD is to not hold them accountable.

If being accountable means that there are consequences for your actions more immediately, more often, and more saliently, then that is what this theory says you must do. You must increase the accountability and bring it up close to the behavior you are trying to manage, not dismiss it and excuse it as if they can't help it and never will be able to. You arrange the right contingencies around somebody with AD/HD and they can act normal. You excuse accountability and they will be in the most serious trouble they've ever been in, because this theory says this: it ain't the consequences that are the problem; it's the delay to the consequences that kill them. It is the lag in those natural consequences that is always the problem for them. What is the consequence for not doing your school

work? Retention in grade and failing high school. That's a nine month to twelve year lag. What does my theory say? Tighten it up. Consequences every day in this class for getting that work done or not. And then they get to the future. And they don't get held back and they don't fail high school.

AD/HD is not a pathology, it's a trait. **There is an AD/HD trait in the population. It's called self-control, and AD/HD represents the lower end of that trait.** Just as dyslexia is not a category, but is simply the lower end of the distribution of phonologic awareness and decoding. And just as mental retardation is the lower end of the distribution of IQ in the population, AD/HD is just the lower end of a normal Bell Curve for self-control in the population. It's not like pregnancy, not something you have or you don't. It's a continuum. And they happen to occupy the extreme end of the continuum of a normal trait.

How AD/HD Symptoms Change with Age

You also need to keep in mind that my theory would argue that AD/HD will increase in complexity with age. How is that? Well listen to what the theory says. If you see somebody with AD/HD and they're a preschooler, it means the only thing you're going to see is inhibitory problems, hyperactivity. But by age five, normal children are using working memory, visual imagery. By age seven they're developing a sense of time. By age nine they've internalized their language and are beginning to use it for self-control. By age 12 they started to manage their emotions better. And also right around that time we start to see the beginnings of internalized play, the ability to mentally manipulate information in order to solve problems. Notice what would happen, then, if you have AD/HD, that as normal children acquire each stage in that process, you just got hit with another layer of deficits. You started out with poor inhibition. You wind up with every stage being disrupted. To see an adult with AD/HD is to see an adult with an entirely disrupted executive system. To see a two-year-old with AD/HD is to see a hyperactive kid, because nobody's developed any executive functioning at two. But by four they will, and on and on. It's a disorder that has layer upon layer of deficit added to it as normal children get these other executive abilities. It increases in complexity with time. It's a disorder of inhibition that will eventually disrupt the executive system and steal that individual's capacity for normal self-control.

Treatment: A Review

What are the implications for treatment? Stop teaching skills. People with AD/HD aren't stupid. They don't need you to tell them what to do. They need you to rearrange those critical points of performance where they're having trouble, so that it helps to elicit what they know at that point of performance.

So the treatment has to be out there at the point of performance. It means that people like me are not therapists. Parents and teachers are therapists. I'm just a consultant. They're the ones who have to carry out that treatment plan, not me. They are the ones who have to be at the point of performance, not me. And one of the biggest problems is that performance disorders are the hardest to treat in the mental health professions, because you can't be at every point of performance. Driving is a point of performance. You can't be with your teenager every time they drive a car. How are you going to be with your teenager when they start to explore sexual activity with the opposite sex? How are you going to be with your teenager when they're out away from you at the shopping mall and they get the urge to shoplift? You can't be at every point of performance.

Lucky for you medication is always in your bloodstream at the point of performance, which is why you're going to see that there are times and places where only medication will work. And then there'll be other places where you can make accommodations and do behavioral interventions and so forth. But you can't be everywhere this kid is going to be, and that's part of our problem. I can't have a treatment that's at every point of performance. I can try, but I won't be perfect.

Information is not moving from external to internal control. It says that the things that are managing you are not moving from external to internal. Can't we use that in reverse, then, to design treatment programs? **Stop relying on mental information to guide behavior. Make the information physical, real at the point of performance.** It means that you are going to have to take key pieces of information and somehow make it physically represented at that point of performance.

If that child has trouble with desk work in school, the rules for desk work are posted on the desk at the point of performance. You are going to use sticky notes and star charts and signs and symbols and reminders and anything you can think of that you can put at that point of performance that reminds that kid of what they know and what they should do at that point. Just like you learn to put your car keys right by the back door before you go to bed at night so that they're there the next morning and

you're never searching for them. You've got to do that for AD/HD. You must make the information that is critical physical, tangible, out there in the real world, and stop relying on them to remember.

All right, that takes care of the first two executive functions, but you're also going to have to **externalize time**. They have no sense of time. It is laughable what I hear teachers and parents say. "Tommy, you've got 30 minutes to go back to your desk and do this academic work." What is 30 minutes? You have an idea what 30 minutes is. You know how long it feels. You know when half of it is over. You don't need a watch. They do. They have absolutely no idea what 30 minutes feels like. You just gave them a time limit. If you're going to do that, you need to make time physical. Clocks, watches, calendars.

To someone with AD/HD time feels like it is moving very slowly, and therefore they think they have more time than they do. Let me put it the other way. The future gets here faster than they think. And consequently they are never ready for it. It is arriving faster than they can feel it coming at them. Externalize time as much as possible.

All right, the next thing my theory says is you can do both of those, but if you don't **externalize motivation**, you're not going to help. You can't put them at the point of performance and not put some motivation there. You have to make it a win-win. What's in it for them to follow your rules and do it within that time limit in that situation? You expect them to do it for the love of the classroom, for the good citizenship award, for some lousy little alphabetical character written in one-quarter by one-quarter of an inch ink on a report card every six weeks or every eight weeks or every nine weeks? Is that what you expect? Is that a motivator? I don't think so. You must externalize the motivation. You better put something at the point of performance that motivates them or they won't work for you, no matter how much you post the information.

And by the way, what does this theory say about giving extra time on exams to people with AD/HD? Most common recommendation I see in high school students and college students. Double time on exams. What a joke. Go ahead. You'll just give them twice the time to waste. Twice the time they can't feel. Twice the time they can't use. There's not a single study anywhere in the literature that shows that giving extra time is an advantage to anybody with AD/HD, and there are studies of children that show that it doesn't help them, it hurts them. To be able to use time effectively, to go back and check your work requires self-control. This person doesn't have it. So you're going to have to put some motivation at the point of performance.

AD/HD is a chronic disability, and as with all chronic disabilities, this is the most important thing to treatment success: Could you take care of a diabetic child if you didn't care about them and didn't make accommodations in your family? They'd die. Could you take care of a retarded child or autistic child if you didn't understand and have compassion and be willing to make accommodations for those children? Of course not. And yet we go through life with AD/HD kids acting as if they don't need accommodation.

“Why should we do it for them when we don’t do it for the other kids?” I heard that all day long. Because they’re disabled! To me, this is what that sounds like: “Why should we build a ramp coming into this hotel? The rest of us walked in.” “You can’t walk in? Well, that’s a choice. That’s a willful choice.” Or here’s the other one I love. “We’ll put the ramp out there for 30 days, and now that you’ve gotten into this hotel successfully thirty days in a row, I think you’ve internalized your ramp and we don’t need to use the ramp anymore.” But what do I hear from parents and teachers? “How long do I have to do that token system, Dr. Barkley?” Forever! It’s the ramp.

But again we come back to this: Treatment is a waste of time if the people who are supposed to do it don’t care and aren’t willing, right? Cooperation and compassion, the two C’s. You don’t have those, I don’t care what your IEP says. I don’t care what your recommendations in your report say. Nothing’s going to change. This kid is doomed. So, that is something that therapists have to work on right at the start. Before you go into any treatment plan, before you go into any specifics about what they should do, the first thing you cover is the disorder, so that you can convince them that it’s a serious disorder and it is lifelong. And therefore, we have to make accommodations.

The Four Steps in Treatment

Okay, so now we’re going to get into the nuts and bolts of this program. What should we be doing to help people with AD/HD. That’s assuming, of course, that you have the understanding and willingness of people to make change. We can summarize treatment in four words. Number one, **diagnosis**—you’ve got to start with a proper evaluation or you don’t know what you’re dealing with. Remember the point I made earlier: knowing the disorders the child has brings with it extra information. If I know that you’re AD/HD with Oppositional Disorder, AD/HD with anxiety, AD/HD with depression, I learn things from that. So we start with the proper evaluation. It’s the first step in treatment, knowing what you’re dealing with. Every case is different.

Next, **education**, and I don’t mean the school system. I mean learning as much as you can about the disorder. You have got to read widely. You’ve got to remember what David Lindsay said, “Truth is an assembled thing.” It comes from no single source. No guru, no website, no single book. You have got to piece it together to get a broad understanding of this disorder, because from understanding comes compassion. So you’ve got to learn as much as you can about AD/HD. Don’t even think about undertaking treatment until you’ve done those two things—proper evaluation and getting yourself educated. If I told you your child had diabetes, what would you do? You’d want to read as much as you could about diabetes. You’d get on the Web, you’d go to the library, you’d go to the medical school, you’d talk to other people. You want to find out if there’s a national association for diabetic children. If your child had autism you would do the same thing. You’ve got to do the same thing about AD/HD.

The third step is, whether you like it or not, **medication**. Why? Because we have over 300 controlled studies that show us that medication is the most effective treatment for the symptoms of this disorder we have. Now does that mean we use medication by itself? Of course not. I am not saying that. But if you are asking me in a head-to-head comparison among all available treatments, which produces the greatest change, it is medication, bar none. And that has been proven again in the largest study ever done on this planet for a childhood mental disorder known as the NIMH MTA study for multi-modal treatment of AD/HD. This study involved 592 children at six sites in the United States and Canada. Took eight years and ten million dollars to do. There is no study that comprehensive and that definitive for any mental disorder of childhood, and they just finished and published their results.

Upshot of the study? If you focus only on AD/HD and not the other disorders these kids had, medication was the best thing. Adding all that psycho-social treatment to medication did nothing, nothing. The psycho-social treatments, however, were effective for helping with related disorders—

Oppositional Disorder, Conduct Disorder and anxiety disorder. So notice what we're saying. The best treatment for AD/HD is medication, but you'll never get away with medication alone. Because many AD/HD children have multiple disorders, and for those disorders, the psycho-social treatment programs are going to be critical. But let's get over this idea that psycho-social treatments are just as effective for AD/HD as medication. Because it isn't even close.

And now here's the other upshot of that study. The psycho-social treatment they did is not available in any community. So unfortunately, most of us deal with much smaller versions of psycho-social treatment programs, right—eight to 10 weeks of some parent training, occasional consultation with a mental health professional, a couple of school consultations and IEP plan, and then you guys are on your own. So, medication turns out to be the most effective thing we have, but you will have to do this, because these kids are going to come in with multiple disorders and also don't forget, there are going to be at least 10 percent of the children who don't respond to medication and you are not going to be able to use medication all the time. And so therefore you're going to have to design behavioral accommodations for this individual.

Of all of these things, if you want to know which one changes behavior the most, it's medication. But if you want to know which was the most important thing you ever did for this family, it's psycho-social treatment programs. Isn't that interesting? There are now multiple studies that indicate that **teaching the family about the disorder was more powerful than just telling them things to do**. So don't skip that step, because it turns out it's more important than just the little tricks you're going to teach them. They need to know about the disorder and then they take the information and use it. Otherwise, you don't know why they need it. And the compassion that you need to deliver isn't going to be there.

Helping Families Accept and Act on the AD/HD Diagnosis

When we sit down and work with families, what is it that you need to make sure the family knows? You need to make sure they **know the disorder**, that you review what it is, what its causes are, what its course is, what the risks are. What are the available treatments, both proven and unproven? You need to make sure that you are constantly stressing that AD/HD is a handicapping condition; it's a disability. It's not bedwetting. It's not something you're going to get this kid over with in eight weeks of behavior management. Diabetes is a very good analogous condition to understanding how to work with families that have AD/HD kids.

And then understand this. When you present that information to a family, what are you going to get? A grief reaction, which is a natural process to being told you have a disabled child. But unlike other grief reactions to transient events, this one doesn't go away; it comes and it goes. When things are good, it's not there. The next crisis, it's back. I've worked 25 years with thousands of families. You never fully resolve it, do you? There are always those regrets, those what-ifs, what if he hadn't had this, what would his life be like? What would our family be like?

But grief reactions are normal and natural and useful, because what is the end stage of grieving? Acceptance. One of the best indicators to me about whether a family is going to be effective at raising that child is whether they have this, because if they don't go through this, I'm very skeptical they ever get here. This is a family that's going to go looking for the magic bullet, the quick cure on the Internet, the Ginkgo biloba, the St. John's Wort, the Pycnogenol, the God's Recipe, the biofeedback. They're going to go out there, trying every damn thing they can because they just cannot accept that they can't get this kid normal, that if they'll just find that next treatment it will be the antibiotic for AD/HD and then they don't have to invest in this kid any more. So watch for that. You don't see that grief reaction, it means one of two things. They've either already had it before they got to see you, or they're not buying the information you're giving them and they're holding out for the quick cure.

The 30 percent rule: If you want to know what this child is capable of doing in the realm of self-management, self-control, organization, getting ready for the future, subtract 30 percent from their age. You'll have a fairly good marker of what that child can and cannot do. And then you make accommodations accordingly.

Change points of performance. You need to talk with families about the fact that treatment is not in my office. Treatment is out there. You've come to my office to learn what the accommodations are you may need to make out there, but you've got to make them out there. And if you don't make them out there, you're wasting my time.

Medications. Well, lucky for you we have more now than we have ever had in the history of this disorder, and I can tell you there are more coming on the market. So, heads up, there is a lot happening out there in psychopharmacology land.

Treatments that work: This is the list of the treatments for which we have evidence that there is effectiveness, that they help provided that you do them and keep doing them: medications, working with parents on behavior modification at points of performance, use of the token systems—the star charts, the daily notes and so forth—and then as that child becomes a teenager moving up and working on what we call conflict resolution, problem solving, negotiation. And then besides doing that you're going to have to do some work with the school. You're going to have to educate the teachers because teachers are as much a source of junk knowledge and folklore as parents are.

By the way, never forget this: Do not get your facts from television. I can't believe how much misinformation shows up on TV and *Newsweek* and *Time* and other places. They really just sensationalize stories. So be very careful about the media.

Other Treatments

About 8 percent of AD/HD children will have to go into psychiatric hospitals or residential treatment and it is not for their AD/HD. It's for their co-morbid disorders—depression, Conduct Disorder, bipolar illness. Those may be treatments for which residential care, private schooling, boarding schools or psychiatric hospitals may be necessary. Also keep in mind between 25 and 40 percent of the families the parents are going to need treatment for their own disorders. What did I tell you? There's a 50 percent chance one of the parents in that family is an adult with AD/HD, so you need to know what are the services in the community for adults with the disorder as well. Finally, we refer all of our families over to the local parents support groups, like the CHADD organization, ADDA, or the independent organizations.

Controversial Treatments for AD/HD

We also go over with our families what doesn't work. This may offend you. You may be unhappy with this list. All I can say is, tough. I'm going to give you a list of treatments that have either been examined and found useless or treatments for which there is no compelling evidence that they work. And by compelling evidence I mean controlled, double-blind, placebo, rigorous scientific trials. And let's go down this list, because I'm afraid that some of your favorites may be on it.

Managing diet is not a major intervention for AD/HD. Diet does not play a role in AD/HD even though it may be an irritant to about 5 percent of all AD/HD preschool children, fine. You can deal with that. But to say that AD/HD responds to dietary manipulations is to grossly misrepresent our literature and that is not true. And that is especially the case for vitamin supplements or other dietary supplements that you can pick up at the kiosk at the local mall, at your health food store, or off the Internet.

This is the fastest growing treatment I know of in the public schools for AD/HD—**Sensory Integration Training**. It's a series of exercises done by occupational therapists in the false belief that it's going to result in rewiring of certain parts of the brain that are critical to this disorder. Both assumptions are false. The part of the brain that it's working on has nothing to do with this disorder, and there is no evidence that it's rewiring anything. In fact, there is not a single controlled study anywhere in the literature for Sensory Integration Training for AD/HD. It's all case reports.

Why aren't scientists excited about anecdotes and case reports? Because data is not the plural of anecdote. Did you get your information from a controlled, scientific trial? When did the number of people doing something ever provide credible evidence that what they're doing is useful? There's a scientific standard I hadn't heard of.

Skull manipulation by chiropractors. I would bet you that you have multiple chiropractors who will do neurologic organization training and scalp massage for AD/HD and learning disabilities. I know, I've seen the manual. It's one of the hottest areas in chiropractic. I know, my cousin's a chiropractor. He shared the manual with me. He said take a look at this stuff. You're not going to believe what they're palming off at our local conventions here, with no evidence anywhere that this works. And the theory is really funny. The theory behind this is that at the time your child's brain was forming, little neurons wandered up through the covering of the brain and as the skull plates of the skull fused they got trapped under there, and so they're up there and they're under tension and we need to find these pressure points on the head and massage them and get those neurons to snap back. Well, interesting theory, but I don't think so. I'm not buying it.

Here's one that my profession and social work loves to do. There is no evidence that **play therapy** works for AD/HD, ODD, or CD. None that I can find. And there have been a number of placebo control trials for this one.

EEG biofeedback? Very rapid growing treatment service offered out there in the community. A lot of people going back to get biofeedback training, so that they can use this equipment in their practice, this EEG biofeedback. There are no controlled studies of this anywhere in the literature. There are case reports, that's all, no placebo controlled studies. There was only one placebo controlled study done in 1992 here in the San Francisco Bay Area, and it did not find anything. Once you use the placebo it found no evidence that this was a compelling treatment for AD/HD relative to a placebo intervention.

Self-control training—we had a lot of hope for this one. This is **cognitive therapy**. If a child lacks self-control, can we teach it to them? Can we teach them to think aloud and think ahead and talk to themselves and reinforce themselves and reevaluate their performance? And so we tried that. All through the 1980s and 1990s we have done self-control training, and all of the studies have been reviewed and they show no evidence that it works. But now we know why. Self-control training requires internalized language, and if that's not internalizing, what's the point?

Social skills training? Here we found an interesting result. If you do it in the clinic, with kids he's never going to see the rest of his life, it's useless. If you do it in the school with the kids he has to live with every day and you keep it going, it might help. But if you stop it, it won't. So notice, treatment in the natural environment with the peer group with which he has to get along might be of some use. Doing it in your office on a Saturday or in a summer camp in northern Pennsylvania or Illinois or in the upper peninsula of Michigan, it's not going to make any difference for this child.

Medication for AD/HD

Due to the many additions and changes in this area since Dr. Barkley's 2000 presentation, we have omitted this dated information. Please refer to the following articles for the most current information:

- Managing AD/HD with Medication: An Overview
<http://www.schwablearning.org/articles.asp?r=340>
- What Parents Need to Know About AD/HD and Medication: Advice from an M.D.
<http://www.schwablearning.org/articles.asp?r=532>

You've seen Hillary Clinton try to make a big deal out of the rise in medication use with preschoolers. You want to know what the rise was? This is what they're all excited about. "Oh, 150 percent rise in the use of medications for preschoolers with psychiatric disorders." What is Hillary saying? "Oh, we're over-medicating. We're doing too much of this. We need to investigate this more so that we can reduce the amount of medication we use for preschoolers." I mean, look at all the assumptions there. You're assuming that we've been doing a good job for the last 20 years and therefore if there has been a rise in medication use in the last five, there's something scandalous going on.

But you would be wrong on all counts. We haven't been doing a good job with preschoolers. They are the most under-diagnosed, under-identified, under-treated group of children in the population with mental illness, and this is what got the media so excited.

What do the **stimulant drugs** do for AD/HD children? A lot of stuff. Do they do this for every child? No. But these are the documented changes that we have found across a variety of domains. Some of them are with the executive functions: working memory, handwriting, fluency, the ability to organize your thinking, rule following, compliance, decreases in aggression.

Side effects. I just want to point out two things. Nobody dies. Right? There's not huge morbidity. The stimulants are the safest drugs in all of psychiatry and pediatrics. And let me add one other thing. They're also the best studied of any drug you put into the mouth of a child. And that includes aspirin, and you guys don't hesitate to use Tylenol or aspirin or cough medicine. We have more research on the stimulants than any drugs used in psychiatry and pediatrics. So, these are very well-investigated medications.

Also notice this. There is no effect on bone growth or adult stature in most AD/HD children. The effect is mainly a little bit of weight loss during the first year, often recovered in the second year. There's a very small subgroup of AD/HD children who do have some weight gain problems, and only those children get drug holidays. We do not do drug holidays any more.

Now there are a couple changes in practice that have gone on over the last few years, but when parents come in and start talking about medication, these are the kinds of misconceptions we often have to deal with. One of them is that the stimulants are addictive when taken orally. Not at all. These are not addictive drugs. To be addictive you would have to crush them and inhale them like cocaine or inject them intravenously, and you would have to do it repeatedly.

[Stimulants] do not create aggressive behavior, they decrease it. They do not increase seizures. They can be taken quite safely by kids who have epilepsy. They do not cause Tourette's syndrome. Half of

children with Tourette's syndrome can take stimulants without it bothering their tics at all. But about 34 percent of them may experience a mild exacerbation of their tics, so you do have to be a bit careful with that. There is no risk of later substance abuse from having taken stimulants in childhood, and the evidence suggests that if you continue taking medication in adolescence the risk goes down, not up, that staying on your medication as an adolescent lowers the risk for substance abuse.

Finally, there are a lot of claims that stimulants don't improve academic achievement, but let's be very clear here. By academic achievement if you mean knowledge, that's true. The stimulants contain no knowledge. You take that pill, you won't know anything more tomorrow than you knew today. So why was this even being raised? But what the stimulants do is the following: They increase productivity, which means number of assignments completed, which increases your grades. They increase social acceptance among your peer group. They decrease disruptive behavior in the classroom and therefore decrease disciplinary measures taken against these children by parents and by schools. Isn't that enough? If we had a drug for autism that did for that disorder what this drug does for AD/HD, we would use it in a heartbeat.

Adopt a Healthy Parenting Philosophy

Keep a sense of priorities. AD/HD children have many things that are going wrong, but fortunately a lot of the things that are going wrong are not important things. They don't matter in life's long run. They might matter to you right now but in the long run they don't, and so we ask parents and teachers to try to pick out what are the developmental priorities right now. For instance, in the morning if you are arguing with your child a lot over whether or not they make their bed before they go to school, get over it. Making a bed is not a priority. It has no developmental significance. I do longitudinal studies. Making a bed predicts nothing in adulthood, nothing. This is your problem, not theirs, right? If you don't like it, close the door. Have them clean their room once a week. What difference does it make? But to destroy a school morning over an irrelevant battle that has no long-term significance is a waste of time. Focus on what really counts at that time.

Okay, you have to **maintain a disability perspective**. Unlike other disabilities that come with physical scarring or unusual appearances or very bizarre behavior that clearly signals there's something wrong with your child, AD/HD kids don't have these physical stigma that are associated with the disorder, and therefore it leads people to think they don't have a disability at all. But their disability is just as real, just as much in the brain as autism is.

You really need to focus on helping families with this idea of **forgiveness**. We teach three things in our parent training program around forgiveness. You had better get good at letting the day's problems go at the end of the day. You have got to get good at forgiving this child those mistakes during that day, because if that resentment builds up, you are just a hair's breadth from child abuse, so you have got to be careful about this. At the end of the day, let it go.

One way that we found very effective with younger children is after your children fall asleep, take a few minutes, go upstairs, sit down on the floor in the dark bedroom, and watch them sleep. There is no image so innocent and so overpowering as to see a young child asleep, and if that's your anchor point to get you back to reality and makes you realize that your child is not doing this on purpose, and helps reestablish that kind of emotional balance that you need, it doesn't matter to us how you do it. You have got to get good at forgiving these kids these mistakes.

But you have got to forgive yourself as well, and we work with families around that. You're not perfect. I'm not perfect. I make mistakes with my kids. The really nice thing is you can make mistakes. We have vastly as a generation overstated our importance as parents. You guys think you're so important. You're not. Trust me. No species would ever survive on this planet with kids so sensitive to an occasional unkind remark said in an offhanded moment when you were upset. Go read Judy Harris' book *The Nurture Assumption*.

It will tell you, you are not anywhere near as important as you think. If you make a mistake, it doesn't matter. Try to do it right tomorrow. It's the striving to do it right that matters, not the fact that you make an occasional mistake.

And then, of course, you have got to get good at **forgiving other people their ignorance of this disorder**, because the public is very ignorant of AD/HD, and often sadly misled by the media about AD/HD. And so you need to get good at forgiving them, and get a little thick-skinned around your child so that the looks you get from other people and the occasional snide remarks and so forth don't bother you quite so much. You've got to remember that they're strangers and they're ignorant and they don't understand this disorder.

About the Expert

Russell Barkley, Ph.D. is currently a professor at the Medical University of South Carolina (Charleston) and has written over a dozen books and more than 150 scientific articles related to the nature, assessment, and treatment of AD/HD.

Resources & References

Related articles

Managing AD/HD with Medication—An Overview
<http://www.schwablearning.org/articles.asp?r=340>

What Parents Need to Know about AD/HD and Medication: Advice from an M.D.
<http://www.schwablearning.org/articles.asp?r=532>

Resources

Websites

Children and Adults with Attention Deficit Disorder (CHADD)
<http://www.chadd.org>

Journal of the American Academy of Child and Adolescent Psychiatry
<http://www.jaacap.com>

Books

AD/HD and the Nature of Self-Control
<http://www.amazon.com/exec/obidos/tg/detail/-/157230250X/schwabfoundation/>
By Russell Barkley, Ph.D.

Your Defiant Child: Eight Steps to Better Behavior
<http://www.amazon.com/exec/obidos/ASIN/1572303212/schwabfoundation/>
By Russell Barkley, Ph.D.

Straight Talk About Psychiatric Medication for Kids
<http://www.amazon.com/exec/obidos/ASIN/1572309458/schwabfoundation/>
By Timothy Wilens, M.D.

Genome
<http://www.amazon.com/exec/obidos/ASIN/0060194979/schwabfoundation/>
By Matt Ridley

Other

Russell Barkley's article in *Scientific American*, September 1998



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