1 What Is Attention-Deficit/ Hyperactivity Disorder?

Attention-deficit/hyperactivity disorder, or ADHD, is a developmental disorder of self-control. It consists of obvious problems with attention span, impulse control, and activity level. But, as you will discover here, it is much more. The disorder is also reflected in impairment in will, or child's capacity to control her own behavior relative to the passage of time, that is, to keep future goals and consequences in mind. It is not, as other books will tell you, just a matter of being inattentive and overactive. It is not just a temporary state that will be outgrown in most cases, a trying but normal phase of childhood. It is not caused by parental failure to properly discipline or raise the child, and it is not a sign of some sort of inherent "badness" or moral failing in the child.

ADHD is real: a real disorder, a real problem, and often a real obstacle. It can be heartbreaking and nerve-wracking when not treated properly.

"Why Don't They Do Something about That Kid?"

It's easy to see why many people find it hard to view ADHD as a disability like blindness, deafness, cerebral palsy, or other physical disabilities. Children with ADHD look normal. There is no outward sign that something is physically wrong within their central nervous system or brain. Yet research clearly shows that it is an imperfection in the brain that causes the constant motion, the poor impulse control, the distractibility, and the other behavior that people find so intolerable in a child who has ADHD.

By now you may be familiar with the way others react to ADHD behavior. At first many adults attempt to overlook the child's interruptions, blurted remarks, and violation of rules. With repeated encounters, however, they try to exert more control over the child. When the child fails to respond, the vast majority of adults decide that the child is being willfully and intentionally disruptive. Ultimately most will come to one conclusion, albeit a false one: the child's problems result from how the child is being raised: The child needs more discipline, more structure, more limit setting, and

less coddling. The child's parents are considered to be ignorant, careless, permissive, uninvolved, unloving, or, in contemporary parlance, "dysfunctional."

"So, why don't they do something about that kid?"

Of course the parents often *are* doing something. But when they explain that the child has been diagnosed as having ADHD, judgmental outsiders may react with skepticism. They see the label as simply an excuse by the parents to avoid the responsibility of child rearing and an attempt to make the child yet one more type of helpless victim unaccountable for his actions. This hypocritical response—viewing the child's behavior so negatively, while at the same time labeling the child as "just normal"—leaves outsiders free to continue blaming the parents.

Even the less critical reaction of considering ADHD behavior a stage to be outgrown is not so benign in the long run. Many adults, including some professionals, counsel the parents not to worry. "Just hang in there" or "Keep them busy," they advise, "and by adolescence these children will have outgrown it." This is certainly true in some milder forms of ADHD: in perhaps one-sixth to one-third of cases diagnosed in childhood, the behaviors are likely to be within the broadly normal range by adulthood, though still relatively frequent. If your preschool child has more serious problems with ADHD symptoms, however, such advice is small comfort. Being advised to "hang in there" for 7–10 years is hardly consoling. Worse, it is often grossly mistaken or harmful advice. The life of a child whose ADHD is left unrecognized and untreated for years is likely to be filled with failure and underachievement, or even earlier death resulting from accidental injuries. Up to 90% of children with ADHD are doing poorly in school, and 30–50% of these children may be retained in a grade in school at least once. As many as 40% require special educational services. But, thanks to the inclusion of ADHD in special education laws and entitlements since the early 1990s, adolescents with ADHD are now graduating from high school at rates near those for typical children—compared to the 35% who in earlier years did not graduate. The positive impact of these accommodations shows that ADHD is a real disorder with real special needs. For half of such children, social relationships are seriously impaired, and for 60% or more of them, seriously defiant behavior leads to misunderstanding and resentment by siblings, frequent scolding and punishment, and a greater potential for delinquency and substance abuse later on. Failure by the adults in a child's life to recognize and treat ADHD can leave that child with an unremitting sense of failure in many domains of major life activities.

"Isn't ADHD overdiagnosed? Aren't most *children inattentive, active, and impulsive?"*

No and yes. ADHD is *underdiagnosed* in most populations, with 20–40% of such children in any given community in the United States not being diagnosed or treated. But most children do show occasional signs of inattention, overactivity, or impulsiveness. What distinguishes children with ADHD from other children is the far greater

frequency and severity with which these behaviors are demonstrated and the far greater impairment children with ADHD are likely to experience in many domains of life.

Imagine the toll on society when, conservatively estimated, 5–8%, or between 3.7 million and 5.9 million school-age children, have ADHD. This means that there are at least one or even two children with ADHD in every classroom throughout the United States. It also means that ADHD is one of the most common childhood disorders of which professionals are aware. Finally, it means that all of us know someone with the disorder, whether we can identify it by name or not.

The costs of ADHD to society are staggering, not only in lost productivity and underemployment in adults, but also in reeducation. And what of the costs to society in individuals being undereducated, more accident prone, and more likely to engage in antisocial behavior, crime, and substance abuse? Even with the higher high school graduation rate today thanks to special education programs, children with ADHD leave school with poorer grades and less academic knowledge, and are less likely to go on to college or technical training than typical children, all of which have a substantial economic impact on the child and society. Specific statistics are listed in the box on the next page.

Recognition of these adverse consequences has spawned a huge effort to understand ADHD. More than 50,000 scientific papers and more than 200 textbooks have been devoted to the subject, with an equal number of books written for parents and teachers. Countless newspaper stories have addressed ADHD over the course of the 230 years that medical science has recognized the disorder as a serious problem. Many local parent support associations have sprung up, most notably Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD), which has grown into a national organization of more than 50,000 members. At least five professional organizations include a number of scientific presentations on the subject in their convention programs each year, and one was created nearly 20 years ago that is devoted entirely to professionals who specialize in ADHD (American Professional Society for ADHD and Related Disorders). (See "Support Services for Parents" at the back of the book for more information.) All this is hardly what you would expect if the disorder were not "real," as some critics continue to claim.

Fact versus Fiction

As mentioned in the Introduction, various unsubstantiated claims about the legitimacy of the disorder we call ADHD make the media rounds periodically. Trying to sort through these, in addition to facing the skepticism of friends, family, and teachers, can make it difficult for parents to accept a diagnosis of ADHD and move forward into productive treatment of their child. It may be reassuring to know that twenty years have passed since a consortium of almost 100 scientists from around the world, many of whom have dedicated a significant portion of their careers to the scientific

ADHD's Cost to Society

- More than 20% of children with ADHD have set serious fires in their communities.
- More than 30% have engaged in theft.
- More than 40% drift into early tobacco and alcohol use.
- More than 25% are suspended or expelled from high school because of serious misconduct.
- Within their first 5–10 years of independent driving, adolescents and young adults with a diagnosis of ADHD have four to five times as many citations for speeding, two to three times as many auto accidents, accidents that are two to three times more costly in terms of damages or likelihood of causing bodily injury, and three times as many total traffic citations as young drivers without ADHD.
- The cost to society of a teenager's not graduating from high school is estimated at $370,000–$450,000 in lost wages, taxes, and other contributions to society as well as in the need for additional social or medical services.
- The medical bills for children with ADHD are estimated to be more than twice as high as those for typical children, not even including the cost of treating the ADHD—mostly from the child's greater use of emergency room services and other outpatient medical services.

study of ADHD, signed a consensus statement in January 2002 attesting to the validity of ADHD and to its adverse impact on the lives of those diagnosed. An updating and renewed signing of this consensus statement is now under way, involving more professionals and countries. The full text of the original statement can be found on my website (*www.russellbarkley.org*) or in the *Clinical Child and Family Psychology Review* (Vol. 5, No. 2, pp. 89–111). More than 100 European professionals signed this document as well in a version published in Germany a few years later. In addition, here is what we know to date:

Fiction: ADHD is not real, because there is no evidence that it is associated with or is the result of a clear-cut disease or gross brain damage.

Fact: Many legitimate disorders exist without any evident underlying disease or gross pathology. ADHD is among them. Yet ADHD is associated with significant delays in brain growth and functioning and disturbed patterns of connectivity between various brain regions.

Disorders for which there is no evidence of gross brain damage (such as scarring, brain atrophy, cysts, or tumors) or disease (infections) include the vast majority of cases of intellectual disability (e.g., various brain-scanning methods reveal no obvious

disease or damage in children with Down syndrome), childhood autism, reading disabilities, language disorders, bipolar disorders, major depression, and psychosis, as well as medical disorders involving early-stage Alzheimer's disease, the initial onset of multiple sclerosis, and many of the epilepsies. Many disorders arise due to problems in the way the brain has developed or the way it is connected and functioning at the level of nerve cells. Some of these are genetic disorders, in which the condition arises from an error in development rather than from a destructive process or an invading micro-organism. The fact that we do not yet know the precise causes of many of these disorders at the level of the molecules in the brain does not mean they are not legitimate. A disorder, as explained in the section "What Is ADHD?" later in this chapter, is defined as a "harmful dysfunction," not by the existence of obvious pathological causes.

As for ADHD, the evidence is now unquestionable that in most cases we are dealing with either a delay in, or subtle brain injuries sustained during, early brain development or abnormal brain functioning (of genetic origin in more than two-thirds of all cases and in pregnancy, birth, or early childhood injuries or adversities in the remainder). Chapter 3 explains in more depth what we know about the genetic origins of ADHD. In cases of hereditary origin, many studies using brain-imaging techniques have found the gray surface area of the brain to be 3–10% smaller in children with ADHD than in other children of the same age, especially in the frontal area, and 2–3 years delayed in maturation. More recent studies also find significantly abnormal patterns of connections among the brain's major networks, known as disrupted white matter functional connectivity. Certain parts of the brain are also found to be less aroused or active or to manifest abnormal variations of activity. Although most cases of ADHD appear to arise from such genetic effects and difficulties with brain development and functioning, ADHD can certainly arise from direct damage to or diseases of the brain as well. A mother's consumption of alcohol during pregnancy can increase the risk that her child will develop ADHD 2.5 times over that of the normal population. ADHD is associated not only with fetal alcohol syndrome, but also with repeated maternal infections during pregnancy. Prematurity sufficient to warrant neonatal intensive care can be associated with small brain hemorrhages and thus with a higher risk for ADHD in later development. And it is well known that children suffering significant trauma to the frontal part of their brain are likely to develop symptoms of ADHD as a consequence. All of this indicates to scientists that any process that disrupts the normal development or functioning of the frontal part of the brain and its connections to several other brain regions, such as the striatum, anterior cingulate, and cerebellum, is likely to result in ADHD. It just so happens that most cases are not due to such gross damage but seem to arise from problems in the early neural development of these critical brain regions or in their normal functioning. Someday soon we will understand the nature of those problems with greater precision. But for now, the lack of such a precise understanding does not mean that the disorder is not valid or real. If the demonstration of damage or disease were the critical test for diagnosis, then the vast majority of mental disorders, nearly all developmental disabilities, and many medical conditions would have to be considered invalid. Countless people

suffering from very real problems would go untreated, and their problems would be unexplored.

Fiction: If ADHD were real, there would be a lab test to detect it.

Fact: There is no medical test for any currently known "real" mental disorder.

Just as we cannot give children with ADHD a test guaranteed to detect it, neither is there a surefire lab test for schizophrenia, bipolar disorder, alcoholism, Tourette syndrome, depression, anxiety disorders, or any of the other well-established mental disorders, or for many widespread medical disorders such as arthritis or the early stages of multiple sclerosis or Alzheimer's disease. Yet these conditions are all very real in being harmful dysfunctions.

Fiction: ADHD must be an American fabrication, since it is diagnosed only in the United States.

Fact: Many studies conducted in numerous foreign countries show that there are children in all cultures and ethnic groups with ADHD. The worldwide prevalence has now been established to be 4.5–5.5% of children and 3.5–4.5% of adults.

For instance, Japan, which was claimed by some ADHD skeptics to have no cases of ADHD, actually has identified up to 7% of children as having the disorder, China up to 6–8%, France up to 7%, and New Zealand up to 7%, to name just a few of the many countries studied to date. ADHD is a universal disorder found in every country studied so far, though it may be referred to by some other term, particularly in developing nations. Less may be known there about its causes and treatment, and it may not even be recognized yet as a legitimate disorder, as it now is in most developed countries. There is also a somewhat lower prevalence of ADHD in Scandinavian countries such as Norway, Sweden, and Denmark. It is not clear if this is due to greater reluctance on the part of parents in those countries to report behavioral problems in their children (or greater willingness of English-speaking parents to do so) or better and more widespread medical care for the entire population that may reduce the risk for ADHD relative to other Western countries. But there is no question that ADHD is a legitimate disorder found worldwide.

Fiction: Because the rate of diagnosis of ADHD and the prescription of stimulants to treat it have risen markedly in the last decade or two, ADHD is now widely overdiagnosed.

Fact: As concluded by the National Institutes of Health (NIH) Consensus Development Conference on ADHD in late 1998, the surgeon general in a report on children's mental health in the United States in 2002, the Centers for Disease Control and Prevention in the *National Health Interview Survey* in 2005, and the National Institute of Mental Health (NIMH) in its *National Comorbidity Survey Replication* in 2005 and 2010, it is *under*diagnosis and *under*treatment of ADHD (and other disorders) in children that are the big problems in the United States, and this remains true today.

Several studies indicate that identification of children with ADHD has improved in the United States, with 60–80% of all children who have ADHD getting diagnosed

with the disorder and about half to two-thirds of these getting treated with medication. Even so, a substantial minority of our children with ADHD are not being referred, diagnosed, or treated properly. The situation is even worse for teens and young adults with ADHD, where we find much higher rates of underdiagnosis and undertreatment, especially in minority communities. Also problematic is that services across the United States for children with ADHD are inconsistent, erratic, and often well below what is considered the standard of care for the disorder. Thus, proclamations that we are overdiagnosing or overmedicating ADHD or any other child mental disorder in the United States lack credible scientific evidence.

One possible reason for the rise in diagnosis and stimulant treatment of ADHD is that the prevalence of the disorder might actually have increased. However, we do not have a lot of research that has measured the rates of children's mental disorders across multiple generations. The little research we do have indicates that ADHD has not been on the rise over the last two generations of children, but that a few other disorders may be, such as oppositional defiant disorder (ODD; see the case of Amy, below), conduct disorder, and autism spectrum disorder. Mainly what we have been witnessing is an increase in the recognition of the disorder by the general population and therefore an increase in the number of children *being referred and diagnosed* with the disorder. Tremendous strides have been made to educate the American public about ADHD in the last 30 years. Thanks to a substantial upsurge in research on the disorder since the 1970s, various parent advocacy groups raising the level of public and political awareness about ADHD since the 1990s, increased professional education on the disorder, and recognition of ADHD as a legitimate disability in the Individuals with Disabilities Education Act and the Americans with Disabilities Act, more children (and adults) with this disorder are getting proper diagnosis and management. But we still have a long way to go, particularly for girls, teens, and young adults with ADHD, who remain underdiagnosed and undertreated compared to boys with the condition.

The same scenario seems to have been occurring more recently in other countries, such as Canada, Australia, Great Britain, Italy, Spain, and Scandinavia, where greater efforts have been made to educate the public and professional communities about the disorder. The result has been a marked increase in the number of children being referred for professional help, diagnosed properly, and possibly receiving ADHD medications and other treatments. Therefore, most of the increase in diagnosis in the United States is likely due to greater awareness of the disorder.

In conclusion, a number of facts suggest that we do not have widespread overdiagnosis or overmedication, despite the marked rise in both in the United States over the last 20–30 years. Indeed, rates of diagnosis and medication use among boys with ADHD have been stable for the past decade, but rates for girls, teens, and adults continue to rise as they were the most likely to be underdiagnosed and undertreated in prior generations. That is not to say that there may not be some locales within the United States where more children than expected or appropriate are being diagnosed or where more medication is being prescribed than would be prudent. But these appear to be very local problems and not an epidemic nationally.

A Question of Perspective

Intense interest in demystifying ADHD has instigated voluminous research. More than 1,300 articles per year are published in scientific journals on the disorder, and more than 9,000 have been published since the last edition of this book in 2013. As I will describe in detail in Chapter 2, the research done up through the 1990s led me to develop a new view of ADHD in 1997 that I revised further in 2012—a view that has been continually reinforced by studies undertaken since the theory was first introduced and by its growing adoption among clinical professionals. I see ADHD as a developmental disorder of the ability to self-regulate behavior with an eye toward the future. I believe the disorder stems from erratic activity—and primarily underactivity—in specific networks of the brain that, as they mature, provide ever-greater means of behavioral inhibition, self-activation, self-organization, self-regulation, foresight, and time management. Relatively hidden from view in a child's moment-to-moment behavior, the behavioral dysfunction this variable or underactivity causes is pernicious, insidious, and disastrous in its impact on a person's ability to manage the critical day-to-day affairs through which human beings prepare for the future, both near and far.

The fact that its daily impact is subtle but its consequences for the child's adaptive functioning are severe has led to many changes in the labels and concepts applied to the disorder over the last century. It explains why clinical science, in its attempts to pin down the nature of the problem, has moved from vague, unfocused notions of attention disorders in 1775 (Melchior Adam Weikard in Germany, as discussed in my 2012 article with Helmut Peters, MD) and 1798 (Alexander Crichton in Scotland) to defective moral control in 1902 (George Still in England) to sharper, more specific concepts of hyperactivity, inattention, and impulsivity in the 1960s to 1980s, on to the more inclusive term self-regulation by the 1990s. This evolution of our knowledge from the very general to the very specific has resulted in great leaps forward in our understanding of the abnormalities of children with ADHD, but it has caused us to lose our larger perspective on how those behaviors affect the social adaptation of these children over long periods of time.

In the 1990s, however, clinical science began stepping back from its microscope on the specific behaviors of children with ADHD and once again peered through its telescope at longer-term social development and other outcomes, thanks in large part to the publication of studies of children with ADHD followed over 20 years to adulthood, such as my study with Dr. Mariellen Fischer at the Medical College of Wisconsin in Milwaukee and those of Drs. Salvatore Mannuzza and Rachel Klein at New York University Medical School, Drs. Gabrielle Weiss and Lilly Hechtman at Montreal Children's Hospital, Dr. Jan Loney at the University of Iowa, Dr. Stephen Hinshaw and colleagues at the University of California at Berkeley, and Dr. Christopher Gillberg and colleagues in Gothenberg, Sweden, among others (see the 2008 book *ADHD in Adults: What the Science Says*). We now understand how these "atoms" of momentary ADHD behavior come to form "molecules" of daily life, how these daily "molecules" form the larger "compounds" of weekly and monthly self-regulation

toward the future that comprises our social existence, and how these social "compounds" form the larger stages or structures of a life played out over many years and across many domains of major life activities. As a result, we see that ADHD is not just the hyperactivity or distractibility of the moment or the inability to get the day's work done, but a relative impairment in how behavior is self-regulated, organized, and directed toward the tomorrows of life. This larger, longer view of ADHD as a disorder of executive functioning (future-directed behavior) and the self-regulation it provides has clarified why those with the disorder struggle in their adaptation to the demands of most major life activities. It further shows why they so often fail to reach the goals and future plans that they have tried to set for themselves or that others demand of them. If we remember that the behavior of those with ADHD is focused on the moment or the "now," and not on the "laters" of life, and that this has a neurological basis, we won't judge their actions so harshly. No one would understand half of what we "normal" adults do if these actions were judged solely by their immediate consequences. For instance, when we turn away from the immediate rewards of consuming large quantities of candy or junk food available at the moment and choose to consume smaller portions of vegetables, nuts, or berries, we are doing so with an eye toward our current and especially future weight and health that no other animal could understand. No other creature thinks about and acts toward the future except humans. Many of the actions we take have been planned with the future in mind. Likewise, we don't understand—and are quick to criticize—the behavior of those with ADHD because we are expecting them to act with self-restraint and foresight when they have always focused instead on the moment. To someone with ADHD, it's always "now." We find it difficult to tolerate the way those with ADHD behave, the decisions they make, and their complaining about the negative consequences that befall them because *we,* who do not have the disorder, can foresee where it is all likely to be leading and use that mental vision to regulate our current behavior while they cannot. Only now is clinical science coming to understand this very important feature of the disorder and to regard ADHD as a disorder of future-directed behavior, or what I call time blindness.

Have You Seen These Children?

The children described in the following cases may be quite familiar to you. They are real cases from my 30-plus years in clinical practice, though names and identifying details have been changed to preserve confidentiality. Their stories will give you some idea of the circumstances children with ADHD commonly find themselves in today. As you read, you will probably be able to see how their lives might be different if their parents, teachers, and others really understood their deficits in executive functioning—their inability to look toward the future and to regulate their own behavior. You also should know, however, how far we have come. To provide some perspective on how much better the prospects are for these children today than in the past, I'll also describe how such children might have been treated during earlier decades.

"Does my child have ADHD?"

Amy: Constant Struggle

Rose and Michael are quite concerned about their 7-year-old daughter, Amy. They tell me they have to repeat their commands to her a lot more than commands to her brothers or sisters, and they sometimes have to guide her physically through tasks, such as getting dressed and undressed or picking up her toys. She seems to pay little attention to her homework, chores, or what others are saying to her unless she's interested in the activity at hand. She has great difficulty sitting still for a meal, watching TV with the family, or staying in bed at night. She runs rather than walks everywhere and often climbs up on furniture as she tears about the room.

Amy seems unable to let others finish what they are saying at family meals before she blurts out her ideas and then changes the subject altogether. Her incessant chatter has moved her siblings to nickname her "Motor Mouth."

When her parents tell her not to do something, Amy often becomes argumentative, angry, resentful, and belligerent. She says, "But I don't care, I want that," repeating her demands and throwing a temper tantrum. When told to pick up her toys, put her dirty clothes away, or get ready for her bath, she pouts or crosses her arms over her chest and says "No!" or just ignores her parents' instructions while she continues to play or just walks out of the room.

Amy's parents have noticed that she doesn't seem to think before she acts. She lunges into other children's play without considering what they're doing and whether she's welcome to join them. She takes over the activity, bossing others about, and gets frustrated and visibly upset when others don't obey her commands. Her emotions seem to get the best of her during many social activities. At parties she becomes excited, giddy, and loud, often being more elated than the birthday child. She becomes even more excited during games and can't wait until others take their turns. Once a game ends, she has great trouble settling down to a quieter activity, such as having birthday cake. She has even been known to start opening the presents for the birthday child.

Amy easily becomes envious of other children and has on occasion taken home someone's new toy that she doesn't have. She brags about her accomplishments, manufacturing many details. Her peers and their parents find her blunt comments rude and her play behavior both unfocused and selfish. Amy has been losing friends and now is not often invited to other children's homes. Neighborhood children have begun to call her "weird" and "hyper." Her parents are worried that she will soon wind up friendless and that she may develop a poor self-image or even depression.

Despite her devil-may-care attitude about most things, Amy depends excessively on her parents or teachers for help with her schoolwork, which she constantly protests with "I'm bored!" and "I hate this!" Amy's completion of schoolwork lags behind the ability that testing has shown her to have, and she is beginning to fall behind her classmates. She finds it hard to concentrate on what the teacher is saying. Instead she talks to her neighbors, doodles, or gets up and moves about, exploring the aquarium at the back of the room and making frequent trips to the trash can and pencil sharpener.

The school psychologist has tested Amy and found her to be of normal intelligence. Her early academic skills are all average or better; no learning disability is causing her poor school performance. She is likely, however, to have to repeat second grade.

Amy was born premature and weighed less than 5 pounds. She did not have any other problems but was slow to put on weight. She was a bit late learning to walk but spoke her first words earlier than most children. Her parents don't remember any serious medical problems during her development. At age 4, Amy's preschool teacher reported that she was "wild," always running around the room, climbing on furniture and shelves, taking toys from the other children, throwing things, and fidgeting during group story time. All of the behavior problems she now displays were also noticed during kindergarten.

When I first met them, Amy's parents were at their wits' end. Cutting sugary foods out of Amy's diet had little effect; more discipline had also produced little improvement. Rose now feels she has somehow failed as a parent and complains of excessive stress and fatigue when she has to be with Amy for long periods of time; Michael reports numerous confrontations with Amy over her behavior problems. Both parents fear that their marriage is suffering and find themselves fantasizing about the peaceful pleasantness of the early days of their marriage, before children.

Amy's case illustrates the classic symptoms of ADHD: inattention and poor ability to follow a task through to completion, impulsiveness and the inability to think about what she does before she acts, and overactivity or frequent restlessness. As for most children with ADHD, Amy's problems began in her preschool years but were not diagnosed until years later. Professional help was not sought until her behavior problems created difficulties outside the family—in this case at school, which is quite common. Amy is also fairly typical of many children with ADHD in showing a second pattern of behavior: oppositional, defiant, and hostile behavior toward others, especially her parents. This pattern is known as oppositional defiant disorder (ODD). Between 35 and 85% of children with ADHD who are referred to clinics will have this problem (the lower figure is more characteristic of children seen in primary care settings such as a pediatrician's office, the higher one of those seen in psychiatric or mental health clinics). It occurs 11 times more often in children with ADHD than in the general population. Fortunately, for children like Amy early intervention offers hope not only for managing ADHD symptoms, but also for possibly minimizing the impact of ODD over the course of a child's development.

Ricky: A Damaged Self-Image

Ricky is an 8-year-old second grader whose parents have "tried everything" to get him to do better at school. He was retained in first grade, and they fear he may be retained again before getting to middle school. Ricky is a noisy, restless gadfly who flits about his home or classroom, doing many things at once but not staying on task long enough to finish any of them. Most days, notes home from his teacher tell his parents he has been "off task," aggressive, and disruptive of other children's work and

play. For little apparent reason, just this year he has taken to shoving other children, taking things from them, bullying peers during recess, and sabotaging others' work when he is not being supervised directly. His mother believes that his teacher relies too much on punishment and too little on the positive feedback, one-to-one attention and assistance, and nurturing that Ricky needs. For the first time, his parents are having difficulty getting him to school. He complains of vague bodily aches and pains, complaints that are clearly intended to keep him home. Recently he has mentioned hating himself and wishing he were dead and has begun referring to himself as "stupid."

Ricky's parents have always taken his differences from his older brother and sister in stride as part of Ricky's unique personality. He frequently responds well to their praise of him and is seen as a loving, affectionate child. Yet this year his self-esteem has plummeted, he is easily irritated, and at times he is on the verge of tears when frustrated by the simplest things. His parents see him as really hurting inside yet cannot seem to provide more than temporary relief for him. They have developed an adversarial relationship with his teacher, seeing her harsh discipline and lack of forgiveness as a major contributor to Ricky's downhill slide in self-image.

Ricky met all the typical developmental milestones at a normal age, though as an infant he was always in motion. His parents were forced to put a net over his crib to keep him from wandering around the house while others were asleep. When he was a little older, he was found riding his tricycle in the driveway at 4:00 A.M. one morning with only the garage light to guide him. Ricky seemed accident prone as a toddler and has always been seen as "a talker," easily engaging even strangers in conversation. Ricky's grandmother often remarked on the similarity between Ricky and his father at the same age.

Ricky, unlike Amy, does not have ODD. Yet, as is true for some children with ADHD, Ricky's self-esteem has begun to decline as he chronically underperforms at school and increasingly gets into trouble with other children. The unyielding and unsympathetic view of Ricky's teacher seems to have contributed to this decline in self-image and certainly makes for a more conflict-filled school day. This has led him to the point of being depressed, which is also not uncommon for children with ADHD who show early signs of low self-esteem, although his statements about harming himself at such a young age are extreme for most such children.

If Ricky had been a child in the 1920s to 1940s in the United States, he might have been labeled as having *restlessness syndrome* or *organic drivenness,* terms in use in scientific journals at the time. He might even have been diagnosed as having a *postencephalitic behavior disorder* if he had survived a recent serious infection of the nervous system (encephalitis) that swept through Europe and the United States near that time. Some children with Ricky's pattern of behavior were being referred to as having *brain-injured child syndrome* because injuries to the brain from either disease or trauma could cause children to act this way. Therefore, any child who behaved like this, even if there was no obvious history of a brain injury, was thought of as having this syndrome. Ricky might have been placed in a special classroom where very little extra stimulation was available except for the material related to the lesson being

taught. The teachers might have worn rather dull-colored clothing and no jewelry, and the classroom might have been kept undecorated to minimize distractions, seen as the greatest problem for children with the brain-injured child syndrome. But these classrooms were rare and quite unusual for their time, and as a result were not available to most families with children like Ricky.

Ricky's parents might have been advised that he was just "all boy" and would be likely to outgrow the behaviors. When his problems persisted into adolescence, he would have been viewed as a troublemaker or social misfit and probably would have dropped out of school as soon as possible, to work either on a farm or in a factory at low wages. Onlookers likely would have judged him a young adult lacking in "character," for which his parents would undoubtedly have been blamed.

Sandy: Doing Well with Lots of Help

Sandy is a 15-year-old in 10th grade at a small private school for children with learning difficulties. Her parents placed her there when she began failing in public school years ago despite having above-average intelligence and no signs of a learning disorder. Her greatest problems have always been inability to concentrate on her schoolwork and to apply persistent effort to boring but necessary tasks. She can rarely complete her high school assignments without assistance yet usually knows the answers or the correct steps to get the problem solved. What others seem to provide for Sandy are some external structure, guidance, and discipline. Although she is somewhat restless, her activity level has decreased considerably since she was a young child and is now limited primarily to moving her feet back and forth while she is seated, tapping her fingers or pencil while she works, and shifting her posture frequently.

Sandy's schoolwork is often poorly organized, and her notebook is a disaster. She often comes to class without something critical to the classwork, such as pencils, the course text, or her lab equipment. When her many homework errors are pointed out to her, however, she can quickly see what she did wrong. Her teachers and parents have tried using daily assignment notebooks and behavior rating cards to support her school performance with limited and temporary success. In class she typically raises her hand and then blurts out an answer, frequently the wrong answer. Her teachers nevertheless enjoy her spontaneity and view her as a bit immature, scattered, and unfocused.

Sandy's problems have existed since at least kindergarten and probably longer. Throughout her schooling, teachers have complained about her inattentive and impulsive style and her poor follow-through on her assignments. Yet she has always had friends, has been well liked and included in other children's activities, and has had no discipline problems. She has been tested three times by various psychologists and educational specialists and found to be at the 75th percentile in intelligence and average or better in all academic skills. Her handwriting has been noted to be poor and sluggish, however, and her fine-motor coordination has been mildly delayed compared to that of other children.

Although Sandy gets along well with her parents and siblings, they have all shown academic accomplishments well beyond hers. All of her siblings as well as both her parents are college educated and see this as a necessity for Sandy as well. Sandy's self-esteem is somewhat low, and she is periodically demoralized by her difficulties. She fears that she will continue to disappoint her family and is highly concerned over what she can do to improve.

Sandy represents that rare child with ADHD who has gotten into adolescence relatively unscathed by the impact of the disorder. I believe this is because her ADHD has had its chief impact on her schooling rather than on her social and family life, she has had a number of understanding teachers along the way who have tried to help her, and because her parents have tried to protect and assist her as much as possible (including moving her into a private school when the need arose). Not to be overlooked, however, is Sandy's own pleasant disposition, which may have caused others to forgive her problems with time management, organization, and completion of schoolwork and which may have allowed her to rebound quickly from any social criticism received. The power of close friendships to help buffer the difficulties experienced by someone like Sandy also cannot be overlooked. Finally, the fact that she is above average in intelligence may have assisted her in finding more socially appropriate ways to cope with difficulties she has faced in school. Much research exists to show that high intelligence predicts a better academic outcome in children with ADHD, just as it does in children without ADHD.

Brad: A Parent's Puzzle

Brad is a 12-year-old in the sixth grade who consistently begins the school year with excellent grades and acceptable classroom behavior and gradually declines over the fall and winter to Cs and Ds and disruptive classroom behavior. Several times he has come close to having to repeat a grade, but his teachers have always given him the benefit of the doubt because of his above-average intellect and academic achievement skills. At school Brad is restless and hyperactive, concentrates poorly on work, and talks excessively. He is careless in his schoolwork and disruptive at his desk. Consequently, he demands a lot of the teacher's time and attention and is sent to the office once every few weeks. He complains to his parents and teachers that schoolwork is boring, and he often questions its relevance to what he claims he wants to do as an adult, which is to be a police detective.

Brad's parents noticed that his activity level and attention span were different from those of other children when he was 3 or 4 years old. He was always racing around from one play activity to another and getting into everything that aroused his curiosity. His mischief included pouring dishwashing detergent into the ventilation grate on his father's new stereo amplifier and decorating the family's new sofa with chocolate syrup. He was also known to take apart anything mechanical just to see how it worked: clocks, small appliances, and many toys. He would lose pieces in the process, so that most things could never be returned to working order.

At age 5, Brad began to argue with his parents over being told to clean up his

toys, take a bath, go to church, or stay out of his sister's room. As he grew older, Brad began teasing other children; they gradually stopped coming over to play or inviting him to their homes. Despite frequent reminders immediately before he began to play with someone not to tease and to control his notorious temper, it would not be long before Brad would come whining to his parents about what the other child was doing that "wasn't fair," or the other child would leave abruptly to go home without much of an explanation. At one point Brad's parents placed him in a summer camp for help with his social skills, but none of the improvements seen at camp carried over into his life at home or school—a typical outcome of traditional social skills programs.

Like Amy's difficulties, Brad's problems are relatively typical of children with ADHD. Unlike the other children described here, however, Brad's ADHD affects his schoolwork episodically rather than more continuously. Brad's unusual pattern may stem from his intelligence, which enables him to pick up new information at the beginning of the school year with little effort but does not suffice once the workload increases and long-term projects are assigned.

What Is ADHD?

To claim that ADHD is a real developmental disorder, scientists must show that it:

- Arises early in child development
- Clearly distinguishes these children from typical children or those who do not have the disorder
- Is relatively pervasive or occurs across many different situations, though not necessarily all of them
- Affects a child's ability to function successfully in meeting the typical demands placed on children of that age in various major life activities
- Is relatively persistent over time or development
- Is not readily accounted for by purely environmental or social causes
- Is related to abnormalities in brain functioning or development
- Is associated with other biological factors that can affect brain functioning or development (genetics, injuries, toxins, etc.)

Addressing these scientific issues has not been easy, but abundant evidence is now available for all eight of these requirements from the thousands of studies on ADHD. As you will read throughout this book, the evidence that ADHD is a valid disorder is not only abundant but long-standing and has been recognized by clinical scientists for decades if not centuries. The evidence is highly compelling, and some of it is described throughout the next four chapters.

The children just described also illustrate how ADHD represents a significant impairment in the ability to inhibit behavior and consider the later consequences of

one's actions. In its early history as a distinctly recognizable phenomenon (about 1775), this attention disorder would have been attributed to bad child-rearing practices by parents. By 1902, ADHD would have been seen as a problem in how children develop a capacity to willfully inhibit their behavior, to contemplate the future consequences of their actions for themselves and others, and to adhere to rules of social conduct—not simply social etiquette, but fundamental morals of the time. Ironically, despite its rather judgmental tone concerning morality, the essence of this view was not wholly inaccurate and is being revisited in the view of ADHD that I present in this book—a disorder of self-regulation. That is because one of the many problems that uninhibited behavior leads to is impairment in how likely children are to think about the longer-term implications of their pending actions and how well rules, instructions, and a child's internal (the mind's) voice or "conscience" can help her control her behavior and make it more appropriate, effective, and supportive of her longer-term adjustment and welfare. That is what was meant by moral control at the start of the 1900s.

Over the next few decades, clinical scientists drifted away from focusing on just the behavior that characterized the disorder (such as hyperactivity) and concentrated more heavily on its possible underlying nature and causes. They began arguing that the disorder seemed to arise out of the brain, especially the frontal lobes, and conveyed this by using labels related to brain dysfunction (such as *brain-injured child syndrome*). But when many children with ADHD were found to have no obvious gross underlying brain damage, at least by assessment methods of the time, the term was softened somewhat to *minimal brain dysfunction,* which still implied that something in the brain was awry. Later, clinical research returned to seeking a better description of the behavioral problems until more and better research could be done on the conjectured neurological origin of the condition. This refocusing on behavior such as hyperactivity led to the disorder being called *hyperkinesis* or *hyperactive child syndrome.* The concept was then widened in the 1970s, thanks to both Canadian and U.S. clinical researchers, to acknowledge that deficits in impulse control and sustained attention were equally problematic for those with ADHD. Research subsequently shifted away from studies of activity level to studies on the nature of attention, its different types, and which types might be involved in the disorder.

At this point the disorder was renamed *attention deficit disorder* (ADD, with or without hyperactivity). As clinical research advanced, it became clear that the hyperactivity and impulsiveness seen in children diagnosed as having ADD with hyperactivity were highly related to each other, suggesting that they formed a single problem of poor inhibitory control. In addition, research increasingly showed that this problem was as important as the problems with attention in distinguishing ADHD from other childhood disorders and even led to the hyperactivity (uninhibited motor activity) associated with the condition. Consequently the term was amended slightly in 1987 to *attention-deficit/hyperactivity disorder,* its current name. Most of what I have to say in this book pertains to ADHD that includes hyperactivity and impulsivity, as the term suggests. Children who are primarily inattentive but not hyperactive or impulsive are now referred to as having ADHD—predominantly inattentive presentation. I will have more to say about these children later because it now appears that up to half of them

may actually have a newly discovered and distinct disorder of attention that is quite different from that seen in ADHD, called *sluggish cognitive tempo* (SCT) by researchers or, more recently, concentration deficit disorder (CDD) by me to avoid the derogatory tone of that initial label.

It is important to understand the thinking about ADHD that has prevailed among many scientists and clinical professionals over the last 30 years because it is the point of view you are most likely to encounter now if you seek professional help for your child. So we will take a closer look at it in the sections that follow. Keep in mind, however, that even this view can stand to be modified to bring it into line with the latest evidence about ADHD emerging from the behavioral sciences, neurosciences, and behavioral genetics.

Today most clinical professionals—physicians, psychologists, psychiatrists, and others—believe that ADHD consists of three primary problems in a person's ability to control behavior: difficulties with sustained attention and increased distractibility, problems with impulse control or inhibition, and trouble self-regulating one's activity level. Other professionals (myself included) recognize that those with ADHD have additional problems with self-awareness and self-monitoring; working memory (remembering what is to be done); contemplating the future consequences of their proposed actions, including planning, time management, and remembering and following rules and instructions; self-regulating emotion and motivation; problem solving to overcome obstacles to their goals; and excessive variability in their responses to situations (particularly doing work). All of these symptoms are subsumed under the term *executive functioning,* which refers to those mental abilities people use for self-regulation over time toward their goals and the future. This, I believe, is the hallmark of ADHD. Some clinical scientists in other countries have also reached this opinion. Scientists continue to debate the extent of and the reason for this problem with executive functioning—whether it applies to all cases and whether it is due to problems with regulating brain activation or arousal or to some deeper problem with brain growth (development) and nerve cell migration, connectivity, and functioning. Nevertheless, at this time most researchers agree that inhibiting and activating/focusing behavior on demand specifically and certain aspects of executive functioning more generally are central problems for most of the children having the disorder.

Difficulty Sustaining Attention

Parents and teachers often describe their children with ADHD in these ways:

"My child doesn't seem to listen."

"My child fails to finish assigned tasks."

"My daughter often loses things."

"My child can't concentrate and is easily distracted."

"My son can't seem to work independently of supervision."

"My daughter requires more redirection."

"He shifts from one uncompleted activity to another."

"She is often forgetful in her daily activities."

All of these refer to problems with paying attention and concentrating.

ADHD is thought to involve significant difficulty with sustained attention, attention span, or persistence of effort. In short, people with ADHD have trouble sticking with things for as long as others. They struggle, sometimes mightily, to sustain their attention to activities that last longer than usual, especially those that are boring, repetitious, or tedious. Uninteresting school assignments, lengthy household chores, and long lectures are troublesome, as are reading lengthy uninteresting works, paying attention to explanations of uninteresting subjects, and finishing extended projects. Our research tells us that although children with ADHD have a shorter attention span for much of what they are asked to do, keeping their attention on something over long periods of time is the most difficult part of paying attention for these children.

Unfortunately, as children grow up, we expect them to be able to do these things even if they are boring or effortful. The older they become, the more they should be able to do necessary but uninteresting tasks with little or no assistance. Those with ADHD will lag behind others in this ability, perhaps by as much as 30% or more. This means that a 10-year-old child with ADHD, for instance, may have the attention span of a 7-year-old child without ADHD. This will require that others step in to help guide, supervise, and structure his work and behavior for him. So it is easy to see how conflicts arise frequently between children with ADHD and their parents and teachers.

Hundreds of studies have now measured the attention problems of children with ADHD by various means, and in the vast majority of these studies they were found to spend less time paying attention to what they were asked to do than the children who did not have ADHD. For instance, as long ago as 1975 I documented such differences in my dissertation study of 36 boys, half of whom were diagnosed as hyperactive (they now would be described as having ADHD) and half as not hyperactive. I asked them to perform a variety of activities in a clinic playroom at the department of psychology at Bowling Green State University in Ohio, where I obtained my doctoral degree. One activity the boys were required to do was to wait in a playroom for 6 minutes by themselves before I came to take them to do some other tasks. Toys were available for play. I had placed thin black lines on the floor to form a grid or checkerboard to measure their activity by counting how many lines they crossed as they walked (or danced or ran!) about the room. Through a one-way mirror, I also observed and recorded the number of different toys they played with and how much time they spent playing with each toy. The boys with ADHD, I discovered, played with three times as many toys as the other boys and spent 50% less time playing with each toy. They also crossed more grid lines in their activity in the room. All of this objectively documented what parents have told us about children with ADHD for decades—they can't pay attention for very long to anything they do, and they are very active, restless, and fidgety.

I then took the boys to another room and asked them to sit and watch a short

movie about a make-believe creature. I told them that I would ask questions about the movie when I returned. While they were watching the movie, I found that the boys with ADHD spent nearly twice as much time looking away from it as the other boys did. The boys with ADHD also answered 25% fewer questions correctly about the content of the movie than did the other boys when I quizzed them afterward. These and other measures I took during this experiment clearly showed that the boys with ADHD paid less attention to what they were doing and so got less information out of it than other children. Many other researchers have found similar results, using a variety of procedures. So parents are correct in describing these children as inattentive, hyperactive, and impulsive.

Filtering Information Is Not a Problem

Interestingly, research also shows that children with ADHD do not have trouble filtering information—distinguishing the important from the irrelevant in what they are asked to attend to. They seem to pay attention to the same things that children without ADHD would when asked to look at or listen to something. It's just that children with ADHD cannot sustain this effort for as long as other children. They look away from the task more frequently than others, as if their mind and attention are wandering. They are also more readily drawn to more rewarding activities. So, children with ADHD are not really overwhelmed by information or stimulation, as scientists believed in the 1950s. Instead, they cannot persist in their activation, effort, and attention, and they find themselves being drawn away by anything that might be more stimulating or interesting to look at or engage in.

Are Children with ADHD More Distractible Than Children without ADHD?

Scientists are now more certain that ADHD involves being more distractible than other children. But it is not that they perceive distractors better than others. Instead these children react more than others to events around them that are irrelevant to their work or goals. And once they are disrupted by such distracting events, they are far less likely to remember or to return to the work they were doing. In addition to being more distractible, especially while working, children with ADHD have two problems that can make them appear to be even more distracted:

1. *Children with ADHD probably get bored with or lose interest in their work much faster than children without ADHD.* This is a problem with motivation or how rewarding the task is to them. It leads them to go searching intentionally for something else that is more fun, interesting, stimulating, and active, even when the assigned work is not yet finished. Some scientists have argued that these children have a lower and more variable level of brain arousal and so need more stimulation to keep their brain functioning at a normal and consistent level than do children without ADHD. Other scientists have suggested that rewards lose their value faster over time for those with ADHD, meaning they are less sensitive to reinforcement. For now, the cause of this

boredom isn't completely clear but may have to do with deficits in the motivational or reward centers of the brain. What is clear is that it exists to a great enough degree that some scientists call children with ADHD "stimulation seekers."

2. *Children with ADHD seem to be drawn to the most rewarding, fun, or reinforcing aspects of any situation.* Like magnets, they seem to be pulled toward these more immediately rewarding activities when there is work to be done that does not involve much reward. For instance, more than 28 years ago, in 1992, Drs. Steven Landau, Elizabeth Lorch, Richard Milich, and their colleagues, then all at the University of Kentucky, studied children with and without ADHD while they were watching television. When there were no toys in the room, the children with ADHD watched the television show as much as the children without ADHD and were just as able to answer questions about what they watched, even though they tended to look away from the TV set more often. However, when toys were placed in the room, the children with ADHD were more likely to play with the toys and less likely to continue watching the TV program than their peers without ADHD. When the program was a typical situation comedy, the children with ADHD were able to answer as many questions about the show as the children without ADHD, but when the program was educational and conveyed the information more visually than verbally the children with ADHD were less likely to answer correctly. The children with ADHD were at a disadvantage only when visual attention was needed.

Why would children with ADHD have been drawn away by the toys when children without ADHD were not? Perhaps children with ADHD simply lose interest faster. Or they may find physical activities more fun, stimulating, and rewarding than passive activities such as watching TV.

Yet a third explanation comes from a study on curiosity in children with ADHD conducted more than 40 years ago by former colleagues of mine at Bowling Green State University, Drs. Nancy Fiedler and the late Douglas Ullman. They found that children with ADHD showed more physical curiosity during their play, and so they manipulated objects more, switched from one object or toy to another more frequently, and spent less time with any particular toy or object. Children the same age without ADHD, however, showed more verbal or intellectual curiosity. They talked aloud about the object or toy, described a number of different things about the toy they found interesting, invented ways that the toy could be used in play, played longer with the toy, and even created stories about the toy. Thus, the children without ADHD spent more time interacting, thinking about, and creatively using a particular toy, given that its intellectual properties seemed to interest them more than it did the children with ADHD.

Beginning in the 1980s, Drs. Ronald Rosenthal and Terry Allen at Vanderbilt University showed that whether or not children with ADHD are distracted more than children without ADHD seems to depend ultimately on how salient or appealing the source of the distraction happens to be. For instance, if a child with ADHD finds a

video game on his desk when he goes to his room to do an hour of homework, you can imagine which activity he will be doing when you come to check on him 20 minutes later.

Even earlier, Drs. David Bremer and John Stern at Washington University found in a 1976 study that children with ADHD were somewhat more likely than children without it to look away from a reading assignment when a telephone rang with lights flashing or when an oscilloscope made patterns of unusual wavy lines on a screen in the same room. However, the groups differed much more dramatically in *how long* they were distracted by the event: an average of 18 seconds for the children with ADHD and 5 seconds for the other children. This indicated that the children without ADHD found it much easier to return to work after a distraction than the children with ADHD. And so it may be that children with ADHD are distracted from activities for longer periods of time than, and do not return to work as readily as, their peers without ADHD. Many studies have supported these conclusions since that time; children with ADHD are clearly more distractible than typical children and are drawn to activities or events around them that are more stimulating or interesting than what they may be asked to do at a particular time.

A Problem with Deferred Gratification

The inability to persist with a boring task is a sign of immaturity. As children grow, they become better able to resist appealing but inappropriate or competing activities when they have been given a task to do. The children may talk to themselves about the importance of the work, reminding themselves of what rewards they may earn later by completing it or what punishment may result if they don't, and find ways to make the work more intellectually interesting. Children without ADHD also may learn to arrange consequences to reward themselves for sticking with a difficult task. We know that as children mature, larger but delayed rewards become more attractive to them, and they are likely to value them and work for them more often than they opt for smaller, more immediate rewards. Children with ADHD, in contrast, tend to opt for doing a little work now for a small but immediate reward, rather than doing more work now for a much bigger reward not available until much later.

This is clearly a problem with deferred gratification. Understanding this issue is crucial to helping children with ADHD. If we believe that people with ADHD are simply highly distracted by everything, we will use methods that have been recommended for over 40 years—removing sources of distraction—but such attempts to help may actually make these children more restless and less attentive. Reducing stimulation actually makes it even harder for a child with ADHD to sustain attention. In fact, Dr. Sydney Zentall and her colleagues at Purdue University showed more than 30 years ago in several studies that adding color to the work materials that were given to children and adolescents with ADHD reduced the errors they made during their work. Similarly, some 10 years later Dr. Mariellen Fischer (then with the Medical College of Wisconsin) and I and other colleagues asked adolescents to

watch a computer screen while numbers were flashed on the screen at the rate of one per second. They were to press a button when they saw a 1 followed by a 9. We found that adolescents with ADHD made more errors on this boring task than did those without ADHD. When we repeated this test with distracting numbers flashing to the right and left sides of the test numbers, the teens with ADHD actually got better at it, matching the performance of the teens without ADHD. These and many other studies tell us that adding stimulation to a task may increase the ability of children and adolescents with ADHD to pay attention and complete their work with fewer mistakes. For instance, Dr. Howard Abikoff and his colleagues at the New York University Medical School determined more than two decades ago that teens with ADHD were able to get more of their math work done if they could listen to rock music than if they had to work with no music in the background. This again suggests that some stimulation may help children with ADHD concentrate better and control their attention span.

Returning to the main point of this section, we should try to increase the novelty, stimulation, or fun involved in the tasks a child with ADHD is asked to do. We might also specify that certain desirable rewards or consequences can be earned immediately by completing the activity, rather than postponing them. We could also break the activity up into smaller segments, letting the child with ADHD take more frequent breaks while working. Of course, removing highly attractive, interesting, or very salient distractors that are not part of the work to be done from the child's vicinity while he or she is working is still a good idea. But as this information suggests, it should not be the only thing you do: increasing the attractiveness or fun of a task or making the consequences associated with it more enjoyable can be just as important.

Difficulty Controlling Impulses

Parents and teachers often describe children with ADHD as "blurting out answers to questions before the questions have been finished" and "wanting what they want when they want it." Children with ADHD have a lot of trouble waiting for things. Having to take turns in a game, line up for lunch or recess at school, or just wait until some activity (such as a religious service) is over may make them restless and "antsy." They may complain about the waiting and even start in on the activity they have been told to postpone. When parents promise to take them shopping or to a movie eventually, the children may badger them excessively during the waiting period. This makes those children appear to be constantly demanding, impatient, and very self-centered. So the second major category of symptoms seen in ADHD is a decreased ability to inhibit behavior or to show impulse control. Those with ADHD have considerable problems with self-restraint, with holding back their initial response to a situation, so as to think before they finally act. They often blurt out comments they would probably not have made had they thought first. They also respond to what others say or do to them on impulse, sometimes emotionally, and wind up being judged critically for doing so. They may act quickly on an idea that comes to mind without considering that they

were in the middle of doing something else that should be finished first. They are excessive and loud talkers, often monopolizing conversations.

This behavior is often viewed as rude and insensitive, and it has negative consequences in both the social and educational arenas. Teachers note that children with ADHD often "blurt out comments without raising their hands" in class and "start assignments or tests without reading the directions carefully." They are frequently described as "not sharing" what they have with others and as "taking things they want that don't belong to them."

Since children with ADHD already have trouble sustaining attention, imagine how their inability to resist impulses—such as the impulse to abandon a boring task—exacerbates their problems with working longer for later, larger rewards. Three studies described in the box below investigated this.

ADHD and Deferred Gratification

- In 1982 Dr. Susan Campbell and colleagues at the University of Pittsburgh hid a small cookie under one of three cups while the children watched. The children were then required to wait until the experimenter rang a bell before they could pick up the cup and eat the cookie. The procedure was repeated for six trials, with the waiting period varying from 5 to 45 seconds. The children with ADHD made many more impulsive choices, taking and eating the cookie before the experimenter rang the bell, than did the other children.

- In 1986, Dr. Mark Rapport and his colleagues at the University of Rhode Island gave a group of 16 children with ADHD and 16 children without ADHD some math work. When the children were told they would receive a small toy immediately for completing a small number of arithmetic problems, the groups completed the same number of problems. Then the children were given a choice: they could get a small toy for doing a small amount of work or could do larger amounts of work for a much larger and more valuable toy. But they would not get the bigger toy until 2 days later. Under these conditions, more of the children with ADHD chose the small, immediate reward for little work, whereas the other children were more likely to choose the larger, deferred reward for more work.

- In 2001, Dr. Gwenyth Edwards and I and our colleagues at the University of Massachusetts Medical School offered teenagers with ADHD varying amounts of money (hypothetical, not real, and typically far less than $100) that they could have right now. We also offered them $100 if they were willing to wait a month, a year, or even longer. We found that teens with ADHD were far more likely than those without the disorder to choose the smaller amount of money now than the larger amount later. In such a study, we can actually estimate just how much the teens with ADHD discount or reduce the value of a reward if they have to wait for it. It was 20–30% less valuable to them than it was to the teens without ADHD.

Taking Shortcuts

Problems with attention and impulse control also manifest themselves in the shortcuts that children with ADHD are notorious for taking in their work. They apply the least amount of effort and take the least amount of time to perform boring or unpleasant tasks. For this reason, it's not clear that giving children or adults with ADHD extra time for exams at school or professional exams as adults actually benefits them. They may wind up just wasting the extra time. Schools and testing organizations should probably instead give these students a stopwatch on their desk and let them have the same amount of "face time" with the task as others but allow those with ADHD to stop the clock for brief periods to stand, stretch, get some water, and then return to the task. This strategy of "time off the clock" lets people with ADHD pace the task better and break the exam into smaller work quotas, all of which may be beneficial to doing better on the test.

Taking Too Many Risks

The impulsivity seen in ADHD may also show up in greater risk taking. Failing to consider in advance the harm that could follow an action may explain why people with ADHD—particularly children with ADHD, some of whom are also defiant and oppositional—are more accident prone than others. It is not that children with ADHD don't care about what will happen. It's that they simply don't think ahead about the likely consequences associated with an action. Constantly "damning the torpedoes and proceeding full speed ahead," they are then surprised by the disasters that others foresaw clearly.

"Our daughter wants her driver's license. Yet she seems so immature and distractible. Are kids with ADHD at greater risk as drivers?"

Yes. The shortsightedness linked to ADHD may explain why Drs. Carolyn Hartsough and Nadine Lambert at the University of California at Berkeley found as far back as 1985 that children with ADHD were more than three times as likely as children without ADHD to have had at least four serious accidents. The greater risk for accidental poisonings had also been documented by Dr. Mark Stewart and his colleagues at the University of Iowa Medical School several years earlier. Then, in 1988, Dr. Peter Jensen and his colleagues at the Medical College of Georgia found similarly that children with ADHD were nearly twice as likely as a group of control children to have had traumas requiring sutures, hospitalization, or extensive/painful procedures. As I found in my own subsequent research over the next 30 years, this accident-proneness of those with ADHD extends to their driving as well (see the box on the facing page).

In a number of subsequent studies on the driving risks for teens and adults with ADHD, both other researchers (including Dr. Dan Cox at the University of Virginia Medical School) and I have repeatedly found them to be higher-risk drivers than those in the control groups. My colleagues and I also found that consuming even small

ADHD and Teenage Driving

In 1993, my colleagues and I then at the University of Massachusetts Medical School published a study in the journal *Pediatrics* that found that:

- Teens and young adults with ADHD had four times as many auto accidents (an average of 1.5 versus 0.4) as their peers without ADHD
- Were significantly more likely to have had at least two or more auto accidents (60% versus 40%) than youths without ADHD
- Were four times as likely to have been at fault in the accidents (48% versus 11%)
- Were nearly twice as likely to have received traffic citations (78% versus 47%)
- Received four times as many such citations (four versus one) in their average of only 2 years of licensed driving experience, with the most common citations being for speeding and the second most common for failing to obey stop signals.

amounts of alcohol worsened their driving-related abilities more than it did in those without ADHD. Fortunately, we and others have also found that being on an ADHD medication appears to improve their driving performance and therefore may reduce their driving risks. Finally, I found in studies jointly done with Tracie Richards and colleagues at Colorado State University that drivers with ADHD are significantly more likely to manifest "road rage," or anger, hostility, and even aggression toward other drivers, particularly when they are frustrated by the specific actions of another driver.

ADHD and Substance Use

Lack of impulse control could also explain why teenagers and adults with ADHD may be more likely to take risks that involve drinking alcohol, smoking cigarettes, and using illegal substances such as marijuana. In our study of teenagers with a history of ADHD mentioned earlier, Dr. Mariellen Fischer and I found that:

- Nearly 50% of these teens had already used cigarettes by ages 14–15, compared to 27% of the teens without ADHD
- 40% of the teens with ADHD had used alcohol, compared to only 22% of the other teens
- 17% had tried marijuana, compared to only 5% of the teens with no history of ADHD
- These problems continued to ages 20 and 27, resulting in more than 20% having a drug-use disorder by the time of adult follow-up

Money Problems

The impulsiveness seen in ADHD may also explain why teenagers and young adults with ADHD have greater difficulties with managing money and credit. They buy things they see and want to have on impulse, without much regard for whether they can really afford them now. They do not consider what effects buying these items will have on their weekly budget or their ability to pay back the debts they already have. Teens and young adults with ADHD save significantly less income than others do; they also carry more debt (such as credit card debt) and are more likely to spend their money frivolously than others are.

Impulsive Thinking

The impulsiveness of those with ADHD apparently is not limited to their actions, but also affects their thoughts. Adults with ADHD have often told us during clinical interviews that they have as much trouble with impulsive thinking as with impulsive behavior. This was demonstrated elegantly in a study more than 25 years ago by Drs. G. A. Shaw and Leonard Giambra at Georgetown College, published in 1993. When college students were asked to press a button when they saw a certain target stimulus, the students with ADHD not only pushed the button more often when they were not supposed to than did the students with no history of ADHD, they also reported, when interrupted by the researchers, significantly more thoughts unrelated to the task than did the other groups of college students. Other studies have documented similar difficulties with wandering minds and internal distractibility associated with ADHD. These studies provide clear evidence that those with ADHD find it harder to keep their mind on their work and to inhibit thoughts that are not related to the task at hand.

A Problem of Too Much Behavior

"Squirmy," "always up and on the go," "acts as if driven by a motor," "climbs excessively," "can't sit still," "talks excessively," "often hums or makes odd noises"—are these descriptions familiar? They define the excessive movement or hyperactivity that is a third feature of ADHD in many, but not all, children with the disorder. This feature may appear as restlessness, fidgetiness, unnecessary pacing, or other movement, and also as excessive talking. It is difficult behavior to ignore, yet it is the behavior that lay observers are most skeptical about. Parents who consistently see their children shifting in their seats, tapping their fingers or feet, playing with nearby objects, pacing, and generally becoming quite impatient and frustrated by waiting periods know this behavior is not normal. Teachers who watch these children constantly getting out of their seats, wriggling or squirming when they should be sitting still, playing with a small toy brought from home, talking out of turn, and humming or singing to themselves when everyone else is quiet know that this behavior is not typical of most children. Yet others often persist in their opinions that parents and teachers are simply "making it up" or being "overly sensitive" about otherwise normal behavior.

Children with ADHD Are Hyperactive

The fact that children with ADHD really are more active than other children under many different circumstances has been demonstrated repeatedly over decades of research, but no more beautifully than in a study published in 1983 by Drs. Linda Porrino, Judith Rapoport, and their colleagues at the NIMH in Bethesda, Maryland. The children in the study wore a special mechanical device that monitors activity or movement. They wore it every day, all day and all night for 1 week as they went about their normal daily activities. The scientists found that the boys with hyperactivity (ADHD) were significantly more active than the boys without ADHD, regardless of the time of day (including during weekends and while sleeping). The greatest differences between the groups of boys occurred in school situations, which makes sense because such situations demand the most self-restraint and the most time sitting still.

In my own studies of children with hyperactivity (ADHD) very early in my career, published in 1976 and 1978, I determined that these children were moving about a room nearly eight times as often as other children, that their number of arm motions was more than twice that of children without ADHD, that their leg movements were nearly four times those of the other children, and that they were more than three times as restless while watching a short movie on TV (as described earlier) and more than four times as fidgety and wiggly during psychological tests while seated at a table. Clearly parents and teachers are not making it up when they say that children with ADHD are hyperactive.

For more than 50 years we have had studies objectively documenting that children with ADHD are far more active (even during sleep), inattentive, and impulsive than typical children—findings that have been repeatedly replicated in numerous studies since then. But the fact that children with ADHD do not regulate or manage their activity level to meet the demands of the moment is what causes them the most trouble. For instance, children with ADHD may have a lot of trouble lowering their activity level as they move from the fast-paced, active play at recess on the playground to the restrained, quiet activity in the classroom. At these times, others may see them as loud, unrestrained, boisterous, rowdy, and immature. My early studies observing children with ADHD in a laboratory playroom, just described, showed that when the boys were told to stay in one corner at one table and play only with the toys on that table, the boys with hyperactivity (ADHD) reduced their activity level much less than the boys without ADHD. As far back as 1983 I published a study with Drs. Charles Cunningham of McMaster University Medical School and Jennifer Karlsson, then working in my lab at Milwaukee Children's Hospital, in which we audiotaped conversations between children and their mothers. We analyzed these conversations in detail and showed that children with ADHD talked about 20% more than children without ADHD. A surprise to us at the time was that the mothers of the children with ADHD also talked more than the mothers of the children without ADHD. We believed that the greater speech of the mothers of children with ADHD was a response to the excessive talking of their children. We proved this by giving the children with ADHD the stimulant medication Ritalin and finding not only an improvement in their ADHD

symptoms but an immediate 30% reduction in their excessive speech. The speech level of their mothers was also immediately reduced.

Children with ADHD Are Also Hyperreactive

What is most important to understand about children with ADHD is not simply that they move about too much, it is that they *react or behave too much*. They are much more likely to respond to the things around them in any situation than are children without ADHD of the same age. Their behavior occurs too quickly, too forcefully, and too easily in situations where other children would be more inhibited. Thus a better term for describing children with ADHD is *hyperreactive*. While such children are certainly more active than children without ADHD, the term *hyperactive* misses the larger point. Their greater activity level really seems, in large part, to be a by-product of their greater rate of behaving or reacting to things around them in a given situation.

This means that the hyperactivity and the impulsiveness seen in children with ADHD are part of the same underlying problem—a problem with inhibiting behavior (excessive reacting). I believe that much, though not all, of their problem with sustaining attention is due to their poor inhibition as well. As the great psychologist William James wrote in 1898, it is not possible for humans to pay attention to any one thing for more than a few seconds. All of us keep adjusting our eyes and our bodies as we attend to things, and we often look away from things briefly before returning to them. It is this continual redirection of effort back to the task while resisting the urge to break off our attending to the task to do something else that creates our sustained attention. What those with ADHD have trouble with is not so much that they look away more than those without ADHD (although they do that too), it is that they have much more trouble returning to attend to the task they were doing before their attention was broken. Because the ability to keep returning attention to something requires that a person also be able to inhibit urges or tendencies to do other things, the problem with sustained attention in those with ADHD may also be part of their problem with inhibiting responses to things around them. So they look away more than others and fail to resist the temptation to leave an uninteresting task for something more interesting and stimulating to do. Those with ADHD find it much more difficult to resist distracting temptations and to sustain this type of inhibition over urges to do other things while they are working on a lengthy task. They also find that they are less likely to return to the task they were working on once they have been interrupted, since they cannot as easily inhibit the desire to respond to other things around them that may be more attractive or compelling. Hence sustained attention also requires sustained inhibition, and it is the problem with inhibition that may be one of several roots of the attention problems in ADHD.

At its core, I believe that ADHD is primarily a problem of both poor inhibition of behavior and poor executive functioning (using mental information to guide behavior across time). This poor executive functioning will be described later in this book. Ultimately I would prefer to see the disorder renamed to reflect this new view, perhaps as *executive function deficit disorder*. But that is unlikely to occur because the name

ADHD appears in so many different laws and regulations that to change the name would require changing all of them as well.

The problem with sustaining attention may even be evident in video games. It is commonly believed that children with ADHD act normally when they play such fast-paced, highly appealing, and immediately reinforcing games. That is not, however, what Dr. Rosemary Tannock and her colleagues at the Hospital for Sick Children in Toronto found in 1997 when they conducted two of the first studies on this issue. In their studies they compared children with ADHD to children without it, observing them while they played video games and also studying them while they were involved in two less interesting tasks. These scientists found that the children with ADHD were more active, restless, and inattentive than the children without ADHD during all of these activities, including the video games. They did find that all children were less active and more attentive when playing the video games than when watching TV or doing a monotonous laboratory task. The children with ADHD also did less well than the other children at the video games, experiencing more failure than the other kids. This was often because they failed to inhibit forward movement of their figures in the video games as readily as others, often crashing their action figures headlong into obstacles that cost them points or required them to restart the game. During a debriefing interview with parents, Dr. Tannock and her colleagues learned that, perhaps as a consequence of these difficulties, children with ADHD tended not to play video games in the presence of other kids but were more likely to do so alone. When they did play such games with others, more fights and tears often occurred. And so it seems that while children with ADHD may be more attentive and less restless while playing video games than when engaged in less interesting activities, their behavior and performance are not normal at these times; contrary to popular belief, their behavior remains distinct from that of typical children. More recent studies have extended these results to include Internet-based gaming and even Internet social networking, which those with ADHD appear more prone to engage in, thus explaining why by adolescence 15–20% of teens with ADHD are likely to qualify as being Internet-addicted.

Difficulty Following Instructions

Those with ADHD are also said to suffer from an inability to follow through on instructions and adhere to rules as well as others their age. Psychologists call this *rule-governed behavior*—when our behavior is controlled more by directions and instructions than by what is actually happening around us. Children with ADHD frequently end up being "off task" or engaging in activities unrelated to what they have been told to do. For instance, the teacher gives a child with ADHD the simple instruction to return to her seat and start her math assignment. The child may start down the aisle, only to dawdle along the way, poke at other children, talk to others, and slowly wander to her desk, usually taking the long way to get there. Once at her desk, the child may take out a pencil and begin to draw pictures of flowers on paper or on her math assignment, to stare out the window at other children playing, or to take a toy

from her pocket and play with it. The instruction given to the child in this case has clearly done little to control the child's behavior.

"My daughter won't do anything I ask. How can I get her to listen to me?"

This problem of following through on rules or instructions was made all the more evident to me when I first began studying the interactions of parents and their children with ADHD more than 40 years ago with Dr. Charles Cunningham while both of us were in training at the Oregon Health Sciences University. Dr. Cunningham and I evaluated the interactions of a group of children with hyperactivity (ADHD) and their parents and compared these interactions to a group of children without ADHD and their parents. Each parent–child pair was required first to play together in a playroom with toys just as they might do at home. After this period, we gave each parent a list of commands to give the child to obey, such as to pick up the toys and put them back on the shelves. We observed these interactions from behind a one-way mirror and recorded how the parents and children interacted. We found that the children with ADHD were less compliant with their parents' instructions than the other children were and that this was especially apparent during the work period. Our findings have been confirmed in many other studies done over the past four decades.

One particularly revealing study was conducted as long ago as 1978 by Drs. Rolf Jacob, K. Daniel O'Leary, and Carl Rosenblad, then at the State University of New York at Stony Brook. They examined groups of children with and without hyperactivity (ADHD) in two types of classroom arrangements. In one arrangement the class was run in a rather informal way, with the children being given choices as to what activities they would do during class work periods. Little structure was provided by the teacher, except to encourage the children to select what they were going to do with their time from a number of academic activities. Then they changed the classroom procedures to resemble those of a more traditional, formal classroom. The teacher directed the children's academic work and either assigned them mimeographed worksheets or required them to listen to a lesson. The behavior of the children with and without ADHD did not differ very much in the informal classroom arrangement. But when the class arrangement changed to a more formal style, the children without ADHD were able to reduce their overall level of activity and inattentiveness and bring their behavior into line with the new rules operating in this more restricted type of situation. In contrast, the children with ADHD were much less able to do so. This difficulty with following rules and restricting behavior accordingly has been documented countless times in subsequent research up to the present, including my most recent survey of a cross-section of U.S. children published in 2012, and extends not just across school situations but to the home and community settings in which these children routinely participate.

The result of this inattentiveness, forgetfulness, and inadequate adherence to rules is that others frequently have to remind those with ADHD of what they are supposed to be doing. Those who supervise a child with ADHD end up frustrated and angry. Ultimately the child may fail, be retained in a grade, and eventually drop out of school. An adult with ADHD may even fail to get a desired promotion or be fired.

The general impression left with others, at best, is that the person with ADHD is less mature and lacks self-discipline and organization. At worst, it implies that the person with ADHD is intentionally lazy, unmotivated, and indifferent or is intentionally trying to avoid his responsibilities.

I believe that these difficulties with following rules and directions are related to both the underlying problem with impulsiveness and to one of poor working memory—the capacity to hold in mind what one is supposed to be doing and use it to guide his ongoing behavior. As I will discuss later in this book, working memory is one of the seven important executive brain functions. It is less clear whether the impulsiveness creates the problem by disrupting the working memory and related rule following when urges to switch to competing activities arise or when the impulsiveness stems from an impaired ability of language to guide and control or govern behavior. Ample research exists to show that verbal ability, working memory, and impulsiveness are all interrelated. Individuals with better-developed language and verbal skills typically have a greater capacity to keep in mind what they are supposed to be doing and are usually much less impulsive and more reflective in performing tasks than those with less well-developed verbal skills and working memory. The three problems are linked because young children learn to talk to themselves as one means of both remembering what they are supposed to be doing and controlling their own behavior so as to be less impulsive, as mentioned earlier. Talking to themselves helps them keep things in mind and inhibit initial urges to respond a certain way. It also allows time for the children to talk over with themselves certain details of the task and various options for responding before choosing which one is the best response. We often refer to this as *thinking* or *reflection*. In either case, it is the use of self-directed speech that is a principal means of keeping our goals and plans in mind and is also involved in helping to control the children's behavior.

This problem of using self-directed speech to help actively remember what one is doing and to inhibit behavior was clearly demonstrated in a study conducted many years ago and published in 1979 by Dr. Michael Gordon, then at the Upstate Medical Center (now Upstate Medical University) in Syracuse, New York. Dr. Gordon was studying the ability of children with and without hyperactivity (ADHD) to inhibit their response to a task and learn to wait. He designed a small computer for this purpose and told the children to sit in front of the computer, press the button, and then wait a while before pressing it again. They earned a point only if they waited 6 seconds or more. The points could be cashed in for candies at the end of the experiment. The children were not told how long to wait each time before pressing the button, so they had to discover that interval through learning. Dr. Gordon found that the children with ADHD pressed the button much more often than the other children and were not as able to wait for the correct interval of time to pass. What was of more interest, however, was that while they were waiting for the time to pass before pressing the button, over 80% of the children without ADHD talked to themselves, counted, or gave themselves verbal instructions and strategies to help pass the time. The children with ADHD, by contrast, sang, hit the sides of the box, spun the button on the box, swung their legs more often, ran around the table, tapped their feet 16 times, stomped their feet 9 or 10 times, and the

like. Only 30% of them reported the use of some verbal strategy like that of the other children. The more they used such physical behavior to help pass the time delay, the more hyperactive they were rated as being by their parents on a behavior rating scale. In other words, the children without ADHD were more likely to use verbal and thinking tactics to help them inhibit their behavior, stay on task, and wait, while the children with ADHD used more physical activity, which was clearly less effective.

As you will see in Chapter 2, I now believe that the problem with inhibiting responses arises first, followed by the later problem in the use of self-directed speech for self-control. However, because in later years they are not relying as much on such self-speech to help them control themselves, the difference in impulsivity between children with ADHD and those without the disorder is likely to be even greater. So the poor impulse control, though it arises first, may further contribute to the later problems children with ADHD have in using self-speech as effectively as other children do. This then feeds back to further hinder their development of impulse control, self-control, and the use of plans and goals to guide their behavior.

Doing Work Inconsistently

Another symptom documented by research to be associated with ADHD is inconsistent and highly variable work performance. Because most children with ADHD are of average or greater intelligence, their inability to produce consistently acceptable work often perplexes those around them. On some days or at certain times, these children seem able to complete their assigned work easily without help. At other times or on other days, they finish little if any of their work and may not get much done even with close supervision. Over time, this erratic pattern creates the impression that a person with ADHD is just lazy. As a child psychiatrist once said, "Children [with ADHD] do well in school twice and we hold it against them the rest of their life." Those times when children with ADHD complete their work unassisted can mislead people into thinking they have no real problems or disabilities. But the problem here is *not that they cannot do the work, but that they cannot maintain this consistent pattern of work productivity the way others can.* More than 40 years ago, this led Dr. Marcel Kinsbourne, a renowned child neurologist, to characterize ADHD as *variability disease,* or VD. Scientists now know that this rather striking pattern of inconsistency in their behavior, and especially in their productivity, is a clear sign that those with ADHD have a disorder of executive functioning. Using our language and self-directed speech to guide us is one of our executive functions and leads to much greater consistency in the way we act and work. Those with ADHD, as I have discussed, are influenced more by the moment than by information being held in mind, such as a rule, instruction, or plan. Consequently, their work will be highly variable, depending on the ever-changing conditions that day. It is quite possible that inconsistent work productivity is also a by-product of the other symptoms described already, particularly the core impairment of impulse control. Consistent work productivity demands the ability to inhibit impulses to engage in other, more immediately fun or rewarding activities, so the more limited and erratic one's impulse control is, the more variable work productivity will be.

Productivity in children with ADHD will depend more on the circumstances of the immediate situation than on self-control, self-speech, and willpower, which eventually come to govern productivity in other children.

"Where Is My Child's Self-Control?": A New View of ADHD

As this chapter has shown, the abilities to stop, think, inhibit, remember, plan, and then act, as well as to sustain actions in the face of distraction—the very things most of us do to help control ourselves—are serious problems for children with ADHD. Current scientific research, however, suggests that all of these surface problems may stem from a deeper core deficit in executive functioning—a developmental delay in self-regulation. It is my considered opinion that all of the primary characteristics of ADHD reflect a serious problem with the seven major executive functions. These mental abilities allow us to behave like an executive running a company—monitoring our actions, thinking about and preparing for the future, and then executing our plans for how best to meet that impending future for the benefit of our long-term welfare. This results in a serious problem with self-regulation more generally or the way in which the self acts as an executive to govern its patterns of behavior over time and especially toward the likely future. In a sense, the self (or central executive) in a child with ADHD doesn't control, regulate, or execute behavior as well as it does in others. So the problems of those with ADHD do not stem from a lack of skill but from a lack of executive functioning or self-control. This means that *ADHD is not a problem with a child's knowing what to do; it is a problem with doing what the child knows*.

Unfortunately, most people believe that self-discipline, self-control, and willpower are entirely at our own command. Therefore, children displaying a lack of self-control are viewed either as not wanting to control themselves (they are "bad seeds") or as not having learned to control themselves (simply "undisciplined" or poorly raised by their parents). Frankly, this view is grossly out of date relative to the science on the disorder. Science is showing us that there are neurological (brain) and even genetic factors that contribute to self-control and willpower, along with learning and upbringing. And when these brain systems are functioning improperly or become damaged, normal levels of self-control and willpower are impossible. Those with ADHD are such people. They have a biologically based problem with self-control and the execution of their willpower. This new view of ADHD as a disorder of executive functioning (self-regulation) is the subject of Chapter 2.

To study ADHD is to gain a glimpse of the will itself and how it comes to be so powerful as an agent in self-control. This power to show self-control for the sake of directing behavior away from the immediate moment and toward the impending future is uniquely human; no other animal has it. Those with ADHD, I believe, have a developmental impairment in this uniquely human mental power. As a result, *to have ADHD is to have a disabled will and consequently a future in doubt.* This is what makes you as a parent so concerned and alarmed about what you see going astray in your child's behavioral and social development. It may be why you are reading this book.

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