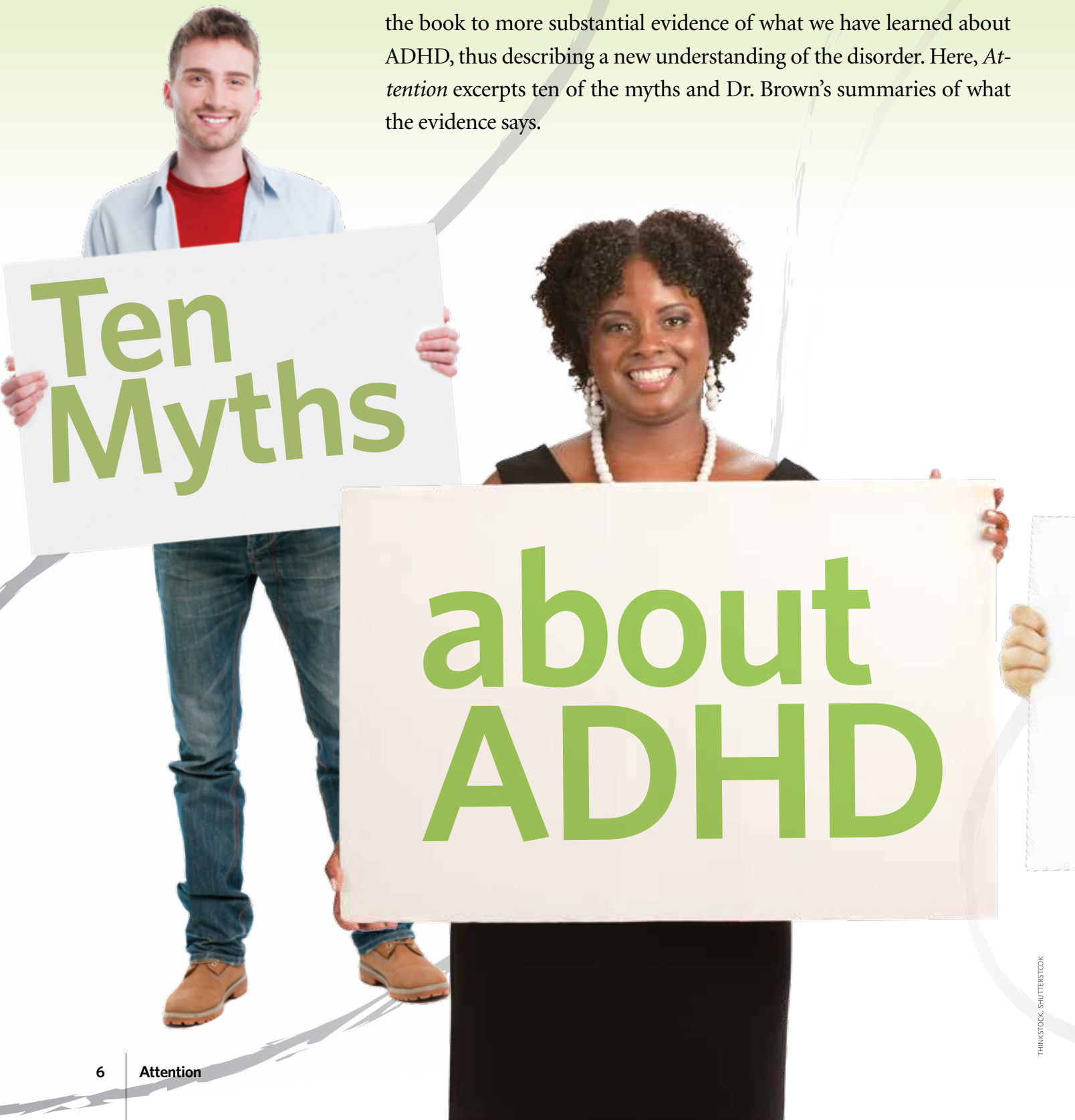
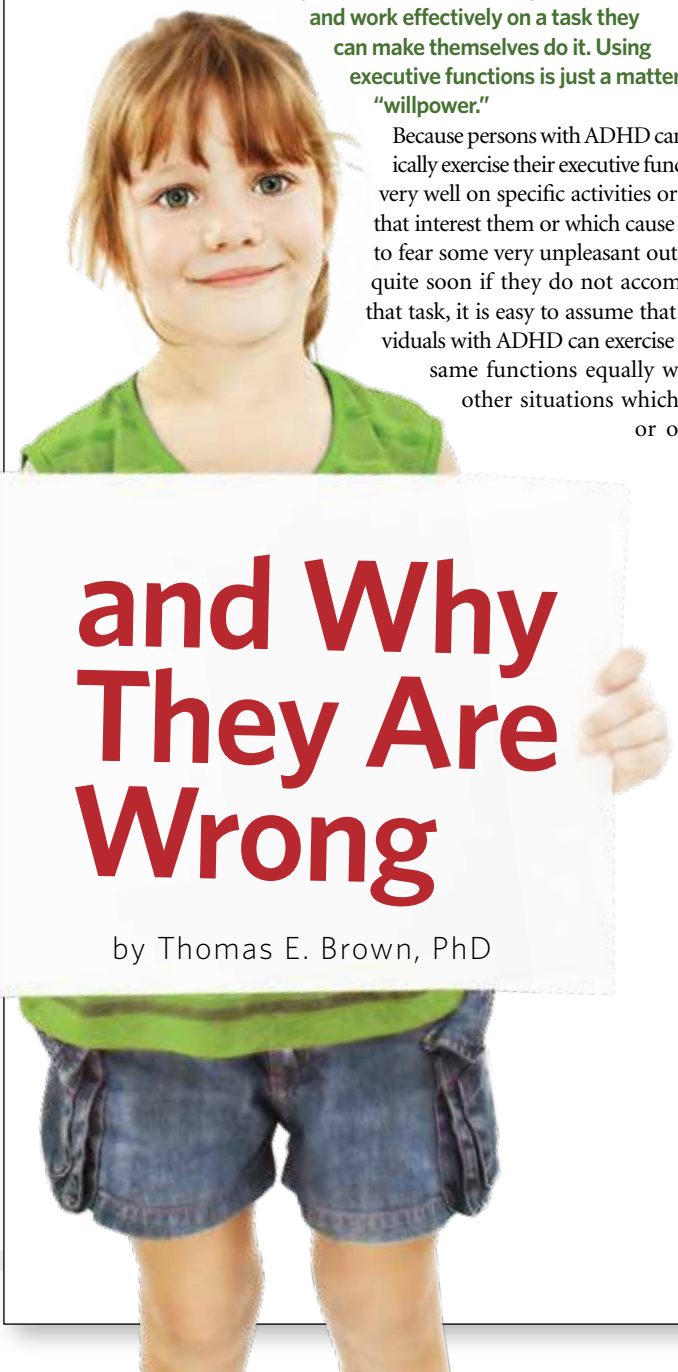
IN HIS NEW BOOK, DR. THOMAS E. BROWN CHALLENGES many of the "widely prevalent myths, mistaken assumptions about ADHD, that are still held by many lay people and some professionals." He lists thirty-five of those myths in his first chapter and then briefly summarizes the science-based facts that contradict them. He devotes the rest of the book to more substantial evidence of what we have learned about ADHD, thus describing a new understanding of the disorder. Here, *Attention* excerpts ten of the myths and Dr. Brown's summaries of what the evidence says.



THINKSTOCK; SHUTTERSTCOK

and Why They Are Wrong

by Thomas E. Brown, PhD



A person who has ADHD always has difficulty with executive functions such as focusing on a task and keeping things in mind, regardless of what they are doing.

Clinical data indicate that executive function impairments characteristic of ADHD are situationally-variable; each person with ADHD tends to have some specific activities or situations in which they have no difficulty in utilizing those executive functions that, for them, are significantly impaired in most other situations. Typically these are activities in which they have strong personal interest or where they believe that something very unpleasant will follow quickly if they do not take care of this task right here, right now. Research findings indicate that intra-individual variability in performance from one context or time to another is the essence of ADHD. Multiple studies have shown that performance of persons with ADHD is highly sensitive to contextual factors, e.g. reward, nature of the task, and internal cognitive and physiological factors.

If a person with ADHD really wants to focus and work effectively on a task they can make themselves do it. Using executive functions is just a matter of "willpower."

Because persons with ADHD can typically exercise their executive functions very well on specific activities or tasks that interest them or which cause them to fear some very unpleasant outcome quite soon if they do not accomplish that task, it is easy to assume that individuals with ADHD can exercise those same functions equally well in other situations which they or others consider important—if only they will exercise a presumed internal force called "willpower." This new model of ADHD challenges that assumption on the grounds that most operations of executive functions are unconscious, not in the psychoanalytic sense of repression, but in the more modern sense of "automaticity."

From this view, most operations of these executive functions are not under conscious control any more than is erectile dysfunction. Research on motivational influences impacting decisions of "Will you do it and, if so, how and when?" has shown that such decisions result primarily from complex and dynamic interactions of memory-influenced emotions with inborn patterns of reactivity that operate instantaneously with relatively insignificant conscious input, despite our assumptions to the contrary.

Persons with high IQ are not likely to have executive function impairments of ADHD because they are smart enough to overcome such difficulties.

Intelligence measured by IQ tests has virtually no systematic relationship to the syndrome of executive function impairments described in the new model of ADHD. Studies have shown that even extremely high IQ children and adults can suffer impairments of ADHD which significantly impair their ability to deploy their strong cognitive skills consistently and effectively in many situations of daily life. Clinical observations indicate that often high IQ individuals with ADHD face lengthy delays before they obtain a correct diagnosis and appropriate treatment. This is due largely to uninformed teachers, parents, clinicians, and patients themselves assuming that high IQ precludes ADHD.

Executive function impairments of ADHD usually are outgrown when the person reaches their late teens or early twenties.

Some children with ADHD gradually outgrow their ADHD-related impairments as they get into middle childhood or adolescence. For them ADHD is a variety of developmental lag. Most often hyperactive and/or impulsive symptoms improve as the individual reaches adolescence while the broad range of inattention symptoms persist and sometimes get worse. Often the most problematic period is during junior high, high school and the first few years of university; that is the time when the individual faces the widest range of challenging activities without opportunity to escape from the ones in which they have little interest or ability. After that period some with ADHD are fortunate enough to get employment and a life situation where they can build on their strengths and find ways to work around their cognitive weaknesses; others are not similarly fortunate.

Modern research methods have established that executive function impairments are localized mainly in the prefrontal cortex.

Executive functions are complex and involve not only the prefrontal cortex, but also many other components of the brain. Those with ADHD have been shown to differ in the rate of maturation of specific areas of the cortex, in the thickness of cortical tissue, in characteristics of the parietal and cerebellar regions, as well as in the basal

ganglia, and in the white matter tracts that connect and provide critically important communication between various regions of the brain. Recent research has also shown that those with ADHD tend to have different patterns in functional connectivity, patterns of oscillations that allow different regions of the brain to exchange information.

Emotions and motivation are not involved in executive functions associated with ADHD.

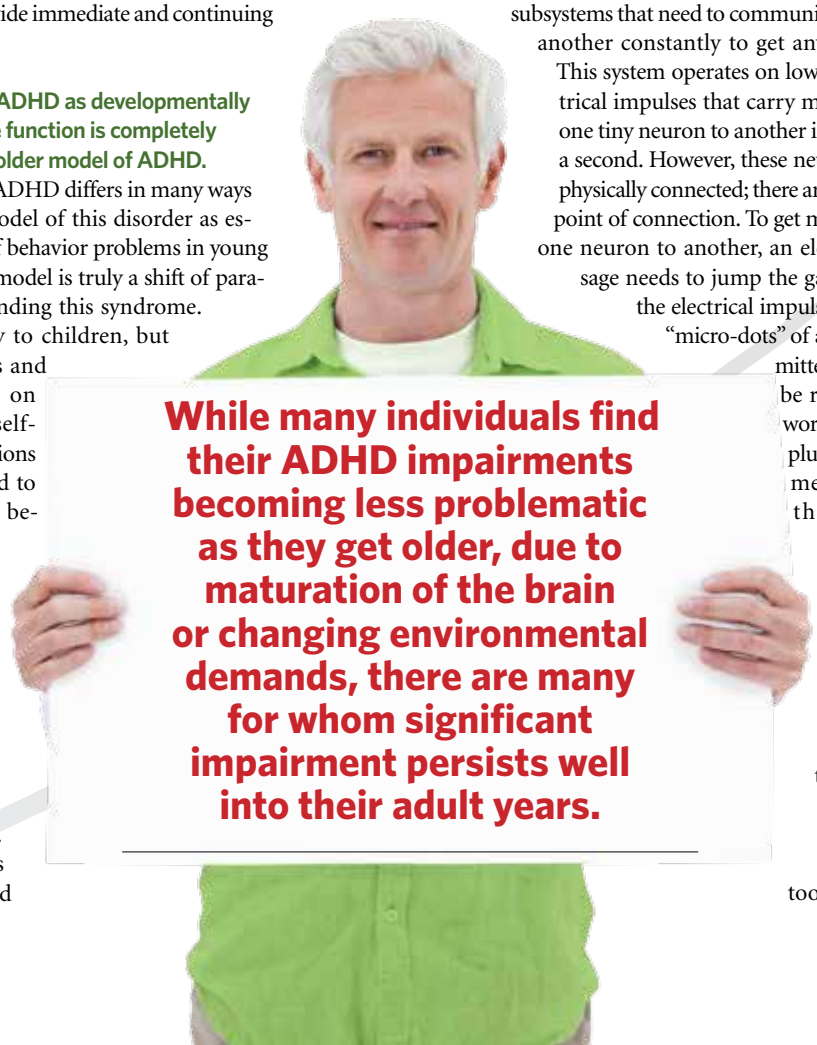
Although earlier research and diagnostic criteria for ADHD gave little attention to the role of emotion and motivation in this disorder, more recent research has highlighted their critical importance. Some research has focused solely on the problems of many with ADHD in regulating expression of their emotions without sufficient inhibition or modulation. However, research has also demonstrated that a chronic deficit in emotions that comprise motivation is a critically important aspect of impairments for most individuals with ADHD. Studies have shown that this is related to measurable differences in the operation of the reward system within the brains of those with ADHD. Those with ADHD tend to have abnormalities in the anticipatory dopamine cell firing in the reward system; this makes it difficult for them to arouse and sustain motivation for activities that do not provide immediate and continuing reinforcement.

The new model of ADHD as developmentally impaired executive function is completely different from the older model of ADHD.

The new model of ADHD differs in many ways from the earlier model of this disorder as essentially a cluster of behavior problems in young children. The new model is truly a shift of paradigm for understanding this syndrome. It applies not only to children, but also to adolescents and adults. It focuses on a wide range of self-management functions that are not limited to readily observable behaviors; functions included are linked to complex operations of the brain. However, there are still substantial and important points of overlap between the old and new models. The new model is an extension and expansion of the old model. Most individuals who meet diagnostic criteria for the new model will also meet the diagnostic criteria for the older model. The old model is no longer tenable not because it identifies individuals with a totally different disorder; the old model is no longer tenable because it does not adequately capture the wide breadth, complexity and persistence of this syndrome as it is found across the lifespan.

ADHD-related executive function impairments are due primarily to a "chemical imbalance" in the brain.

The term "chemical imbalance in the brain" is often used to explain impairments of ADHD. This suggests that there are chemicals floating around in the cerebral spinal fluid that surrounds the brain that are simply not in correct proportions, as though there were too much salt in the soup. This assumption is simply wrong. Impairments of ADHD are not due to a global excess or lack of a specific chemical within or around the brain. The primary problem is related to chemicals manufactured, released, and then reloaded at the level of synapses, the trillions of infinitesimal junctions between certain networks of neurons that manage critical activities within the brain's management system. The brain is essentially a huge electrical system that has multiple subsystems that need to communicate with one another constantly to get anything done. This system operates on low voltage electrical impulses that carry messages from one tiny neuron to another in fractions of a second. However, these neurons are not physically connected; there are gaps at each point of connection. To get messages from one neuron to another, an electrical message needs to jump the gap. Arrival of the electrical impulse causes tiny "micro-dots" of a neurotransmitter chemical to be released. This works like a spark plug to carry the message across the gap and further down the circuit. Persons with ADHD tend not to release enough of these essential chemicals, or to release and reload them too quickly, be-



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fore an adequate connection has been made. Medications used to treat ADHD help to improve this process.

For some individuals with ADHD, prescribed medications can cure their ADHD impairments so they do not need to keep taking the medication.

Medications for ADHD cure nothing. They are not like antibiotics that may cure an infection if the medication is taken consistently for a few days or weeks. ADHD medications are more like eyeglasses that may improve or even normalize a person's vision while the glasses are worn, but the eyeglasses cannot fix the problem with the person's eyes. When the eyeglasses are taken off, the person's vision returns to whatever it was previously. Most medications for ADHD currently available last for somewhere between 2 and 12 hours, then they gradually stop being helpful. Some persons who take medications for ADHD find that there is a point where they no longer need to take that medication; they are able to function reasonably well without it. Sometimes this is due to increased development of their brain as they get older; the processes of natural maturation that were a bit slower in them than for their contemporaries eventually kick in. In other cases such an improvement may be due to some change in the situation, a new teacher who is more supportive, a new job that is not as demanding of executive functions as the previous job, or added sources of support. Such improvements without medication may be temporary or quite long-lasting.

There is no evidence that medications for ADHD actually improve executive function impairments or that any improvements last.

There are three different types of evidence that demonstrate the effectiveness of specific medications for ADHD improving impaired executive functions. First, imaging studies have shown that stimulants improve, and may normalize, the ability of individuals with ADHD to get activated for assigned tasks, to minimize distractibility while doing tasks, to improve functional connections between various regions of brain involved in executive functions, to improve working memory performance, to reduce boredom during task performance, and, in some cases, to normalize some structural abnormalities in specific brain regions of those with ADHD.

Second, experiments comparing performance of children with ADHD with matched controls or when on placebo in comparison to prescribed medication have shown that when on appropriate medication, children with ADHD tend to minimize inappropriate classroom behavior and control their behavior more like typical children in their class. Experiments have also shown that medication can help those with ADHD to improve their speed and accuracy in solving arithmetic problems; they increase their willingness to persist in trying to solve frustrating problems; they improve their working memory, and increase their motivation to perform and execute more adequately a wide variety of tasks associated with executive functions. These results do not mean that all children on such medications display these results, but group data demonstrate statistically significant improvements. However, it should be noted that these results are found only during the time the medication is actually active in the person's body.

ADHD impairments sometimes last into early adulthood, but then they usually diminish before middle age.

Impairments of ADHD are determined not solely by the individual's symptoms, but by discrepancies between the demands of daily life facing the individual and their capacity to meet them. A business or professional person with ADHD might function very well in their daily life if they are fortunate enough to have a job that fits their talents, and coworkers, a secretary or others, who are able and willing to take care of functions that are difficult for the person with ADHD. Yet, if that adult is transferred to a different job where there are increased demands and insufficient support, their ADHD impairments may become much more conspicuous and problematic. Likewise, if an adult with ADHD is living with a partner who is able and willing to carry much of the responsibility of planning and preparing meals, managing finances, and attending to household routines, that person with ADHD may live comfortably and contribute to the household in other ways. However, if the help and support of that other person is lost due to illness, separation, divorce or death, the person with ADHD may suddenly be faced with multiple problems that are very difficult to cope with.

While many individuals find their ADHD impairments becoming less problematic as they get older, due to maturation of the brain or changing environmental demands, there are many for whom significant impairment persists well into their adult years. Research has shown that many individuals with ADHD find their functional impairments persist well into middle age and often beyond. In addition, bodily changes may cause late onset of ADHDlike impairments, e.g. for women during and after menopause, and for both men and women as their bodies age. Extension of ADHD impairments into middle and later years of life has not yet been adequately studied.

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