

THOMAS E. BROWN



A New Understanding of
ADHD
in Children and Adults

Executive Function Impairments



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PRAISE FOR THIS BOOK

"Dr. Brown more than fulfills his promise to provide an accessible summary that describes and integrates new facts and perspectives on ADHD. The book is comprehensive, current, and engagingly written. It will be a terrific resource for parents, educators, and clinicians as well as for patients themselves."

F. Xavier Castellanos, MD, *Brooke and Daniel Neidich Professor of Child and Adolescent Psychiatry, Professor of Radiology and Physiology and Neuroscience, and Director, Center for Neurodevelopmental Disorders, New York University Langone Medical Center Child Study Center*

"Brown presents a comprehensive case for comprehending this disorder in terms of a wide range of executive functions, rather than on the basis of behavior and attention alone. Loaded with up-to-date research findings and synthetic in scope, this work is bound to challenge assumptions and pave the way toward new paradigms."

Stephen P. Hinshaw, PhD, *Professor of Psychology, University of California, Berkeley, and Editor, Psychological Bulletin*

"Tom Brown's book is placing cognitive changes at the heart of ADHD and drawing out the implications for clinicians and researchers. It is a welcome corrective to the overemphasis on disruptive behavior and it is written so clearly that it can be recommended to everyone who wants to understand the nature of this serious problem for adults and children."

Eric Taylor, FRCP, FRCPsych, *Professor of Child and Adolescent Psychiatry, Institute of Psychiatry, University of London*

"A very intriguing read. Dr. Brown skillfully examines the diverse nature of executive functions, ADHD, and their overlap."

Timothy E. Wilens, MD, *Associate Professor of Psychiatry, Harvard Medical School, and Director of Substance Abuse Services, Massachusetts General Hospital*

"Professionals and lay people looking for a synthesis of our current understanding of this condition will find Dr. Brown's latest book a sensible, understandable, and very readable contribution."

Gabrielle A. Carlson, MD, *Professor of Psychiatry and Pediatrics, and Director, Child and Adolescent Psychiatry, Stony Brook University School of Medicine*

"Dr. Brown presents a science-driven and cohesive way of re-conceptualizing the disorder, revitalizing the central role of executive functioning impairment in ADHD. This book translates recent advances in ADHD science into understandable words not only for mental health professionals, but for all those interested in this very prevalent disorder affecting individuals across the whole life cycle."

Luis Augusto Rohde, MD, PhD, *President of the World Federation of ADHD, and Professor of Psychiatry, Federal University of Rio Grande do Sul, Brazil*

"Tom Brown's newest book pulls from the latest research in ADHD to present a new explanatory paradigm. Research results are distilled to debunk myths and offer sound guidance on evaluation and effective treatment. This book is a must-read for any education, health, or mental health professional who encounters children or adults with ADHD. Its direct and clear language makes the explanations and conclusions accessible to parents and adult patients, too."

Mina K. Dulcan, MD, *Osterman Professor of Child Psychiatry and Head, Department of Child and Adolescent Psychiatry at the Ann & Robert H. Lurie Children's Hospital of Chicago; Professor of Psychiatry and Behavioral Sciences and Pediatrics, and Director, Child and Adolescent Psychiatry, Northwestern University Feinberg School of Medicine*

"This book presents a highly useful and current summation of the major findings concerning ADHD and the role of executive functioning in it. Clinicians, students, and laypeople will find here much valuable information on the disorder, its assessment and diagnosis, and its management."

Russell A. Barkley, PhD, *Clinical Professor of Psychiatry and Pediatrics, Medical University of South Carolina*

"Thomas E Brown has produced a comprehensive reference. It extends our understanding of the impact of Attention Deficit Hyperactivity Disorder as that diagnosis assumes new borders in DSM 5."

Martha Bridge Denckla, MD, *Professor of Neurology, Pediatrics, and Psychiatry, Johns Hopkins University School of Medicine, and Director, Developmental Cognitive Neurology, Kennedy Krieger Institute*

"Tom Brown is one of the true pioneers in our growing understanding of ADHD. Both a clinician and a researcher, he continues to deepen and enlarge our knowledge of ADHD. Dr. Brown is a dedicated doctor who's written yet another brilliant book."

Edward Hallowell, MD, *author of Delivered from Distraction and The Childhood Roots of Adult Happiness*

A NEW UNDERSTANDING OF ADHD IN CHILDREN AND ADULTS

For over 100 years, ADHD has been seen as essentially a behavior disorder. Recent scientific research has developed a new paradigm which recognizes ADHD as a developmental disorder of the cognitive management system of the brain, its executive functions. This cutting-edge book pulls together key ideas of this new understanding of ADHD, explaining them and describing in understandable language scientific research that supports this new model. It addresses questions like:

- Why can those with ADHD focus very well on some tasks while having great difficulty in focusing on other tasks they recognize as important?
- How does brain development and functioning of persons with ADHD differ from others?
- How do impairments of ADHD change from childhood through adolescence and in adulthood?
- What treatments help to improve ADHD impairments? How do they work? Are they safe?
- Why do those with ADHD have additional emotional, cognitive, and learning disorders more often than most others?
- What commonly held assumptions about ADHD have now been proven wrong by scientific research?

Psychiatrists, psychologists, social workers, and other medical and mental health professionals, as well as educators and those affected by ADHD and their families, will find this to be an insightful and invaluable resource.

Thomas E. Brown, PhD, is Associate Director of the Yale Clinic for Attention and Related Disorders and Assistant Clinical Professor of Psychiatry, Yale University School of Medicine. He is a Fellow of the American Psychological Association, developer of the *Brown ADD Scales for Children and Adults* (Pearson), and author of the prize-winning book, *Attention Deficit Disorder: The Unfocused Mind in Children and Adults*. Dr. Brown is also editor of the textbook, *ADHD Comorbidities: Handbook of ADHD Complications in Children and Adults*. Visit the author's website at www.DrThomasEBrown.com.

The untangling of the complexity has barely begun... But even at its early stages, the whole business of the matter of the mind requires a global view if we are to get anywhere.

Gerald M. Edelman (1992)

Bright Air, Brilliant Fire: On the Matter of the Mind

Perhaps the most indispensable thing we can do as human beings, every day of our lives, is remind ourselves and others of our complexity, fragility, finiteness and uniqueness.

Antonio R. Damasio (1994)

Descartes' Error: Emotion, Reason and the Human Brain

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T. E. B.

INTRODUCTION

The disorder currently identified as Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD) has been described in the medical literature with a variety of different labels for over 100 years. (In this book, the term ADHD is used to refer to Attention Deficit Disorder with and without hyperactivity). Throughout most of those years, the emphasis has been on behavior problems of young children who were seen as being overly active and not listening to others. The term “attention” as a central aspect of the syndrome was not introduced into diagnostic criteria until 1980 (American Psychiatric Association, 1980). Until recently, this syndrome was classified in the diagnostic manual as a “disruptive behavior disorder.” That old model of ADHD is now outdated. Rapidly it is being replaced by a new understanding of ADHD as a developmental impairment of the brain’s self-management system, its executive functions.

This book describes that new understanding and the recent clinical and neuroscience research that supports it. Here the reader will find, in clear and accessible language, information on how scientific research on functioning of the human brain has created this major shift in how ADHD is now understood. This discussion describes and elaborates many concepts and research findings about ADHD not included even in the description of ADHD provided in DSM-V, the most recent version of the psychiatric diagnostic manual. It moves beyond a simple listing of behavioral characteristics of those with ADHD and provides a more integrated understanding of the complex problems of brain development and cognitive functions that underlie the disorder at various points in the lifespan. Moreover, this volume offers a working definition of ADHD that highlights characteristics of this developmental impairment of the brain’s management system, its executive functions.

The purpose of this book is to provide an accessible summary that describes and integrates new facts and understandings of this disorder which have been

developed by a number of researchers and clinicians working at the cutting edge of the study of ADHD. The integrated understanding provided here is not new in the sense of totally original or never before seen. Concepts in the working definition proposed in this book are not the creation of any one individual. Much of the research and most of the key concepts have been disparately reported in many scientific journals, books and conferences by a number of researchers and clinicians over the past 15 years. What is new in this publication is the integration of these fragments of emerging research data and perspectives into an updated and readily understandable paradigm with a working definition for this complex syndrome.

Findings from neuroscience, brain imaging and various forms of clinical research have made the old understanding of ADHD as essentially a simple behavior disorder no longer tenable. A new paradigm has emerged to conceptualize this syndrome. This new model is not yet fully refined. Its language of executive function is barely mentioned in the description of ADHD provided in the most recent version of the official diagnostic manual. Yet this updated model increasingly is being recognized and used by many professionals in psychology, medicine, education and related fields.

This new paradigm can provide a useful way to put together many of the not yet integrated pieces of research on this puzzling syndrome which causes some children and adults to have great difficulty in focusing and managing many aspects of their daily life, while they can focus and manage a few other tasks or activities quite well. This new understanding provides a useful way to more readily recognize, understand, assess and treat this complex syndrome which impacts about 9% of children and almost 5% of adults.

Further research and increased clinical experience will eventually provide even better ways to conceptualize this disorder, its assessment and treatment. In the meantime, this book offers a new and, hopefully, helpful understanding for primary care physicians, psychologists, child and adult psychiatrists, pediatricians, advanced practice nurses, clinical social workers, and other medical and mental health professionals as well as educators, disability service providers and interested patients and family members who struggle with the complexities of ADHD.

Research has made it increasingly clear that ADHD is not essentially a behavior disorder and not limited to childhood years. The working definition offered in the second chapter of this book asserts that this syndrome known as ADHD is a complex developmental impairment of the brain's self-management system, its executive functions, which may emerge in boys or girls during early childhood, but often is not recognized until the affected individual encounters

the challenges of adolescence or adulthood. For some, impairments of ADHD diminish considerably as their brains mature over the mid to late adolescent years; for others, the disorder persists as a chronic impairment throughout their lifespan.

This book begins with a review of multiple widely-held, but mistaken assumptions about ADHD; it also presents scientific facts from research findings that contradict those myths. It then offers and explains a new working definition of ADHD based on the emerging facts and paradigm. The four chapters following that description describe and explain in more detail the nature of the disorder, how it can be effectively assessed, how it can be effectively treated, and why many learning and psychiatric disorders often co-occur with ADHD.

Chapter 1 presents 35 commonly held myths about ADHD that are challenged by findings developed from scientific research. Listed after each of those myths is a brief summary of facts that contradict that mistaken assumption and citations to specific pages of this book where more detailed information on relevant research can be found.

Chapter 2 proposes and explains a working definition of the new paradigm that is based upon facts of ADHD developed in research. It also highlights the developmental nature of the disorder and the puzzling fact that individuals with ADHD all tend to have a few specific activities and situations in which they have no difficulty deploying those executive functions in which they are usually significantly impaired. That chapter also describes similarities and differences between the old and new models and summarizes findings regarding the prevalence of ADHD in various age groups.

In Chapter 3 are reviews of research describing specific ways in which individuals with ADHD at various stages of life tend to be impaired in brain development, cognitive functioning, and their self-management for many activities of daily living. Recent findings on differences in rates of brain maturation, brain structure, and functional connectivity of brain components are included to address the question: "Is the ADHD brain structured or wired differently?" This chapter also describes research on the role of emotion and motivation in ADHD. It explains why ADHD impairments are found among persons along the full spectrum of IQ, including some who are extremely bright. A concluding section reviews genetic research seeking to explain the very high rate of familial heritability for ADHD coupled with information about environmental factors that can also impact this disorder.

Chapter 4 presents research findings on how impairments of ADHD understood in this new model can be adequately assessed and diagnosed at

various points across the lifespan. It challenges the assumption that impairments of ADHD can be adequately assessed with traditional neuropsychological “tests of executive functions” and explains how clinicians can use clinical interviews and rating scales to assess ADHD as it is now understood in this new model. It also points out limitations of some ineffective assessment methods in current use.

Chapter 5 reviews research on the uses and limitations of approved medications and various psychosocial treatments for ADHD. It reports research regarding how medications for ADHD can improve brain function and describes the ways medications can affect various aspects of the self-management system of the brain. It also summarizes scientific findings regarding possible side effects to medication treatments for ADHD and reports on which psychosocial treatments for ADHD are helpful for various cognitive and behavioral functions in different age groups.

The sixth chapter of the book describes research showing how and why most individuals with ADHD suffer also from one or more additional learning or psychiatric disorders. It argues that executive function impairments of ADHD underlie and are foundational to dyslexia and other learning disorders, anxiety and depressive disorders, bipolar disorders, oppositional defiant and conduct disorders, obsessive-compulsive and hoarding disorders, substance use disorders, and Autistic Spectrum disorders. It suggests that ADHD is not like having a problem with one software program that interferes with only one type of functioning of a computer. It presents ADHD as more like a problem with the operating system of the computer, a broader, more foundational impairment that impacts a wide range of cognitive functioning.

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35 MYTHS ABOUT ADHD AND WHY THEY ARE WRONG

This book describes a new understanding of ADHD (Attention Deficit Hyperactivity Disorder) based upon facts demonstrated in empirical research. This new understanding is summarized in a new definition and model described in Chapter 2. It challenges a number of widely-prevalent myths, mistaken assumptions about ADHD, that are still held by many lay people and some professionals. This chapter lists 35 of those assumptions, provides a brief summary of science-based facts that contradict each of these myths, and refers the reader to the more substantial evidence in Chapters 2 through 6 that challenges each mistaken assumption.

1. 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 (Chap. 2, pp. 32–33). 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 (Chap. 3, pp. 58–63).

2. Everyone has impairments of executive functions; those with ADHD are just like everybody else.

Although everyone suffers from executive function impairments sometimes, only those individuals who are significantly and chronically impaired by this syndrome of impairments qualify for the diagnosis of ADHD. Epidemiological research in the U.S. indicates that about 9% of children aged 6 to 17 years, 8.7% of adolescents aged 13 to 18 years, and 4.4% of adults qualify for an ADHD diagnosis under current diagnostic criteria. A pooled estimate from 102 studies of children up to age 18 years in diverse cultures around the world yields a more conservative estimate of 5.29% (Chap. 2, 40–41). Comparisons of individuals with ADHD versus matched groups in multiple aspects of brain development, brain structure and brain functioning have demonstrated significant differences between those who have ADHD and those who do not (Chap. 3, pp. 63–70).

3. 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 (Chap. 2, pp. 33–37).

4. Anyone who has ADHD will show clear signs of it during early childhood and will continue to have difficulties with executive functions for the rest of his/her life.

For decades ADHD, under various names, has been seen as essentially a disorder of childhood; DSM-IV (Diagnostic and Statistical Manual of Mental Disorders-IV) diagnostic criteria stipulated that, for diagnosis, at least some of the symptoms must be noticeable by age seven years. More recent research has shown that many with ADHD function quite well during childhood and do not manifest any significant symptoms of ADHD until adolescence or later when greater challenges to executive function are encountered (Chap. 4, pp. 77–78). Over the past decade research has shown that impairing symptoms of ADHD often persist well into adulthood (Chap. 2, pp. 29–31; Chap. 3, pp. 46–51). However, longitudinal studies have also shown that some individuals with ADHD during childhood experience significant reductions in their ADHD impairments as they grow older (Chap. 3, pp. 52–55).

5. Impairments of executive function are best assessed by neuropsychological “tests of executive function” administered by a neuropsychologist.

“Tests of executive function” used by neuropsychologists are not useful for assessing impairments of executive function associated with ADHD. Some with ADHD do poorly on a battery of such tests, but many who clearly meet diagnostic criteria for ADHD perform adequately or even quite well on such measures, despite their impairments of executive function (EF). The most effective measure for assessment of ADHD is use of a normed ADHD/EF rating scale in the context of a semi-structured clinical interview done by a clinician experienced with such disorders. These measures should inquire about how well the individual is able to manage relevant tasks of daily life as well as assessing for other possible causes of the symptoms and for possible comorbid difficulties. Unlike neuropsychological tests that attempt to infer dynamic patterns of functioning from just 5 to 20 minutes of behavior in an artificial laboratory setting, rating scales inquire over much wider time frames in a variety of settings and tasks (Chap. 4, pp. 88–92).

6. 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 (Chap. 3, pp. 70–72).

7. Modern imaging techniques such as PET and fMRI scans or computerized tests can provide objective evidence to diagnose executive function impairments associated with ADHD.

Many claim that “objective” measures such as positron emission tomography (PET), single photon emission computed tomography (SPECT) or functional magnetic resonance imaging (fMRI) scans can determine whether an individual has ADHD or not. Although these measures are useful research tools, they are not sufficiently developed or normed to make them useful or valid for assessment to make or deny an ADHD diagnosis for any specific individual. The same limitations apply to computerized “tests of attention” and to quantitative electroencephalography (EEG) tests. All of these measures provide only snapshots of brain functioning in brief moments of time and do not adequately capture the wide situational variability in functioning characteristic of most individuals with ADHD. This complex disorder can be effectively assessed and validly diagnosed only by a clinical interview that assesses longer term patterns of functioning in multiple contexts. This task requires a clinician skilled and experienced in this field (Chap. 4, pp. 94–95).

8. 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