

CHAPTER 14

Attention-Deficit/Hyperactivity Disorder

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Attention-Deficit/Hyperactivity Disorder (ADHD) is a complex, chronic, and potentially debilitating disorder of brain, behavior, and development that affects between 3% and 7% of school-age children, or approximately 1.1 to 2.5 million children between 5 and 13 years of age in the United States, based on recent census estimates (U.S. Census Bureau, 2005). Accumulating evidence suggests that the core symptoms of ADHD—inattentiveness, severe impulsivity (both behavioral and cognitive), and overactivity—reflect dysfunction or dysregulation of cerebellar-striatal/adrenergic-prefrontal circuitry (Castellanos, 2001).

Near-, intermediate-, and long-term studies reveal a rather bleak picture of adverse outcomes associated with ADHD, ranging from scholastic underachievement and school failure to dysfunctional interpersonal and employment-related relationships. An overwhelming majority (>90%) of children with ADHD perform poorly in school and underachieve scholastically (i.e., 10 to 15 point deficits on standardized academic achievement batteries)—a fact highlighted by the estimated 10% to 70% with comorbid learning disabilities in reading, spelling, math, or handwriting (Barkley, 2006). They make more failing grades, have lower grade point averages (1.7 vs. 2.6), and are retained (42% vs. 13%), suspended (60% vs. 19%), and expelled (14% vs. 6%) more often from school relative to typically developing peers. An alarming 23% (3% to 7% prevalence estimates = 249,000 to 581,002) to 32% (3% to 7% prevalence estimates = 346,436 to 808,351) of children with ADHD fail to complete high school (for details, see Barkley, Fischer, Smallish, & Fletcher, 2006; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993), which translates into significantly fewer entering (22% vs. 77%) and completing (5% vs. 35%) college.

The elevated risk for adverse outcomes associated with ADHD continues through-out late adolescence. Those diagnosed with the disorder are sexually active at an earlier age, with a higher number of sexual partners, and are less likely to use contraceptives

relative to their peers—a collective set of behaviors that increases their risk for teenage pregnancy and contracting sexually transmitted diseases. The inattentive and impulsive components of the disorder also contribute to their poor driving records. They receive more speeding citations (4–5 vs. 1–2) and are involved in and at fault for more vehicular accidents (26% vs. 9% involved in 3 or more crashes) relative to same-age control children, particularly those causing serious injury (60% vs. 17%). Their poorer overall driving skills are highlighted by significantly higher rates of license suspensions and revocations (32% vs. 4%) relative to same-age peers (Barkley, 2006).

The impairing nature of the disorder continues into adulthood for many individuals. A surprising 90% of children previously diagnosed with ADHD are gainfully employed by their late 20s to early 30s; however, their overall socioeconomic status is significantly lower relative to controls followed over the same time frame (Manuzza et al., 1993). Moreover, young adults with ADHD are more likely to be fired from their job (55% vs. 23%), change jobs more frequently (2.6 vs. 1.3), evince more ADHD symptoms on the job, and earn lower employee work performance ratings relative to peers. Approximately 66% of those diagnosed with ADHD during childhood continue to experience significant symptoms of the disorder as adults, and some meet diagnostic criteria for Antisocial (11%–21%), Histrionic (12%), Passive Aggressive (18%), and Borderline (14%) Personality Disorder. The increased risk associated with the development of comorbid personality disorders in adulthood, however, appears to be conveyed by elevated Conduct Disorder (CD) symptoms during childhood and/or the expression of CD problems during adolescence.

Attention-Deficit/Hyperactivity Disorder is a controversial clinical disorder and is difficult to diagnose for several reasons. One of the core symptom clusters used to define the disorder—attentional problems—has poor specificity and occurs with high frequency in many other childhood disorders. Many of the disorder's core and secondary symptoms represent dimensional variants of normal temperament, and ADHD is presumed to reflect diverse factors or pathways that result in a similar developmental outcome, a phenomenon termed *equifinality*.

Despite the abundance of assessment instruments available today, none are uniquely sensitive and valid for diagnosing ADHD. This situation is due to two intertwined factors: the introduction of ADHD as a diagnostic category prior to developing appropriate tools to measure its core features and the failure to scrutinize core deficits or features of the disorder and their underlying assumptions prior to designing assessment instruments. The initial section on current assessment strategies highlights these issues, and the conceptualization section provides a detailed discussion of theoretical issues underlying the design of clinical assessment measures for ADHD. The ensuing two sections examine empirically based treatments for ADHD, followed by a detailed case description that illustrates the major topical issues discussed throughout the chapter.

ASSESSMENT

OVERVIEW

Expert guidelines in psychiatry (McClellan & Werry, 2000) and psychology (Barkley, 2006) recommend that a qualified clinician conduct a comprehensive diagnostic

evaluation utilizing multiple assessment instruments. These range from subjective measures such as ratings scales and clinical interviews to increasingly objective measures such as direct observation and sophisticated actigraphs. Aside from the handful of small n and uncontrolled case studies, self-report and self-monitoring instruments have been confined to assessing treatment-emergent effects (i.e., side effect rating scales) and co-occurring symptomatology (e.g., self-report depression and anxiety inventories) in ADHD. Clinicians interested in these specialty instruments can find detailed discussions throughout this book and elsewhere (cf. Mash & Terdal, 1997). The diagnostic process must also include a careful review of psychoeducational test data and the child's social-developmental, medical, educational, psychiatric, familial, and treatment histories, as discussed in the following sections.

HISTORICAL INFORMATION

Obtaining detailed and accurate historical information is essential to the assessment of ADHD. Information obtained concerning the onset, course, and duration of behavioral and emotional problems is one of the most valid means of separating ADHD from other childhood disorders, following the early methods of defining clinical syndromes used by Hippocrates (i.e., recognizing patterns or clusters of symptoms). A child with a relatively benign history of behavioral and academic problems, for example, whose academic performance is compromised beginning in fifth grade accompanied by an acute onset of behavioral and/or emotional difficulties, is unlikely to have ADHD based on our knowledge of the disorder. Alternative candidates, such as affective disorders, anxiety disorders, early-onset Schizophrenia, or abrupt environmental change represent more likely alternatives to explain the difficulties. Table 14.1 provides an overview of the differences in onset, course, and duration of problematic symptoms in childhood-onset disorders.

Questions concerning pre-, pari-, and postnatal development, early or continued ingestion of alcohol, drugs, and other toxins, length and course of pregnancy, delivery and birth complications, Apgar scores, and other information relevant to the child's early development are outlined in the University of Central Florida Children's Learning Clinic-IV (CLC-IV) clinical intake form shown in Table 14.2 (also available in pdf version from the author). The rationale for including this information derives from research suggesting slight elevations in pregnancy complications and physical abnormalities, general health problems, allergies, and accidental injuries and poisonings in children with ADHD (for a review, see Rapport, Timko, & Wolfe, 2006).

Detailed medical, educational, and child and family psychiatric, social, and developmental histories are required. Obtained historical information contributes to the diagnostic process by providing converging evidence of occurrences common to children with ADHD. For example, family psychiatric histories typically reflect a higher prevalence of ADHD in first-degree biological relatives of children with ADHD (25% to 37% average risk), particularly in fathers (44%) and brothers (39%; Biederman, Faraone, Keenan, Knee, & Tsuang, 1990).

The educational history associated with ADHD is typically characterized by an early onset and gradual worsening of behavioral, emotional, and academic difficulties. Teachers often invoke the term *immaturity* when describing 4- to 5-year-old children with ADHD. A laundry list of pejorative characteristics that reflect gradually impairing levels of inattentiveness, impulsivity-hyperactivity, and general classroom

Table 14.1
Onset, Course, and Duration of Major Clinical Disorders of Childhood

<i>Clinical Disorder</i>	<i>Onset^{a,b,c}</i>	<i>Course</i>	<i>Duration</i>
Disruptive Behavior Disorders			
Attention-Deficit/Hyperactivity Disorder (ADHD) ^g	3.5 ^b	Chronic	Adolescence–lifelong
Conduct Disorder (CD)	<10 ^c	Variable	Adulthood ^d
Oppositional Defiant Disorder (ODD)	<8 ^c	Variable	Early adulthood
			Remits or antecedent to CD
Pervasive Developmental Disorders			
Asperger's Disorder	3–6 ^c	Chronic	Lifelong
Autistic Disorder ^e	<3 ^b	Chronic	Lifelong
Childhood Disintegrative Disorder ^e	3–4 ^b or ^c	Chronic	Lifelong
Rett's Disorder ^e	1–2 & <4 ^c	Chronic	Lifelong or fatal
Mood Disorders			
Major Depressive Disorder ^f	5–19 ^b or ^c	Variable	Remits or variable
Dysthymic Disorder	8.5 ^c	Variable	Remits or variable
Manic Episode (In context of Bipolar Disorder)	5–14	Variable	Lifelong
Anxiety Disorders			
Acute Stress Disorder	Any age ^h	1 month	2 days to 1 month
Obsessive-Compulsive Disorder ⁱ	6–15(m) ^c	Chronic	Lifelong
	20–29(f) ^c	Chronic	Lifelong
Posttraumatic Stress Disorder	Acute or Delayed ^h	Variable	2 months to 2 years
Separation Anxiety Disorder ^l	9–13 ^b or ^c	Variable	2 years–adolescence
Social Phobia ^l	Mid-teens ^b or ^c	Chronic	Remits by adulthood
Specific Phobia ^l	7–12 ^b or ^c	Variable	Remits by adolescence
Other Clinical Disorders			
Tourette's Disorder	7 ^c	Variable	Lifelong
Early-Onset Schizophrenia ^l	5–11 ^b or ^c	Variable	Lifelong

^aAge of onset indicates age in years at which symptoms are most frequently first reported in children;

^bAcute onset; ^cInsidious onset; ^dAt risk for Antisocial Personality Disorder and Substance Abuse Disorder as adults; ^eTypically associated with mental retardation; ^f typically associated with an anxiety disorder;

^gFrequently associated with Conduct Disorder; ^hOnset immediately following a traumatic event; ⁱCommonly associated with depression, other anxiety disorders, and/or Tourette's; ^jSlightly higher rates in females and dependent on the type of phobia; ^kSignificantly higher number of males versus females prior to age 10;

^lFrequently continuous with adult anxiety disorder.

From "Treating Children with Attention-Deficit/Hyperactivity Disorder (ADHD)" (pp. 65–107), by M. D. Rapport, in *Handbook of Psychological Treatment Protocols for Children and Adolescents*, V. B. Van Hasselt and M. Hersen (Eds.), 1998, New York: Erlbaum. Adapted with permission.

disruptiveness replaces the immaturity adjective invoked during the first and second grades. Intellectual development frequently lags behind same-age peers by as much as 7 to 15 points on standardized intelligence tests, and academic functioning is nearly always impaired except in high IQ ADHD children. This constellation of chronic and worsening behavioral, cognitive, and emotional problems results in more failing

Table 14.2
Children's Learning Clinic-IV Clinical Intake Form

Child's Name _____ DOB _____ Age _____

PREGNANCY

Prenatal history:

Planned _____ Smoking _____ ETOH _____ Medications _____
Vitamins _____ Other substances _____

(Note: Specify type, amount/dosage or number, and duration for each category)

Parinatal history:

Full term/other _____ Medical complications (e.g., preeclampsia) _____

Labor _____ Delivery (e.g., natural, induced, C-section) _____

Delivery complications _____

Postnatal history:

APGAR score _____ Height _____ Weight _____ Complications _____
Hospital stay _____

DEVELOPMENTAL HISTORY

Early temperament (describe child's reaction/interaction with caregivers and environment including eye contact, ability to be comforted, use and reaction to gestures, social bonding) _____

Early development problems (e.g., colic, eating difficulties, sleep problems) _____

Developmental Milestones (in months):

Roll over _____ Sit up _____ crawl _____ 1st steps unassisted _____
Independent walking _____ First words _____ 3-word sentences _____ Toilet training _____

MEDICAL HISTORY

Diseases/chronic infections/febrile illnesses _____

(Note: Describe history, treatment, and outcome for each incident)

Chronic ear infections (otitis media) _____

Hospitalizations/ER visits _____

Head injuries/loss of consciousness _____

Surgeries/sutures (event and number) _____

Broken bones/other medical problems _____

Allergies _____ Accidental poisonings _____

Medications (current/past) _____

Other medical problems (e.g., seizures, hearing loss, vision problems) _____

Table 14.2
(Continued)

EDUCATIONAL HISTORY

Age (e.g., 4–5 Years)

School/facility _____ Location _____

Teacher _____ Grades/comments _____

Behavior _____

(Note: Complete above information for each grade/classroom placement)

Previous testing/assessments/special education staffing/placements _____

Suspensions/expulsions/school-initiated punishments (include age/grade, event, outcome) _____

SOCIAL FUNCTIONING

Peer relationships (friends—younger/older preference, home/school) _____

Organized sports/activities (e.g., soccer, baseball, swimming, Scouts, karate) _____

Other preferred activities (e.g., hobbies, computer/video games, art, music, bicycling, skateboarding, water sports) _____

Family relationships (with parents, siblings, other family members) _____

FAMILY HISTORY

Paternal

Siblings _____

Parents _____

Grandparents _____

Maternal

Siblings _____

Parents _____

Grandparents _____

(Note: Describe all serious medical and psychiatric problems/diagnoses; include probes for school failure, learning problems, suicidal behavior/depression, anxiety, substance abuse, and treatments for unknown diagnoses.)

grades and grades failed, culminating in a 10 to 30 point lag on standardized academic achievement tests (Barkley, DuPaul, & McMurray, 1990).

Methods and assessment tools used in clinic, laboratory, and classroom settings to diagnose children with ADHD are reviewed in the ensuing sections, emphasizing their incremental validity for rendering diagnostic decisions.

CHECKLISTS AND RATING SCALES

Behavior checklists and rating scales play a prominent role in assessing children with ADHD. They serve as an important source of information concerning a child's behavior in different settings, how others judge behavior, and the extent to which behavior deviates from age- and sex-related norms. Information gleaned from rating scales contributes to the diagnostic process, and several scales serve as treatment efficacy measures. Specific psychometric properties of commonly used rating scales are provided in Table 14.3.

Limitations common to most rating scales include their reliance on subjective judgments and multiple threats to internal validity. These include halo effects, response bias, intensity and immediacy effects, and rater expectation bias (Harris & Lahey, 1982; McClellan & Werry, 2000). The underlying assumptions that Likert rating formats (e.g., 0–3 symptom severity rating) reflect interval level measurement and that all behavioral and emotional problems should be equally weighted (i.e., count equally toward a total score when endorsed at the same level) represent additional psychometric challenges to clinical rating scales.

Checklists and rating scales reviewed next are listed under *broad-band* and *narrow-band* categories. This distinction represents differences in scale development and the breadth of behavioral-emotional problems assessed by the instruments.

Broad-Band Rating Scales Broad-band rating scales provide for a rapid screening of the most common child clinical disorders and allow clinicians to compare obtained profile scores to scores based on sex and developmentally appropriate behavior. The severity of ADHD symptoms can be assessed, and patterns or presence of more general psychopathological dysfunction can be documented. Screening for other potential diagnoses is important for two reasons: Attentional difficulties are common to most child clinical disorders, and ADHD is highly comorbid with other disorders, particularly learning disabilities, Oppositional-Defiant Disorder, and Conduct Disorder. Converging evidence also indicates that AD/HD without the presence of other disorders may be associated with a different developmental outcome (Fergusson, Lynskey, & Horwood, 1997; Rapport, Scanlan, & Denney, 1999).

Characteristics and psychometric properties of available broad-band rating scales are provided in Table 14.3. Most scales report separate sex norms for children ages 6 to 18, with some scales reporting norms for children as young as 2 years (e.g., CBCL, BASC-2). Scales that do not provide separate norms for boys and girls must be administered with caution, because sex differences in behavioral and cognitive symptoms are well documented in the literature. All scales use a Likert-type endorsement format, with response options indicating either frequency or severity of behavior. Completion time for scales is generally between 10 and 20 minutes, but may vary based on the respondent's reading level. The number of scale items ranges from 27–28 for the short forms of the Conners teacher and parent rating scales, respectively, to 160 for the parent version of the new Behavior Assessment System for Children, second edition (BASC-2). Scales with too few items may fail to assess important aspects of behavior, but increasing the number of items is beneficial only to the extent that added items are not redundant with existing items, as indicated by overly high internal consistency. Internal consistency estimates and test-retest reliability metrics are within recommended ranges for the broad-band scales listed in Table 14.3.

Table 14.3
Broadband and DSM-IV Rating Scales Used in Childhood Assessment of ADHD

Scale	No. of Items	Item Type	Comp. Time	T-R	Int. Cor. (alpha)	Psychometric Properties				Norms		Rating Period	Publisher/Cost
						Conv/Div	Validity Evidence		ROM	Age	Sex		
							Criterion	Criterion					
<i>Broadband Scales</i>													
BASC-2 Reynolds & Kamphaus, 2002	P 134-160	0-3 freq.	10-20	(1-10 wk) .65-.92 (7 mo.) .69	.72-.95	CBCL Attention (.66) Conners Parent (.71) Conners Teacher Inattention (.81) TRF Attention (.76)	BGD: With and without CD, behavior disorder, depression, emotional disturbance, ADHD, LD, Mild MR, and Autism.	N/A		2-21	Y	NR	American Guidance Services, Inc. Complete kit: \$360/\$500 (w/ or w/o software; manual, 25 of each form type, 25 DC forms) From 25 @ \$30
	T 100-139												
CBCL Achenbach & Rescorla, 2001 Fater: Parent	118	0-2 freq.	15-20	(1 wk) .80-.94 (3 mo) M = .84	.63-.67	93 items identical b/c CBCL & TRF See manual for detailed validity information.	Discriminant analysis (referred vs. nonreferred: 80-88% correctly identified BGD: ADHD v. non-ADHD, LD	No sig. correlation with actometer (Aronen, Fjallberg, Paavonen, & Soininen, 2002)		2-18	Y	past 6 mo.	ASEBA Complete computer scoring kit: \$325 (manual, software, 50 CBCL, TRF, & YSR forms) Forms 50 @ \$25 (any type)

CBCL-TRF Achenbach & Rescorla, 2001 Rater: Teacher	118	0-2 freq.	15-20	(2 wk) .50-.96 (2 mo) .63-.88	.72-.95	Factor scores "correlate well" with equiv. CTRS scales and direct observations	Discriminant analysis (referred vs. nonreferred: 74-80% correctly identified BGD: ADHD vs. non-ADHD, LD	NR	5-18 Y	Past 2 mo.	see CBCL
CBRF-A Van Egeren, Frank, & Paul, 1999 Inpatient only	65	0-3 sev.	NR	(2 wk) .63-.76 (3 wk) .38 (OA)	NR	Overactivity Scale with: CBCL: .23-.28 (Externalizing, Aggressive Behavior) --.21 (Internalizing)	Overactivity scale did not predict length of hospital stay	NR	3-17 N	8-hour shift	Author Cost: NR
CBRSC Neeper, Lahey, & Frick, 1990 Rater: Teacher	70	0-5 freq.	10-15					Published norms based on earlier 81-item test--NR for available scale	6-14 Y	NR	Harcourt Assessment, Inc. Complete kit: \$133 (contents unspecified) Forms: \$29 (# unspecified)

(continued)

Table 14.3
(Continued)

Scale	No. of Items	Item Type	Comp. Time	Psychometric Properties						Norms		Rating Period	Publisher/Cost
				T-R	Int. Con. (alpha)	Validity Evidence				Age	Sex		
						Conv/Div	Criterion	ROM	Criterion				
CRS-R Conners, Sitaronios, Parker, & Epstein, 1998 Rater: Parent, Teacher	80	0-3 (not at all true to very much true)	15-20	.6-8 wk .47-.85	.73-.94 .77-.96	Long: Short: .95-1.00 P:T: .12-.55 CDI: .40-.82 (teacher) .36-.79 (parent)	BGD: ADHD v. non-ADHD, emotional problems Sensitivity (.78-.92) Specificity (.91-.94) PPP (.85-1.0) NPP (.21-.61)	CPT: $r = .33-.44$	3-17	Y	Last month	Pearson Assessments Complete kit: \$255 (manual, 25 of each form type) Forms: 25 @ \$37/\$40 (long/short)	
													.89-.96 .72-.92
	Self-report and ADHD DSM-IV Scale also available	25 27	P T	.89-.96 .72-.92	.88-.95								
											CSI-4 Gadow & Sprafkin, 1994, 2002 Screens for DSM Disorders including ADHD	77 99	0-3 freq.

DSMD Naglieri, LeBuffe, & Pfeiffer, 1994 No attention subscale	111	1-5 freq.	15-20	.73-.94	.90-.95	CBCL Attention Subscale: .50	65-90% correctly classified across disorders	N/A	5-18	Y	PAR, Inc. Complete kit: \$260 (manual, 25 each child and adolescent forms) Forms: 25 @ \$85
	MCBC Sines, 1986/1988 Activity level scale	77 68	T-F	10-15 (ukn) .49-.78	.58-.83	NR	NR	NR	9-14	Y	Author: Cost: NR
PBQ Behar & Stringfield, 1974	30	0-2 freq.	5-10	(3-4 mo.) .60-.94	NR	Sig. corr. w/DO of clism bx & interactions	BGD: Normal vs. hyperactive, emotionally disturbed preschool children	NR	3-6	NR	Author: Cost: NR
	RBPC Quay & Peterson, 1993	89	0-3 sever.	15-20	(2 mo.) .49-.83	.73-.94	Original BPS: .93-.97 CBCL: .43-.92 among alike scales ME not sig. correlated with DO of gross motor activity ($r = .00$; N = 34)	Discriminate clinical from nonclinical groups of children	NR	5-18	N

(continued)

ADDES-3 McCarney, 2004	Home School	46 60	0-5 freq.	12-15	(ukn) .87+	.99	Unavailable from publisher		5-18	Y	NR	Hawthorne Educational Services, Inc. Complete kit: \$232 Forms: 50 @ \$35 (either version) Software: \$35
							Sensitivity .81-.85 Specificity .57-.94	NR				
ADHD-SC-4 Gadow & Sprafkin, 1997	Parent	50	0-4 freq.	NR	(6 wk) .75-.82	.93-.95	CBCL (.48-.81) TRF (.45-.88)	NR	3-18	Y	NR	PAR, Inc. Complete kit: \$69 (manual, 25 each version, scoring sheets) Forms: 50 @ \$30
	Teacher				.70-.89	.92-.95		Sensitivity .61-.89 Specificity .57-.94				
ADHD-IV DuPaul, Power, Anastopoulos, & Reid, 1998	Home	18	0-3 freq.	10	(4 wk) .78-.86	.86-.92	CPRS-R: .10-.80 CRTS-R: .12-.41	Sensitivity .72-.84 Specificity .49-.86 PPP .54-.78 NPP .81-.81 BGD: ADHD-I, ADHD-C, and controls (parent and teacher)	5-18	Y	Last 6 mc.	Guilford Publications, Inc. Complete kit: \$42 (book, manual, scale) Forms: photocopiable
	School				.88-.90	.88-.96	ADHD Bx Code: .25-.26 AES: .36					
ADHD-SRS Holland, Gimpel, & Merrell, 1998 Rater: Parent, teacher (same form; separate norms provided)		56	0-4 freq.	10-15	(2 wk) .93-.98	.92-.99	ADDES: .80-.95 CTRS: .64-.97 (like scales) ADHD-IV: .89-.93	BGD: ADHD vs. non-ADHD	5-18	Y	NR	Wide Range, Inc. Complete kit: \$85 (manual, 25 forms) Forms: 25 @ \$38

(continued)

Table 14.3
(Continued)

Scale	No. of Items	Item Type	Comp. Time	Psychometric Properties						Norms		Rating Period	Publisher/Cost
				T-R	Int. Con. (alpha)	Conv/Div	Validity Evidence		ROM	Age	Sex		
							Criterion	ROM					
ADHDT Gilliam, 1995 Rater: Parent or Teacher	36	0-2 sev.	5-10	(1 wk) .85-.94 (2 wk) .85-.92	.91-.97	Compared to 7 other tests used to dx ADHD or bx concerns: "satisfactory"	BGD: ADHD vs. non-ADHD True positives/negatives: 92% False positives: 7.7%	NR	3-23	Y	NR	Pro-Ed, Inc Complete kit: \$110 (manual, 50 summary/response forms) Forms: 50 @ \$50	
BADDS	50		10-20	(ukn.) .61-.93	.73-.89				3-18	Y	NR	Hawthorne Educational Services, Inc. Complete kit: \$350/\$195 (w/ or w/o software; manual, 5 of each form) Forms: 25 @ \$59	

BASC-M Kamphaus & Reynolds, 1998	Parent	47	0-3 freq.	5-10	(2-8 wk)	.64-.83	CBCL: -.68 to .79	BGD: ADHD vs. non-ADHD & ADHD-I vs. ADHD-C (both versions)	NR	4-18	Y	NR	American Guidance Services, Inc. Complete kit: \$129 (manual, 25 each form, scoring template) Forms: 25 @ \$32
	Teacher				.72-.93	.78-.93	CTRS-R (-.36 to .62)						
BHSQ-R DuPaul & Barkley, 1992	Home and School versions	20	9-point scale	5-10	(ukn.)	.64-.66							Guilford Publications, inc. Complete kit: \$33 (book, manual, scale) Forms: photocopiable
					.60-.89								
CAAS Lambert, Hartsough, & Sandoval, 1990 Rater: Teacher or parent	Home	31	1-4 freq.	2-5	(3 yr)	.75-.81	NR	NR	NR	5-13	NR	NR	American Guidance Services, Inc. Complete kit: \$155 (manual, 25 each form, scoring profile) Forms: 25 @ \$50
	School				.32-.44	.78-.94							

(continued)

Table 14.3
(Continued)

Scale	Psychometric Properties										Publisher/Cost	
	No. of Items	Item Type	Comp. Time	T-R	Int. Con. (alpha)	Conv/Div	Validity Evidence		Norms			Rating Period
							Criterion	ROM	Age	Sex		
ECADDES McCarney & Johnson, 1995	50	0-4 freq.	12-15	.87-.97 (1 mo.) .82-.89	.87-.97	CPRS-R: .41-.71 ADHDT: .46-.81	BGD: ADHD vs. non-ADHD	NR	2-6	Y	NR	Hawthorne Educational Services, Inc. Complete kt: \$162 (technical and intervention manuals, parent's guide, 50 school, home, & DSM-IV forms) Forms: \$35 per 50 forms (home or school); \$22 per 50 DSM-IV
	56	School		.90-.98								
NICHQ VAS Wolraich et al., 1998/2003	P	0-3 freq.	10-15	N/R	.90-.92	DISC-IV (.79)	BGD: ADHD vs. non-ADHD	N/R	5-12	N	6 mo.	NICHQ Free online: http://www.nichq.org
	T											

S-ADHD-RS Spadafore & Spadafore, 1997 Rater: Teacher	50	0-4 freq.	10	(2 wk - 1 mo.) .88-.90	NR	NR	Correctly identified: 50/50 ADHD Incorrectly identified 2/50 non-ADHD as ADHD	NR	5-19	Y	Complete kit: \$80 (manual, 25 scoring protocols, 25 observation forms, 25 med tracking forms) Forms: 25 @ \$25
SNAP-IV Swanson, 1992 Rater: Teacher or parent (same form)	90	0-3 freq.	10-15	(2 wk) .70-.90	NR	NR	NR	NR	NR	Y	Form and scoring guidelines are free online: http:// www.adhd.net

ACTeRS = ADHD Comprehensive Teacher Rating Scale; ADDES-2 = Attention Deficit Disorders Evaluation Scale—Second Edition; ADDES-S = Attention Deficit Disorders Evaluation Scale—Secondary-Age Student; ADHD-IV = ADHD Rating Scale-IV; ADHD-SC-4 = ADHD Symptom Checklist—DSM-IV Edition; ADHD-SRS = ADHD Symptoms Rating Scale; ADHDT = ADHD Test; BADDSS = Brown Attention Deficit Disorder Scale; BASC = Behavior Assessment System for Children; BASC-M = Behavior Assessment System for Children—Monitor for ADHD; BGD = Between-group differences; BHSQ-R = Barkley Home Situations Questionnaire—Revised; CADS = Conners' ADHD/DSM-IV Scales; CAAS = Children's Attention and Adjustment Survey; CBCL = Child Behavior Checklist; CBRF-A = Child Behavior Rating Form—Abbreviated; CBRSC = Comprehensive Behavior Rating Scale for Children; CDI = Children's Depression Inventory; CPRS-R = Conners' Parent Rating Scale—Revised; CPT = Continuous Performance Test; CRS-R = Conners' Rating Scales—Revised; CSI-4 = Child Symptom Inventory—Fourth Edition; CTRS = Conners' Teacher Rating Scale—Revised; ECADDES = Early Childhood Attention Deficit Disorders Evaluation Scale; M = Mean; MCBC = Missouri Children's Behavior Checklist; NICHQ VAS = National Institute for Children's Healthcare Quality Vanderbilt Assessment Scale; NPP = Negative Predictive Power; P = Parent; PBQ = Preschool Behavior Questionnaire; PPP = Positive Predictive Power; RBPC = Revised Behavior Problem Checklist; S-ADHD-RS = Spadafore ADHD Rating Scale; SNAP-IV = Swanson, Nolan, & Pelham Rating Scale—Version IV; T = Teacher; TRF = Teacher Report Form; WWPPARS = Werry-Weiss-Peters Activity Rating Scale.

Note: Pricing information obtained from publishers' websites, accessed February, 2006.

Convergent and criterion validity data are available for many of the broad-band scales, providing inchoate evidence that the scales measure what they purport to measure. Validity evidence is generally limited to comparisons with other existing rating scales (which may be inflated due to shared source and item variance) and the scale's ability to statistically discriminate between ADHD and non-ADHD groups. The Achenbach (CBCL/TRF), Conners, and Child Symptom Inventory (CSI-IV) are exceptions, with recent versions demonstrating moderate to high *sensitivity* and *specificity* (the probability that a symptom is or is not present, given that a child has ADHD). Clinicians, however, are more interested in *positive* and *negative predictive power*—that is, the probability that a child does or does not have ADHD, given the presence of particular symptoms. The Conners and Achenbach parent and teacher rating scales (see Table 14.3) report moderate to high positive predictive power and low to moderate negative predictive power. Scale costs vary by test and publisher and are not necessarily correlated with scale quality.

Most broad- and narrow-band rating scales have not been compared to more objective measures such as precision actigraphs or direct observations of classroom behavior. The few studies that have examined these relationships tend to provide discouraging results. For example, Aronen and colleagues (2002) compared CBCL parent ratings of hyperactivity with high-precision actigraph measurements of activity level and failed to find a significant correlation. A similar study revealed that, when measured by step counter, nearly 64% of children rated as clinically hyperactive were less active than the most active child rated normal by the teacher (Tryon & Pinto, 1994).

Narrow-Band Rating Scales In contrast to broad-band scales, which are typically used early in the assessment process to quickly screen for several of the most common childhood disorders, narrow-band scales generally provide greater depth and breadth of specific symptoms relevant to situational characteristics associated with ADHD. Age and sex norms are available for some but not all scales—a serious limitation considering the well-documented developmental and sex differences in children's attention and activity level. Completing narrow-band scales typically requires significantly less time relative to broad-band scales because they are more focused and contain fewer items. Reliability and validity evidence is generally adequate when available, and these values are subject to the same concerns described in the section on broad-band scales. For example, the new ADDES-3 reports an internal consistency of .99, which indicates significant redundancy in the items and suggests that a shorter version of the scale could decrease administration time without negatively impacting reliability and validity. Emerging evidence suggests that scales with fewer items may also be equally sensitive for detecting treatment effects compared to longer rating scales.

Scale costs vary by test and publisher; however, there is no clear relationship between cost and diagnostic utility. Most scales require an initial investment, ranging from \$33 to \$350, for a starter kit containing the test manual and a requisite of forms. Additional packages cost between \$30 and \$59 for 25 to 50 forms. Two of the narrow-band scales, the ADHD-IV and the Barkley Home Situations Questionnaire (BHSQ), allow the user to freely photocopy the scale for unlimited use. One scale, the National Initiative for Children's Healthcare Quality Vanderbilt Assessment Scale (NICHQ VARS), is free online. Normative data and reliability and validity evidence for the parent version of this scale are based on a relatively small sample.

STRUCTURED/SEMI-STRUCTURED CLINICAL INTERVIEWS

Overview. The distinction between structured and semi-structured interviews lies in the degree of freedom granted to the clinician to stray from a given script and ask open-ended, probing questions in response to symptom endorsements made by the interviewee. Rutter and Graham (1968) are credited with pioneering the development and use of structured and semi-structured clinical interviews to aid clinical judgment. The development of these schedules represents the recognition of both the questionable reliability and validity of unaided clinical interviews and the frequent disagreement between parent and child reports of symptom endorsement and severity. To illustrate the potential problems associated with unaided diagnosis, consider the seminal study by Slcator and Ullmann (1981), which found that nearly 80% of children meeting formal diagnostic criteria for ADHD were misdiagnosed by their primary pediatricians. At 3-year follow-up, these children were no different from children correctly diagnosed with respect to continuing behavior problems, poor grades, and medication status. The fact that most children with ADHD fail to exhibit signs of hyperactivity in an office setting contributed to the high rate of misdiagnosis, and highlights the need for reliable and valid instruments for assessing childhood disorders in general, and ADHD in particular.

Structured and semi-structured clinical interviews result in decreased error compared to unstructured clinical interviews, both errors arising from internal (e.g., differential training level of clinicians, clinician biases) and external (e.g., discrepancies between informants) sources. Using the Hippocratic model, clinical diagnosis is based on the recognition of specific clusters of symptoms that characterize a particular disorder. Children with ADHD historically are poor informants, regarding both the presence and the severity of problematic symptoms. Information must thus be obtained from adult informants who are familiar with the child (e.g., parent or guardian, teachers).

Clinical Interviews. Semi-structured clinical interviews provide unique information beyond the data gained from rating scales. They are currently the only assessment option that allows the clinician to probe for the onset, course, and duration of endorsed symptoms—a necessity for differential diagnosis—and are currently considered the gold standard for ADHD assessment and diagnosis. Strong convergent and discriminant validity is reported for most of the available semi-structured interviews, and test-retest reliability suggests stability of diagnosis over 1 to 3 years in clinical samples (Pelham, Fabiano, & Massetti, 2005). High sensitivity and specificity are typically reported for the semi-structured interviews, with only limited information available pertaining to positive (PPP) and negative (NPP) predictive power. The lack of PPP and NPP metrics is due in part to the use of semi-structured clinical interviews as the gold standard from which the predictive power of other measures (e.g., rating scales) is established.

Semi-structured clinical interviews typically require between 1 and 2 hours to complete, depending on a range of factors. These include the clinician's experience, the informant's ability to remain focused and recall historical information, and the severity, range, and duration of presenting problems (see Table 14.4). The time investment limits their practicality for repeated use (e.g., for assessing treatment effects). Financial investment varies significantly across interview schedules. Some are free and

Table 14.4
Clinical Child Diagnostic Interviews

Measures	Age Range	Time (min.)	Test-Retest (Kappa)	Symptom History	Disorders Considered	Scoring Format	Instrument Cost	Training Required
Structured Interviews								
Diagnostic Interview Schedule for Children-IV (DISC-IV)	6-17 (P) 9-17 (C)	90-120 (P) 45-90 (C)	0.79 (P) 0.42 (C)	4 weeks/ 12 months	All major Dx	Y/N	\$150- \$2,000	2-3 day training module
Diagnostic Interview for Children and Adolescents-IV (DICA-IV)	6-17	60-120	NR (P) 0.32 (C) 0.59 (A)	4 weeks/ 12 months	All major Dx	Y/N	\$1,000	2-4 weeks
Children's Interview for Psychiatric Syndromes (CHIPPS)	6-18	40	0.4	NR	All major Dx	Y/N	\$115	NDR
Semi-structured Interviews								
Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS)	6-17	30-90	0.63	6 months/ Lifetime	All major Dx	0-3	Free online	CTR
Semi-structured Clinical Interview for Children and Adolescents (SCICA)	13-18	60-90	0.57 (Attention problems scale)	NR	Does not correspond with DSM-IV		\$110-\$295 \$25 for 50	NDR
Child and Adolescent Psychiatric Assessment (CAPA)	9-17	20-210 M=66 (P) 22-150 M=59 (C)	NR for ADHD 0.55 for CD	3 months	All major Dx	0-3	\$600 + \$2,000 Fixed costs	BA
Interview Schedule for Children and Adolescents (ISCA)	8-17	120-150 (P) 45-90 (C)	Between 0.64 and 1.0	NR	All major Dx	0-3		CTR

Note: Properties are equivalent for parent and child/adolescent version unless otherwise indicated. A = Adolescent; BA = Bachelor's-level training; C = Child; CTR = Clinical training required; DX = Diagnosis; NDR = No degree requirements; P = Parent; NR = Not reported.

available online (e.g., K-SADS), whereas others have an initial cost of \$600 in addition to \$2,000 fixed training costs (e.g., CAPA). All but one of the semi-structured interviews covers all major *DSM-IV* diagnoses for school-age children through age 18. Some of the semi-structured interviews provide separate versions for parents, children, and adolescents. None of the available semi-structured interviews include a teacher version. Clinicians must use other instruments to obtain school-related information for purposes of establishing impairment across multiple settings.

The Child and Adolescent Psychiatric Assessment (CAPA) appears to be the most extensively developed of the clinical interviews, but requires up to 2 weeks of classroom instruction and an additional 1 to 2 weeks of practice to acquire the necessary certification (Angold & Costello, 2000). This training is estimated to cost \$600, and there is an additional fixed cost of \$2,000, which may limit widespread usage among clinicians, especially when schedules such as the K-SADS demonstrate adequate reliability and validity and are available online at no cost. The CAPA, however, may be superior to other available schedules due to several excellent features. The instrument provides for an intensity rating that varies by three symptom groupings: intrapsychic phenomena such as worrying, qualitatively different symptoms such as psychosis, and conduct disturbances. Training and coding are based on a detailed glossary, and thoroughly investigated symptoms are matched to appropriate glossary definitions and levels of severity. Formal rules are provided for the use of screening, mandatory, and discretionary questions.

The Diagnostic Interview for Children and Adolescents, *DSM-IV* edition, provides separate versions for children (ages 6–12) and adolescents (13–18) based on field testing of interview questions with different age, sex, and ethnic groups. Two to four weeks of training, at a cost of approximately \$1,000, is required to reach the desired level of competence. The duration of training is based on clinician experience and includes topics such as age-appropriate probe questions and maintaining a child's interest through techniques such as tone of voice and appropriate nonverbal gestures. Reliability estimates corroborate research findings indicating that children are less reliable reporters of externalizing symptoms but more reliable reporters on internalizing symptoms relative to their parents. Computer versions are available, but initial research suggests poor reliability compared to the standard interview format.

The Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS) is currently the most widely used semi-structured clinical interview. The Present-Lifetime (PL) version collects information from the parent regarding current symptomatology as well as symptomatology at its most frequent and severe levels in the past. A separate interview is conducted with the child, and a third pair of ratings is generated based on integration of the parent and child reports with historical information and other data (e.g., rating scales). The K-SADS-PL focuses on chronology, treatment, impairment, and severity of symptoms. The initial screening interview consists of 82 items covering all major *DSM-IV* diagnostic categories. Cutoff scores are used to determine the need to administer the in-depth supplementary sections available for each diagnostic category, thus shortening administration time by allowing the clinician to skip supplementary sections based on negative endorsement of key screening questions. Interrater reliability estimates for the K-SADS are among the highest of any of the semi-structured clinical interviews. Extensive knowledge of diagnostic and symptom subtleties is required owing to lack of formal training requirements, and

clinicians must evoke clinician judgment to interject noncued verbal probes to clarify informant responses and elicit examples of problematic behavioral and emotional symptoms.

OBSERVATION METHODS

Natural Settings A recent meta-analytic review found that independent observations of on-task behavior in natural classroom settings resulted in statistically significant differences between ADHD and typically developing peer groups in 27 of 29 studies. After correcting for study methodology, best case estimation indicated that children with ADHD were on task in the classroom an average of 75% of the time across studies compared with 88% for typically developing children (Kofler, Rapport, & Alderson, in press). Direct observations are often considered the gold standard for experimental and outcome research; however, their use in clinical assessment is limited by several factors. No two research teams or commercially available observation systems define attention in exactly the same way, and research indicates that differences in observational schema can produce widely discrepant results in collected data.

Commercially available observation systems shown in Table 14.5 are available for school-age children and typically require between 10 and 30 minutes of observation. Multiple days of observation are required to produce representative and reliable data. Many systems offer software versions of their product, allowing the clinician to record behavior directly onto a personal digital assistant (PDA) or laptop computer. Although direct observations by independent observers can provide more objective and valid data than any of the other assessment methods discussed here, their relatively high temporal cost coupled with the general lack of norms suggests that their usefulness may be limited to situations where large discrepancies exist between teacher, parent, and other informant reports.

Relatively low-cost observations can be completed by classroom teachers. For example, desk checks ("Is the child prepared for class?"), teacher records of verbally intrusive behavior, and the percentage of daily academic assignments completed correctly discriminate between groups of children with and without ADHD (Pelham et al., 2005). These methods have the potential for objectivity that characterizes the independent observation methodologies, but they await critical evaluation to determine their utility for rendering diagnostic judgments at the individual level.

LABORATORY TASKS

A comprehensive review of laboratory- and clinic-based neuropsychological, cognitive, and behavioral tests, tasks, and experimental paradigms by Rapport, Chung, Shore, Denney, and Isaacs (2000) found that only five of 56 currently used measures reliably distinguished ADHD from non-ADHD groups. These tasks differ from unreliable measures in several important ways. Reliable tasks require recognition or recall memory of relevant stimuli, more rapid processing (measured in milliseconds or seconds for reliable tasks, versus minutes for most unreliable tasks), and place greater demands on phonological or visuospatial working memory compared to unreliable tasks. Specific tasks are not reviewed because none of them currently have diagnostically relevant psychometric properties (e.g., sensitivity, specificity, PPP, or NPP), most

Table 14.5
Mechanical and Observational Assessment Tools

Instrument/Distributor	Age Range	Recording Length	Norms	Software Available	Cost
Mechanical					
Actigraphs					
Ambulatory monitoring MiniMitter MTI, Inc.	Any	22 days per 32 Kilobytes of memory	N	Y	Starter: \$1,000+ (w/ necessary software and reader interface); \$500-\$2,000 for each additional actigraph
Actometers^a Model 108 Engineering Department Times Industries, Waterbury, CT 06720	Any	Variable	N	Y ^b	NR
Pedometers (available at sporting goods stores) Stand-alone With data downloadable to PC	Any	Range: 99,999 steps (~5.25 miles) to 1,000 miles	N	N Y	\$10-\$40 \$125-\$400+
Direct Observations					
ADHD BCS Barkley, 1990	NR	15 min.	N	N	NR
AET-SSBD Sopris West	School age	15 min.	Y	N	Kit: \$108 (includes all 3 parts of SSBD)

(continued)

Table 14.5
(Continued)

<i>Instrument/Distributor</i>	<i>Age Range</i>	<i>Recording Length</i>	<i>Norms</i>	<i>Software Available</i>	<i>Cost</i>
ADHD-SOC Checkmate Plus, Ltd.	School age	16 min.	N	N	Kit: \$25
BASC-2 SOS AGS, Inc.	School age	15 min.	N	Y	25 forms @ \$33
BOSS Harcourt Assessment	School age	15 min.	N	Y	Kit: \$120
COC Abikoff, 1977/1980	School age	32 min.	N	N	NR
DOF ASEBA	5-14	10 min.	Y	Y	50 forms @ \$25
SECOS Saudargas, 1997	Grades 1-5	20 min.	Y	N	
Noldus Observer Noldus Information Technology	Any	Variable	N	Y	Observer Basic 5.0 \$1,795 Observer Video Pro 5.0 \$5,850

AET-SSBD = Academic Engaged Time Code of the SSBD; BCS = Behavior Coding System; BOSS = Behavioral Observation of Students in Schools; COC = Classroom Observation Code; DOF = Direct Observation Form; SECOS = State-Event Classroom Observation System; SOC = School Observation Code; SOS = Student Observation System. ^aMany studies report either using the Kaulins and Willis actometers (no longer manufactured) or enlisting a jeweler to modify a self-winding wristwatch as described by Schulman and Reisman (1959). ^bEaton, McKeen, and Saudino (1996) provide SAS syntax for performing group-level data analysis based upon actometer readings.

are relatively insensitive to between-dose medication effects, and none provides incremental validity above classroom observations, rating scales, and academic efficiency measures.

SUMMARY

A chief role of behavioral assessment is the identification of prominent behavioral, cognitive, affective, and physical signs and symptoms in the individual. Obtained information is used to formulate an initial diagnosis, select and evaluate response to treatment, and in some cases, portend long-term outcome. The complexity and multifaceted nature of ADHD, which includes broad-based behavioral and cognitive domains, eludes facile efforts at clarification and measurement. Many areas of dysfunction are apparent only under certain environmental conditions or situations (Douglas, 1988; Whalen & Henker, 1985). To complicate matters, children with ADHD frequently exhibit an inconsistent pattern of deficits from day to day, even when tasks and other parameters are constant. This phenomenon occurs in both field and highly controlled laboratory settings, to the dismay of researchers and clinicians alike (for reviews, see Castellanos et al., 2005; Rapport, 1990).

Eliciting information from single sources and limiting or relying exclusively on certain types of information to diagnose ADHD results in a high rate of misidentified cases. A desirable evaluation for children suspected of ADHD includes comprehensive history taking, parent (and, when appropriate, child) clinical interview, review of teacher and parent broad- and narrow-band rating scale data, psychoeducational test data, and behavioral observation. Direct observation of children functioning in an academic setting can be extraordinarily helpful, but is usually not feasible owing to time and cost constraints. By-products of the child's behavior in educational settings (i.e., permanent products), such as academic completion rates, may address this void (Pelham et al., 2005). Auxiliary neurocognitive assessment, coupled with behavioral observation during testing, provides valuable information but awaits psychometric validation. Objective measures of activity level, such as actigraphs, represent the sine qua non of behavioral assessment but are too costly for many clinical settings.

CONCEPTUALIZATION

DSM-IV CLINICAL MODEL

The appropriate design of assessment instruments for diagnosing children with ADHD and assessing treatment outcome rests on correctly specifying the core deficits associated with the disorder. Elucidation of core deficits, central processes, and the means by which these cause ADHD behavior problems inform us about the types (and content) of instruments to develop that will enable valid measurement. When developing neurocognitive instruments, hypothesized underlying mechanisms and processes guide the researcher in the design and manipulation of task parameters thought to challenge suspected systems.

Figure 14.1 illustrates the implicit and explicit causal assumptions underlying the current *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000)* clinical model of ADHD. It presumes that biological influences (e.g., genetics, pre-, peri-, postnatal insults) give rise to individual differences in the functional properties of neurobiological systems (e.g.,

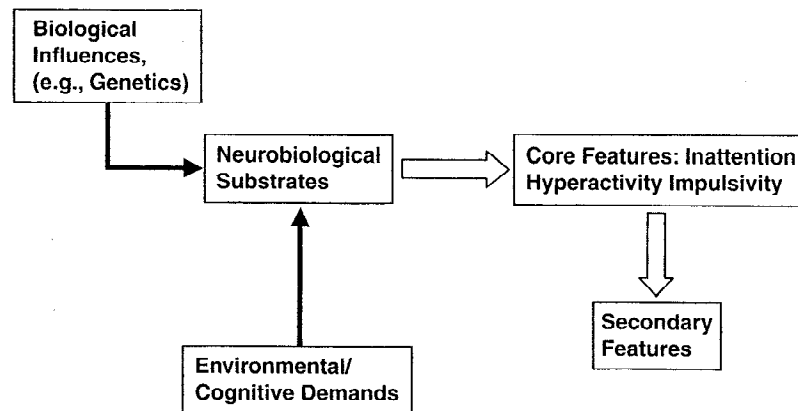


Figure 14.1 A visual schematic of the *DSM-IV* conceptual model of ADHD.

dopaminergic-noradrenergic neurotransmission in the frontal-striatal-cerebellar regions) that are etiologically responsible for the core psychological (i.e., cognitive and behavioral) features of ADHD. The *DSM-IV* clinical model conceptualizes inattention and hyperactivity-impulsivity as the core features of the disorder, and related behavioral and emotional problems as causal by-products of core symptoms. For example, academic underachievement represents a causal consequence of broader, more primary features of the disorder, such as chronic inattention and hyperactivity; children who cannot sit in their seat and pay attention are unable to complete academic assignments. Other secondary features common to ADHD, such as inadequate social skills and peer relationships, low frustration tolerance, and strained family relationships, are also by-products of core behavioral and cognitive influences to the extent that children rely on them for successful execution. Empirical validation of core processes can proceed at multiple levels but must eventually entail careful manipulation of discrete independent variables and observation of their effects to understand how underlying mechanisms and processes transcend to behavioral characteristics of ADHD.

ALTERNATIVE CONCEPTUAL MODELS

Theories of ADHD evolved from implied brain damage (Strauss & Lehtinen, 1947) and dysfunction (Cruickshank & Dolphin, 1951; Strauss & Kephart, 1955) to single-construct theories of sustained attention (Douglas, 1972), deficient rule-governed behavior (Barkley, 1989), cognitive-energetic dysregulation (Sergeant, Oosterlaan, & van der Meere, 1999), and delay aversion (Sonuga-Barke, 2002). Reviews of these models and their underlying psychological and neurobiological constructs and etiological factors are available (cf. Barkley, 2006; Castellanos & Tannock, 2002). Recent conceptualizations of ADHD include a comprehensive theory with behavioral inhibition as its core component, and an alternative model that postulates working memory dysfunction as a candidate endophenotype.

Behavioral Inhibition The most contemporary and ambitious theory of ADHD was proposed in 1997 by Dr. Russell Barkley, building on earlier theoretical models of

behavioral inhibition derived from Gray's (1982) theory of brain-behavior processes, wherein an underactive behavioral inhibition system fails to provide sufficient anxiety and fearfulness, resulting in the initiation or continuation of unwanted behavior (Quay, 1997). The central feature of the disorder is a developmental delay in behavioral inhibition. Disruption of this system affects children's ability to inhibit (a) previously reinforced behavior or responses, (b) ongoing behavior that should be stopped to permit consideration of more appropriate or adaptive responses, and (c) attention to task-irrelevant events (e.g., distractions). Poorly developed and inefficiently modulated behavioral inhibition processes subsequently impact the use and control of four higher order executive functions—working memory, internalization of speech/verbal working memory, self-regulation of affect/motivation/arousal, and reconstitution—that are necessary to direct and regulate the motor system and guide and provide control over current and future behavior (see Figure 14.2). Collectively, these deficiencies are causally related to the broad range of impairments observed in individuals with ADHD (for a comprehensive discussion, see Barkley, 2006).

Empirical evidence of executive function deficits in children with ADHD is incontrovertible (Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005), providing strong support for the central portion of Barkley's (1997) model. Laboratory-based studies examining two of the hypothesized behavioral inhibition (BI) deficits by means of the stop-signal task, however, have produced mixed results. Recent meta-analytic reviews examining these studies suggest that previously reported BI differences between children with ADHD and normally developing controls appear to be due to deficiencies in central processing and attention rather than deficient behavioral inhibition (Alderson, Rapport, & Kofler, in press; Lijffijt, Kenemans, Verbaten, & van Engeland, 2005). Moreover, working memory's reliance on BI processes as a core executive function in the proposed model is difficult to defend because working memory processes must be invoked to evaluate stimuli (including situational cues) prior to the initiation of the inhibition process. Specifically, the central executive component of working memory regulates attentional resources, such as switching attention among competing stimuli, and phonological and visuospatial stimuli must be evaluated by working memory subsystems prior to BI activation. This suggests that behavioral inhibition is downstream of working memory processes. Competing models must recognize this conundrum and hypothesize a core role for working memory within a multilayered model.

Working Memory Recent conceptual models emphasize an endophenotypic approach, recognizing the probable involvement of multiple systems and levels in the pathophysiology of ADHD. Endophenotypes involve heritable traits that vary quantitatively and index a child's probability for developing the disorder. They follow a causal developmental model perspective and attempt to link etiological factors (e.g., candidate genes) to putative brain differences or abnormalities (e.g., catecholaminergic dysregulation, striatal lesions, EEG theta excess) to candidate endophenotypes (e.g., working memory deficits) to behavioral outcomes (e.g., delay aversion, scholastic underachievement, inattentiveness, disorganization). Recent empirical findings concerning potential candidate genes, underlying neurobiology and physiology, cognitive impairments, and associated behavioral outcomes support a multilayered, integrated model of ADHD.

Extant research provides growing support for working memory (WM) dysfunction as a candidate endophenotype. A visual schematic of the model is shown

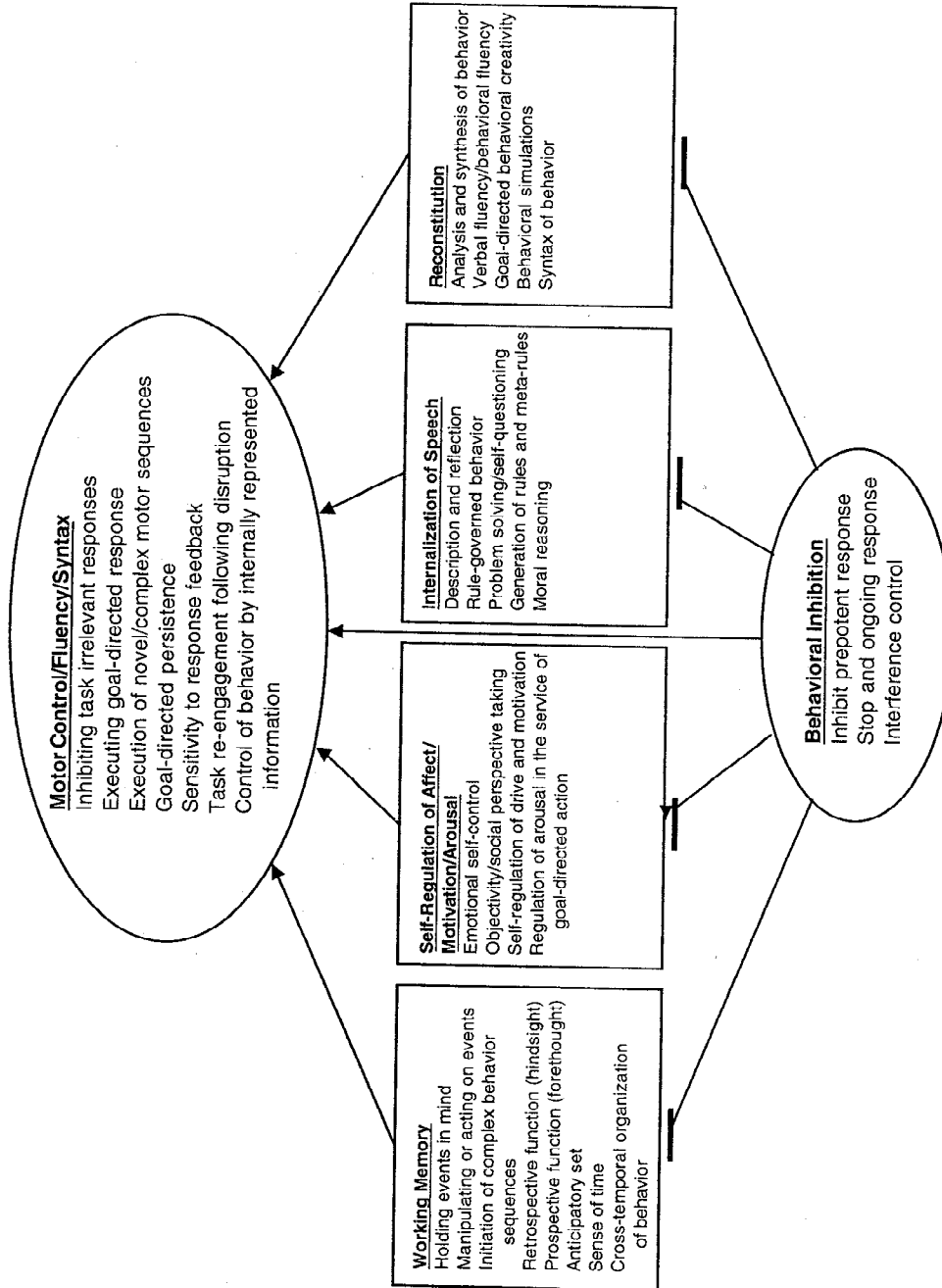


Figure 14.2 A visual schematic of Barkley's (1997) model of ADHD.

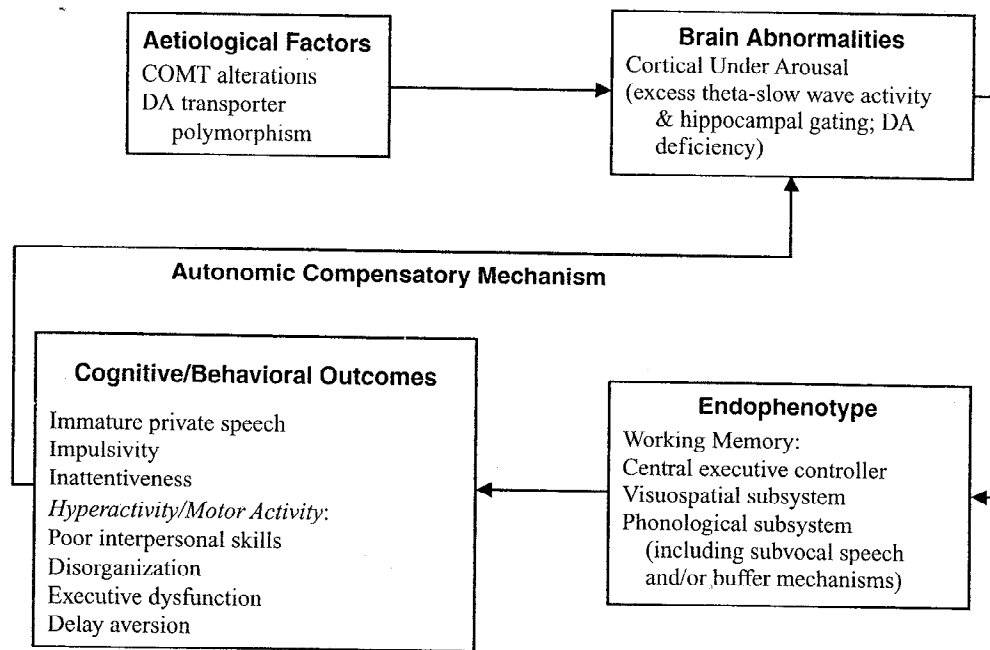


Figure 14.3 A visual schematic of Rapport et al.'s (2000) conceptual working memory model of ADHD. Biological influences underlie brain abnormalities (e.g., cortical underarousal) that adversely affect working memory processes and associated cognitive/behavioral outcomes.

in Figure 14.3. Hypothesized underlying etiological factors include alterations in catechol-O-methyl transferase (COMT) and genetic polymorphisms that influence dopaminergic and/or noradrenergic function (Castellanos & Tannock, 2002). These factors give rise to brain abnormalities, such as excess theta (slow wave, 4.0 to 7.5 Hz) activity and decreased blood flow in frontal and prefrontal regions, which are associated with cortical underarousal during tasks that tax working memory processes. Motor movement serves three functions. The first is to increase *autonomic* arousal to help compensate for *cortical* underarousal (excess slow wave activity) while engaged in cognitive activities that rely on working memory. The second is to compensate for the rapid decline of WM representations by inputting new stimuli, which take the form of stimulation-seeking behavior. The third function of increased motor activity is to reduce the aversive nature of attending to tasks that tax working memory by means of escape behavior and, later, by means of avoidance behavior (e.g., out-of-seat behavior, behavior incompatible with homework completion). The three forms of motor activity vary significantly in topography and require sophisticated measurement to differentiate them from each other.

Evidence supporting the working memory model derives from multiple sources. Compelling evidence for heritability (reviewed later in the chapter) coupled with emerging evidence of cortical underarousal (including catecholaminergic dysregulation) in prefrontal regions provides an initial linkage of etiological factors and brain differences in ADHD (Beauchaine, Katkin, Strassberg, & Snarr, 2001; Ferguson & Pappas, 1979; Loo & Barkley, 2005). A central role for cortical hypoarousal as an

underlying physiological process in ADHD is also demonstrated by studies reporting increased slow wave (theta) and decreased fast wave (beta) activity in children with ADHD while performing academic (Mann, Lubar, Zimmerman, Miller, & Muenchen, 1992) and cognitive (Clarke, Barry, McCarthy, & Selikowitz, 1998; El-Sayed, Larsson, Persson, & Rydelius, 2002) tasks.

A comprehensive model of ADHD must include a convincing account of the excessive motor activity observed in children with ADHD, a feat thus far unaccomplished by extant models. Hyperactivity is traditionally viewed as a core clinical feature and *ubiquitous*, rather than serving a functional role as hypothesized by the working memory model. The WM model postulates that challenges to WM subsystems (phonological and visuospatial) will evoke increased activity level to compensate for cortical underarousal until WM systems are overloaded. When this occurs, children shift from task engagement to escape behavior or vacillate between these two states. Measured activity level is likely to show an overall reduction and change in topography under these circumstances, as children seek to reduce the aversive nature of impinging task demands (e.g., out-of-seat behavior, seeking alternative stimuli).

A recent study illustrates the hypothesized causal relationship between working memory and children's activity level (Rapport, Timko, Kofler, & Alderson, 2005). Children with ADHD and age- and IQ-matched normally developing control children completed computer-administered phonological and visuospatial working memory tasks under varying set sizes (i.e., number of stimuli) in a counterbalanced order once per week across a 4-week time span. Activity level was measured using sophisticated actigraphs placed on both ankles. Both groups of children were significantly more active while completing working memory tasks relative to baseline periods, and motor activity increased linearly as a function of increasing working memory demands except under the largest set size. Control children continued to show increased activity level when administered the largest set size (i.e., 6 stimuli), whereas children with ADHD exhibited a decrease in measured motor activity coupled with an increase in escape behavior (e.g., out-of-seat behavior, looking away from the computer screen). These results suggest that increases in motor activity serve an important purpose for all children—it increases autonomic arousal to facilitate cognitive functioning. The finding that children with ADHD exhibit significantly higher levels of motor movement relative to controls suggests a compensatory process, wherein higher levels of motor input (i.e., autonomic arousal) are needed to help compensate for chronic cortical underarousal (i.e., excess theta-slow wave activity) when WM systems are overwhelmed. Children with ADHD, and potentially all children, engage in escape behavior when WM is overwhelmed. Collectively, the WM model poses serious challenges to the notion of ubiquitous, purposeless activity level in ADHD.

OTHER CONCEPTUALIZATION FACTORS AND VARIABLES

Findings from family and twin studies reviewed next, coupled with accumulating evidence for working memory as a candidate endophenotype, provide compelling evidence that the majority of variation in the behavioral traits constituting ADHD results from genetic factors. Other factors discussed—including developmental issues, learning and modeling, parenting style, life events, peer influences, and culture—are best viewed as influencing the extent and diversity of impairments rather than causing the impairments.

Genetic Influences The field of behavior genetics is concerned with evaluating the extent to which behavioral similarities between individuals are correlated with degree of biological relationship. The strength of this relationship is quantified using heritability estimates derived from twin studies because these enable investigators to control for environmental influences that might otherwise confound genetic variation. Heritability refers to the proportion of phenotypic (i.e., observable) variation that is explained by genetic factors (i.e., after statistical control for environmental influences).

Studies employing behavioral genetic methodology provide compelling support for a heritable, biologically based etiology for ADHD. Most twin studies of ADHD have utilized scores on parental rating scales as dependent variables. Heritability estimates derived from these ratings indicate that approximately 65% of individual differences in attention are attributable to genetic variation (Gjone, Stevenson, & Sundet, 1996; Sherman, Iacono, & McGue, 1997). Similarly, 70% of individual differences in parent-rated impulsivity-hyperactivity are genetic in origin (Sherman et al., 1997; Silberg et al., 1996), and genetic differences account for 83% of observed variation in composite ratings of ADHD symptoms (Levy, Hay, McStephen, Wood, & Waldman, 1997; Nadder, Silberg, Eaves, Maes, & Meyer, 1998).

A small number of studies have computed heritability estimates based on discrete diagnostic categories derived from structured interviews or the application of cutoff scores to rating scales. The majority of these have used mothers as informants. The resulting heritability estimates have been very comparable to those based on continuous rating scale scores, ranging from .75 to .89 (Levy et al., 1997; Sherman et al., 1997; Thapar, Hervas, & McGuffin, 1995), with a median of .75. Thus, approximately 75% of observed variation in categorically diagnosed ADHD is genetically based. These data suggest that the heritability of ADHD is similar regardless of whether symptomatology is expressed categorically or in terms of continuous dimensions. This inference has been explicitly tested in two studies (Gjone et al., 1996; Levy et al., 1997). Both demonstrated that degree of heritability was constant across levels of symptomatic severity within their samples. These findings indicate that the features of ADHD are heritable and normally distributed in the population rather than representing a categorically distinct group.

Developmental Issues Key developmental issues that contribute to the conceptual understanding of ADHD center on three interrelated questions: What is the normal developmental trajectory of children's motor activity? Is there evidence of heterotypic continuity in ADHD; that is, do the types and forms of behavior problems change over time? Are there significant, sex-related behavioral or cognitive differences in ADHD that merit scrutiny?

Motor behavior frequency and intensity show an upward trajectory in toddlers and early preschoolers, but the changes are less pronounced and slower relative to those observed during infancy. Development of gross and fine motor behavior dominates this period as children explore and interact with their environment and acquire myriad skills, ranging from using scissors and crayons to riding a tricycle. Environmental, and particularly setting, effects can significantly influence children's activity level at this time. Some children attend nursery schools and day care facilities, whereas others have limited access to playgroups and other children. The stability of children's activity level over this period is remarkable despite differences in context and environment. For example, the test-retest correlation for a sample of 129 boys and girls assessed at

age 3 and again at age 4 was .44 and .43, respectively (Buss, Block, & Block, 1980). This finding indicates strong continuity in children's activity level at a time when development is proceeding rapidly.

The relationship between age and activity level changes rapidly in late preschool and early elementary school (age 5 to 10), but for the first time shows a *decline* after peaking at approximately 8 years of age (Eaton, McKeen, & Campbell, 2001). Children are expected to sit and engage in academic tasks and other cognitive activities for longer time intervals. Those able to do so are praised for their concentration abilities and tenacity, with accompanying high grades and test scores. Pejorative characteristics are conferred on those less able to regulate their activity level after entering elementary school; they are described as distractible, aggressive, restless, hyperactive, and impulsive. A majority of these children develop serious learning problems, make marginal or failing grades, exhibit a wide range of externalizing behavior problems, and experience impaired interpersonal relationships.

Evidence concerning the heterotypic continuity of ADHD is mixed. Symptoms of ADHD arise early in childhood; however, their presence does not necessarily portend a persistent pattern of ADHD beyond 3 years of age in an estimated 50% to 90% of children so characterized (Palfrey, Levine, Walker, & Sullivan, 1985). Continuation of early ADHD-like symptoms to 4 years of age, however, is highly predictive of clinical hyperactivity at 9 years of age (Campbell, 1990). Thus, the early onset, degree, and persistence of symptoms past 4 years of age is highly predictive of a clinical diagnosis (indicating continuing and worsening impairment) and continuing difficulties throughout adolescence and early adulthood. The stability of the diagnosis is also noteworthy. High percentages of children meeting formal diagnostic criteria in childhood continue to meet diagnostic criteria 8 to 10 years later as adolescents (70% to 80%: Barkley, Fischer, Edelbrock, & Smallish, 1990) and young adults (46% to 66%: Barkley, Fischer, Smallish, & Fletcher, 2002), although the level and topography of some core variables change with advancing age. Inattention problems tend to remain relatively stable between 7 and 11 years of age, whereas hyperactivity declines moderately (Hart, Lahey, Loeber, Applegate, & Frick, 1995). Fidgetiness tends to replace the excessive gross motor activity during adolescence, and most adolescents with ADHD report feeling more restless compared to age-matched controls (Weiss & Hechtman, 1993).

Sex predicts *DSM-IV* diagnostic subtype in many studies of children with ADHD, with females likely to exhibit more inattentive symptoms and males likely to display more hyperactive-impulsive behavior (Abikoff et al., 2002; Biederman & Faraone, 2004; Graetz, Sawyer, & Baghurst, 2005). These findings, however, may reflect differences in referral source. Few sex differences emerge in clinic-based samples, whereas lower levels of aggression and fewer internalizing symptoms are reported in community-based samples of girls relative to boys (Gaub & Carlson, 1997). Girls also appear to have a lower risk for comorbid externalizing disorders (ODD, CD) and depression than boys (Biederman et al., 2002).

Parental Factors Considerable research has been devoted to studying parents of children with ADHD. Much of the early research focused on understanding whether there were particular parental attributes that contributed to the disorder's development, that is, whether parents were causally responsible for the myriad behavioral problems displayed by their children. Information gleaned from this research failed to support a causal role for faulty parenting.

Second-generation observational studies conducted in child research clinics generated considerably more information concerning the interactions of children with their parents. This advance was achieved by having parents and their children follow prearranged scripts, engage in games, participate in discussions, and attempt specific child management techniques under close observation. Collectively, these studies indicate that children with ADHD are more defiant and demanding, more talkative, more negative, and less likely to comply with parent requests. They also place heavier demands on their parents' attention and supervisory responsibilities due to their inability to play and work independently, and higher activity level relative to typically developing children (DuPaul, McGoey, Eckert, & VanBrakle, 2001). The collective result is a significantly higher level of intrafamily conflict.

Studies of specific styles and interaction patterns associated with parents of children with ADHD suggest a general parenting approach characterized by a more lax but overreactive, coercive, and acrimonious interaction pattern, coupled with higher levels of emotional expression and lower parenting efficacy. Mothers of ADHD children tend to be less responsive to their children's requests for attention, more negative and directing, and less rewarding of appropriate behavior relative to control families (DuPaul et al., 2001). This identified interaction and commanding style of child management by mothers of children with preschool hyperactivity is highly correlated with the persistence of ADHD symptomatology throughout childhood (Campbell, 1990). Barkley and Cunningham (1979) reported an interesting finding that supports the bidirectional and interactional, rather than causal, nature of parent-ADHD child interactions. Mothers of children with ADHD were significantly less controlling and more positive when their children were receiving psychostimulant treatment relative to no medication or placebo. This finding strongly suggests that the parents' negative reactions and aversive managerial style are elicited to a considerable degree by the overly demanding, noncompliant, impulsive, and defiant nature of their children.

Life Events and Physical Factors Extant research is relatively consistent in demonstrating that children with ADHD—as a group—experience significantly more adverse life events compared to typically developing children. These findings contribute to the supposition that ADHD may reflect a broad spectrum of early insults that manifest themselves as a final common pathway.

A higher incidence of pre-, peri-, and postnatal incidents, as well as brain trauma—once considered idiopathic of ADHD—remains unproven based on systematic intake data collected in recent years. Research concerning other adverse life events, including general health problems, sleep disturbance, accidental injuries, minor physical anomalies, and motor coordination problems, suggests that they occur at higher rates in ADHD children relative to the general population.

A greater incidence of general health problems is common for children with ADHD, particularly allergies and recurring upper respiratory infections. Sleep disturbance is also common. An estimated 56% of children with ADHD experience difficulty falling asleep, and up to 39% experience sleep continuity disturbance, often beginning in infancy, based on parent report (Corkum, Tannock, & Moldofsky, 1998).

Accidental injuries are common in children with ADHD, and recent studies suggest that these are associated with their higher levels of hyperactivity and aggression. For example, a study of 10,394 British children reported that overactivity and aggression uniquely contributed to the incidence of accidental injuries in children with ADHD (Bijur, Golding, Haslum, & Kurzon, 1988); however, a recent study examining 6,000

children in England reported that hyperactivity alone predicted increased accidental injuries after controlling for demographic and socioeconomic factors (Laloo, Sheiham, & Nazroo, 2003). Collectively, their higher rate of accidental injuries results in greater use of outpatient medical care facilities, particularly emergency medical services (Leibson, Katusic, Barbaresi, Falissard, & O'Brian, 2001), and are associated with 3 times the annual health costs of typical children (Swenson et al., 2003).

Children with ADHD experience significantly higher rates of motor coordination problems relative to typically developing children (Barkley, DuPaul, et al., 1990) and many meet diagnostic criteria for Developmental Coordination Disorder. Problems with gross motor coordination, motor overflow, sluggish gross motor movements, fine motor coordination (balance, paper mazes, handwriting), and motor preparedness (Oosterlaan & Sergeant, 1995) are the most commonly documented difficulties. A higher incidence of minor physical anomalies in ADHD is also common. These slight deviations in outward appearance (e.g., hair whorls on the back of the head, index finger longer than middle finger), however, are inconsistently related to behavior problems.

Peer Influences The chronic and pervasive peer difficulties associated with ADHD are well documented. A majority of children with ADHD experience significant problems in social relationships with other children (Pelham & Bender, 1982). These findings are not particularly surprising given the core symptoms of the disorder (inattentive, impulsive, excessive motor activity) and broad range of expected impairments. Children with ADHD overwhelm peers with their unbridled enthusiasm and are viewed as overly talkative, loud, intrusive, domineering, impulsive, and emotionally reactive. Their inability to hold information sufficiently long to thoroughly process and use it for social interactions (i.e., working memory deficits) contributes to their preference for immediate gratification, deficient delay skills, difficulty understanding instructions and rules, immature speech, and verbal communication deficits. These deficient social and peer interaction patterns are so discerning that they are rejected by non-ADHD peers within 20 to 30 minutes, particularly children with ADHD who display higher levels of emotional reactivity, aggression, and sensation-seeking behavior (DuPaul et al., 2001; Mikami & Hinshaw, 2003). They also are more likely to bully and be bullied by other children relative to their peers (Unnever & Cornell, 2003). The collective impact of these behaviors, coupled with deficient knowledge concerning social interactions, portends poorly for the development of desired social interactions and relations throughout adolescence and into adulthood (Barkley et al., 2006). To make matters worse, they possess limited understanding or appreciation of their problems, which, in turn, contributes to an inflated perception of their abilities, accomplishments, and the extent to which others like them (Diener & Milich, 1997). Some peer interaction and social behaviors show moderate improvement with treatment; however, maintenance and generalization of treatment effects are the exception rather than the rule.

Cultural and Diversity Issues ADHD prevalence rates for other countries are similar to U.S. averages when estimates are derived using identical diagnostic criteria (e.g., DSM-III-R, DSM-IV). U.S. estimates derived from studies published since 2000 typically range from 1.5% to 9.9% (mean = 7.7%), with higher estimates reported from studies using DSM-IV criteria (7.4% to 9.9%). The increase in prevalence rates over previous years may reflect increased awareness and improved diagnostic practices

to some degree, but more likely represents changes in diagnostic subtyping, that is, the addition of *primarily inattentive* and *primarily hyperactive-impulsive* subtypes to the *combined* subtype.

Cultural and diversity factors play important roles in understanding ADHD because of their influence on observations, perceptions, and reports of child symptoms. For example, a study examining teacher perceptions found that Thai teachers reported higher rates of off-task behavior in same-age elementary school children relative to U.S. teachers. Direct observations of the children, however, showed the opposite result: U.S. children were off-task significantly more often than were Thai children (Weisz, Chaiyasit, Weiss, Eastman, & Jackson, 1995). Differences in child ratings also occur among teachers from mainland China, Hong Kong, and the United Kingdom (Alban-Metcalf, Cheng-Lai, & Ma, 2002) and may reflect different expectations for children from different cultural backgrounds. de Ramirez and Shapiro (2005) reported an interesting example of this phenomenon. Hispanic teachers rated Hispanic children higher than Caucasian children on a hyperactivity-impulsivity scale, whereas Caucasian and Hispanic teacher ratings of Caucasian students were not significantly different. Mexican mothers are also less likely than both Mexican American and Puerto Rican mothers to report impulsive behavior in their children (Schmitz & Velez, 2003). Collectively, these findings suggest that differences in cultural expectations of children's behavior may significantly affect adult ratings and require due consideration when obtaining information from parents and teachers.

MEDICAL TREATMENT

Treatment of attention deficits traditionally involves using behavior or pharmacological therapy alone or in combination. Pharmacological interventions (particularly the psychostimulants), however, are considered more cost-effective and have the added benefit of affecting both behavioral and cognitive domains throughout the day without the specific programming and oversight required by behavior therapy. Table 14.6 displays the most frequently prescribed psychostimulants and their corresponding properties. A low dose is usually prescribed initially, with dosage gradually titrated upward on a biweekly basis until clinical improvement is optimized, while minimizing potential emergent symptoms. Second- and third-tier interventions typically include antidepressants, selective serotonin reuptake inhibitors (SSRIs), clonidine, and, less frequently, atypical antipsychotics for the treatment of highly aggressive children with ADHD. Combined regimens, such as stimulants and antidepressants, are prescribed with increasing frequency to treat the comorbid conditions (e.g., mood disturbance) that often accompany ADHD. Pemoline, once considered a viable treatment for ADHD, is rarely prescribed because of elevated risk for hepatic failure.

BASIC CLINICAL PROPERTIES AND PRESCRIPTION PRACTICES

Understanding the basic clinical properties of psychostimulants is essential for assessing outcome. Some physicians continue to prescribe psychostimulants based on children's body weight (i.e., on a mg/kg basis), despite compelling evidence that methylphenidate (MPH) dosage titrated to gross body weight or body mass is unrelated to treatment response (Rapport & Denney, 1997). This practice frequently results in overdosing low-weight and underdosing high-weight children. Knowledge of the behavioral time-response course of these agents is equally important because of the

Table 14.6
Prescription Psychostimulants for ADHD

Generic Name	Brand Name	Dosing Schedule	Onset of Action	Peak Half-Life	Peak Behavioral Effect	Duration of Behavioral Effect
Extended Release	Mixed salts of amphetamine	q A.M.	60–120 minutes	11–13 hours	Bimodal	10–12 hours
	Dexamylphenidate hydrochloride	q A.M.	60 minutes	2–4.5 hours	Bimodal	6–8 hours
	Methylphenidate hydrochloride	q A.M.	30–120 minutes	3.5 hours	Bimodal	12 hours
	Methylphenidate transdermal system	q A.M.	60–120 minutes	1.4–4 hours	NA	12 hours
Intermediate Release	Methylphenidate hydrochloride	q A.M.	30–120 minutes	6.8 hours	Bimodal	6–8 hours
	Metadate CD	q A.M.	60–90 minutes	NA	5 hours	4–8 hours
	Metadate ER	q A.M.	60–90 minutes	NA	5 hours	4–8 hours
	Ritalin SR	b.i.d.	30–120 minutes	2.5 hours	Bimodal	6–8 hours
	Ritalin LA	q A.M.	60–90 minutes	12 hours	8 hours	6–8 hours
	Dexedrine Spansule	b.i.d.				
Immediate Release	Methylphenidate	b.i.d. to t.i.d.	20–60 minutes	2.8 hours	2 hours	3–6 hours
	Dexmethylphenidate hydrochloride	b.i.d. to t.i.d.	20–60 minutes	3 hours	2 hours	3–6 hours
	Mixed salts of amphetamine	b.i.d. to t.i.d.	20–60 minutes	2.2 hours	2 hours	4 hours
	Dextroamphetamine	b.i.d. to t.i.d.	30–60 minutes	9.7–13.8 hours	1–2 hours	4–6 hours
	Dexedrine	b.i.d. to t.i.d.	20–60 minutes	10.25 hours	2 hours	4–6 hours
		b.i.d. to t.i.d.	20–60 minutes	12 hours	3 hours	4–6 hours

q A.M. = Once daily in the morning; b.i.d. = Twice a day; t.i.d. = Three times a day.

wide variation in onset and behavioral half-life among brands. As shown in Table 14.6, onset of medication effects varies between 20 and 120 minutes, and therapeutic effects last between 3 and 12 hours. Diminished therapeutic effectiveness occurs away from the peak time of behavioral effect. Outcome measures, including subjective teacher and parent verbal reports, may thus only partially reflect medication effects or not reflect them at all if based on inactive time parameters. Increasing the dosage does not remedy the problem; low and high doses of the same medicine have an identical behavioral half-life and time-response course. Moreover, it is important to consider the overlap of behavioral half-lives for each medicine to optimize treatment effects (i.e., a second dose must be administered before the behavioral effects associated with the first dose wear off). It is encouraging to note that most children who fail to benefit from a prescribed stimulant respond positively to an alternative formula. Finally, brand name mixtures (e.g., Ritalin) are typically more potent than generic medications (e.g., methylphenidate), and switching from the former to the latter may result in diminished therapeutic efficacy.

DOSE-RESPONSE EFFECTS

A large-scale observation study of 76 children with AD/HD provides a representative précis of dose-response effects in natural classroom environments (Rapport, Denney, DuPaul, & Gardner, 1994). Children received each of four MPH doses and a placebo for 1 week in a counterbalanced order following baseline assessment. Attention (percent on-task), academic efficiency (percentage of assignments completed accurately), and classroom deportment (teacher ratings of behavior) all improved significantly with increasing MPH dose, as depicted in Figure 14.4. Collectively, these findings and those derived from experimental studies using sophisticated learning and cognitive paradigms (Rapport & Kelly, 1991) fail to support earlier views that cognitive function and behavior are optimized at low and high dosages, respectively (Sprague & Sleator, 1977).

Despite showing *statistically significant* effects for all dose levels relative to baseline and placebo, a more interesting question concerns the *clinical significance* of the results; that is, to what extent are treated children functioning like their typically developing classmates with respect to school performance and behavior? Conventional metrics (e.g., the reliable change index) address this question by quantifying the degree to which treated children's attention, academic efficiency, and classroom deportment are similar to classmate controls. Figure 14.5 reveals an interesting pattern of results. Attention and classroom deportment were either significantly improved or normalized in high percentages of children under active medication (76% to 94%), whereas only 53% showed this level of change in academic efficiency. These findings highlight the observation that improved attention and behavior do not necessarily translate into improved academic functioning for approximately half the children receiving psychostimulants. The findings also emphasize the need for auxiliary interventions (e.g., academic tutoring) and teacher rating scales that reflect improved adaptive functioning (e.g., the Academic Performance Rating Scale; DuPaul, Rapport, & Perriello, 1991). The *deceased person rule* is a useful guideline for determining a scale's validity for assessing adaptive functioning in children. If a deceased person can obtain a desirable score on the scale due solely to an absence of maladaptive behaviors (e.g., bothers others, easily distracted, acts like he's driven by a motor) are endorsed as *not*

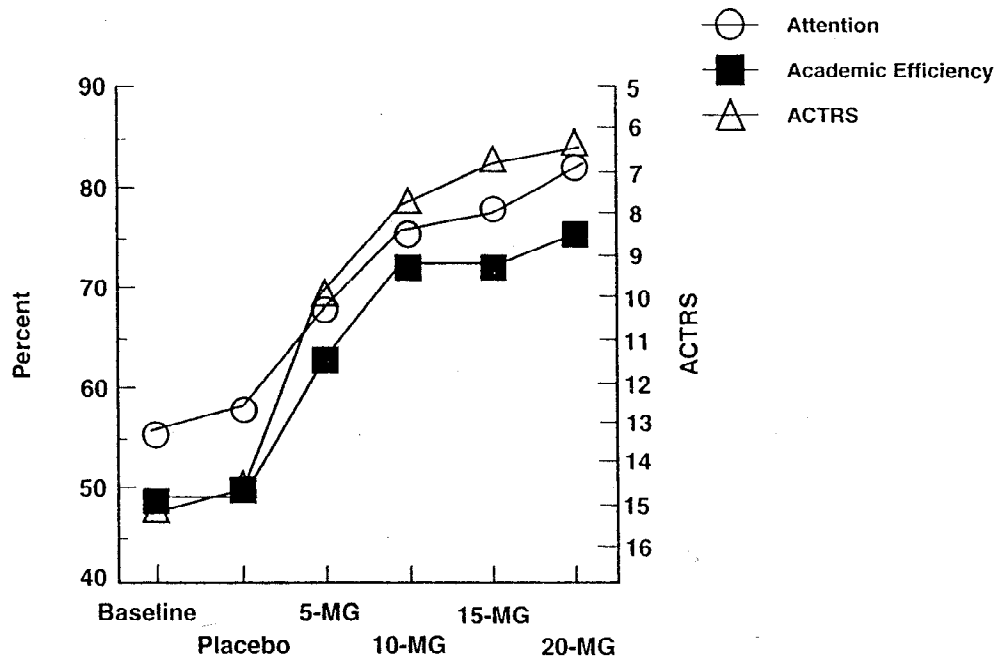


Figure 14.4 Mean group dose-response curves for three classroom measures. ACTRS = Abbreviated Conners Teacher Rating Scale. Upward movement on the ordinate indicates improvement. From "Attention Deficit Disorder and Methylphenidate: Normalization Rates, Clinical Effectiveness, and Response Prediction in 76 Children," by M. D. Rapport, C. B. Denney, G. J. DuPaul, and M. J. Gardner, 1994, *Journal of the American Academy of Child and Adolescent Psychiatry*, 33, pp. 882–893. Adapted with permission.

occurring), then it probably is not a good outcome measure for children (Rapport, 1993).

POTENTIAL EMERGENT EFFECTS

Side effects can and do occur with stimulant treatment, but most can be avoided or minimized with appropriate management. The most commonly reported side effects associated with psychostimulant treatment fall into one of three categories: cardiovascular effects (i.e., heart rate, blood pressure), physical effects (i.e., weight and growth), and physical and behavioral complaints. A recent review indicates that cardiovascular and physical effects associated with psychostimulant therapy are usually transient, dose-dependent, readily resolved by discontinuing therapy, and fail to remain significant in long-term follow-up studies (Rapport & Moffitt, 2002). Other common side effects, such as reduced appetite and associated weight loss (or the failure to make expected weight gains), can be minimized or eliminated by ingesting medication after rather than prior to meals. Clinical lore held that food reduced drug efficacy, but this has not held up to scientific scrutiny (Swanson, Sandman, Deutsch, & Baren, 1983). Physical and behavioral complaints frequently reported following psychostimulant treatment must be disentangled from the general discomfort reported by same-age

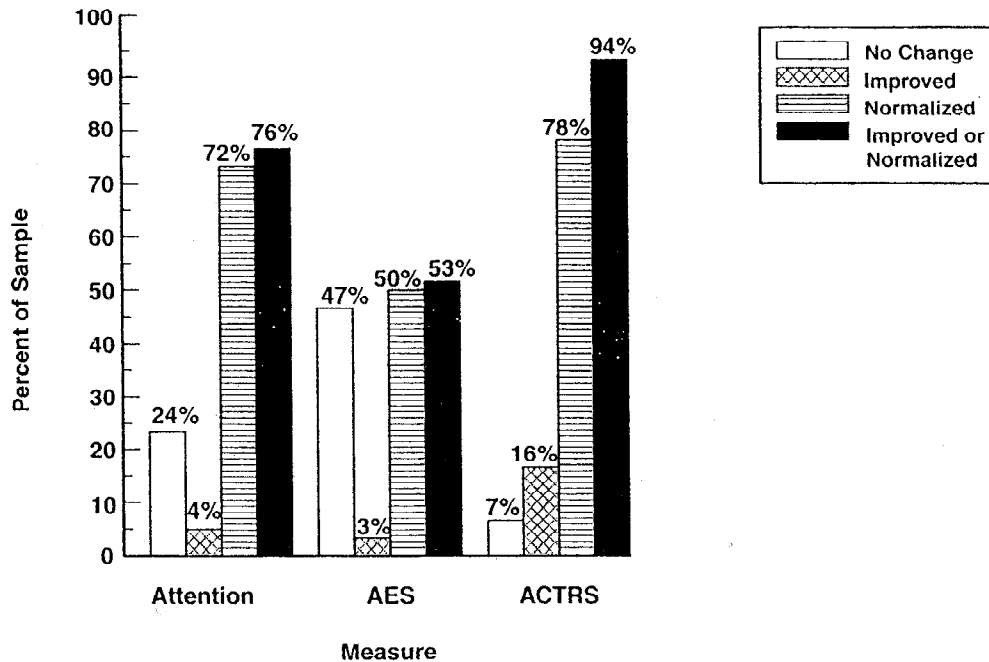


Figure 14.5 Clinical status of the group collapsed across methylphenidate dose conditions for three classroom measures. AES = Academic efficiency score; ACTRS = Abbreviated Conners Teacher Rating Scale. From "Attention Deficit Disorder and Methylphenidate: Normalization Rates, Clinical Effectiveness, and Response Prediction in 76 Children," by M. D. Rapport, C. B. Denney, G. J. DuPaul, and M. J. Gardner, 1994, *Journal of the American Academy of Child and Adolescent Psychiatry*, 33, pp. 882–893. Adapted with permission.

children not receiving medication. For example, high percentages of typically developing children report headaches, daily fatigue, sore muscles, and abdominal discomfort; children with clinical disorders other than ADHD report higher levels of these complaints in addition to stomach aches under no-medication conditions. Obtaining baseline measures of children’s physical and behavioral complaints prior to initiating a medication protocol is necessary to sort out the extent to which effects are due to typical bodily complaints rather than medication.

BEHAVIORAL TREATMENT

Behavioral interventions designed to treat children with ADHD mainly focus on improving classroom functioning and parent-child interactions. Second-tier interventions ameliorate dysfunctional peer relationships and specific skill deficits by means of peer tutoring, group-level management techniques, mediation, and special skills training. The discussion in this section focuses exclusively on classroom interventions and parent training for two reasons: Poor academic functioning (including maladaptive behavior) is the chief complaint of parents and teachers leading to referral for a diagnostic evaluation, and auxiliary interventions are currently in a nascent

developmental stage with limited empirical validation (for reviews, see Barkley, 2006; DuPaul & Stoner, 2003).

OVERVIEW OF CLASSROOM INTERVENTIONS

Early behavioral interventions focused on decreasing disruptive, maladaptive behavior in children with ADHD. The discovery that reducing disruptive behavior rarely translated into improved academic performance led to the abandonment of these interventions. This was an important finding, because academic achievement is one of the best predictors of a good prognosis and favorable long-term outcome in children. Accumulating research also revealed that behavioral interventions requiring teachers to deliver positive feedback (using verbal praise or by administering points, stars, or checks on a sheet containing descriptions of desirable behavior) were also less than ideal. The most pronounced shortcoming involved the excessive demands on teacher time relative to the large numbers of students in a typical classroom. A second criticism was that many children with ADHD tended to be drawn off-task by the delivery of positive feedback and experienced difficulty getting back on-task—an effect opposite of that intended by the intervention (Rapport, 1983).

Empirical studies examining the relative efficacy of behavioral interventions beginning in the early 1970s and continuing through the 1980s revealed an interesting finding. If the behavioral intervention directly targeted improved academic performance as its main goal (e.g., by making consequences specific for completing academic work successfully), disruptive behavior nearly always showed a concomitant decline in frequency. The procedure was coined the *incompatible response approach* (Allyon, Layman, & Kandel, 1975). It implied that increased academic performance was incompatible with disruptive conduct in the classroom and should be the primary target of intervention efforts.

During the 1980s and continuing to the present, the most successful classroom interventions followed this general principle and focused on developing incentive and/or feedback systems that directed children's attention to the completion of their school work. A combination of positive and mildly aversive corrective feedback delivered consistently, continuously, unemotionally, and with minimal delay worked optimally. This type of intervention relies on a behavioral principle termed *response cost*. Children earn points that can be traded for structured free time or specific classroom activities and lose points for not attending to their academic assignments (Rapport, Murphy, & Bailey, 1982).

RESPONSE COST INTERVENTIONS

The Attention Training System (ATS) is a prototypical example of a response cost intervention procedure for the classroom (see Figure 14.6). After receiving basic instructions, children earn 1 point per minute throughout the duration of the academic period. The ATS display window shows accumulated points.

The classroom teacher possesses a handheld remote-control device (see Figure 14.6) that is used anywhere within the classroom to control up to four student units. This allows the teacher to work with other students throughout the academic period, either in small groups or individually, while monitoring targeted children's behavior. The teacher continues with instructional activities so long as targeted students are appropriately engaged in academic activities, because the ATS automatically awards points on a 1-minute interval for remaining on task. This procedural component is

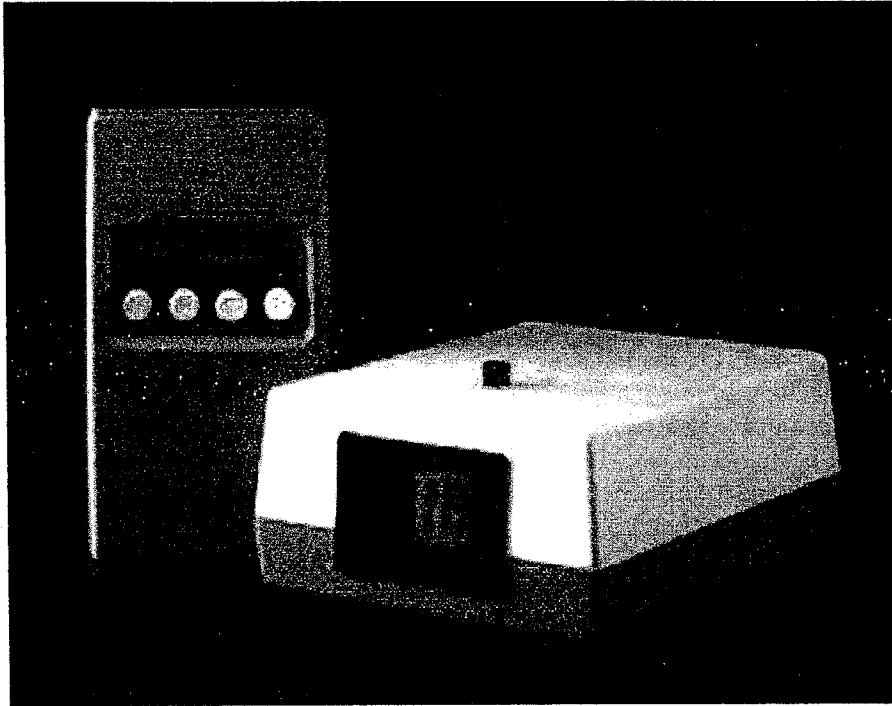


Figure 14.6 The Attentional Training System (ATS). Invented by M.D. Rapport (see Rapport, Murphy, & Bailey, 1982) for treating children with ADHD. Manufactured and distributed for commercial use by Gordon Systems, DeWitt, NY.

advantageous relative to traditional behavioral interventions for two reasons: It permits teachers to continue their ongoing instructional activities rather than stopping to deliver incentives to targeted students, and it avoids inadvertently drawing children with ADHD off-task by delivering incentives or verbal feedback.

The teacher activates the handheld held device by pushing a button on occasions when students are not attending to their assigned activities. The red dome on the student's desk module illuminates for 15 seconds and signals the child of an electronic point loss from his or her accumulated total due to off-task behavior. The teacher immediately returns to the ongoing instructional activity and checks the student's progress again in a minute or two. Earned points are recorded in an observation log at the conclusion of the academic period and exchanged for structured free-time activities later in the day (e.g., 15 points earns 15 free-time minutes). A learner point-to-earned-free-time ratio (e.g., 2:1) is initiated after several weeks of successful classroom functioning. Dr. Mark D. Rapport invented and designed the original ATS, and Dr. Michael Gordon (Gordon Systems, DeWitt, NY: www.gsi-add.com) commercially developed and marketed the system.

Several variations of response cost interventions have been developed and examined empirically over the past decade. One alternative uses color-coded cards; students begin an academic period with a specific color card, which is replaced with a lower point value color card for classroom infractions. Card construction typically

utilizes either a Velcro backing or paper pocket to facilitate visual display within the classroom. Accumulated earnings based on card colors are exchanged for desirable activities and privileges during the day based on preassigned point totals (Barkley et al., 1996).

Group format response cost interventions may be preferred in situations in which several or even most students in the classroom evince disruptive conduct and/or difficulties remaining on task. For example, the entire class can be awarded tokens such as poker chips at the beginning of an academic period (e.g., placed in a bowl or on a display board with Velcro), with each classroom infraction costing the students one chip. Chips remaining at the end of the period are cashed in for structured free-time activities. Group-level response cost may also be preferable to traditional token reinforcement systems for preschoolers owing to the reduced teacher demands. For example, teachers preferred a response cost intervention wherein students lost buttons from a chart for classroom infractions to a traditional token system that administered buttons for following rules (McGoey & DuPaul, 2000).

OTHER SCHOOL-BASED INTERVENTIONS

Varieties of behavioral procedures used in isolation, or as a comprehensive intervention component, prove effective for reducing discrete incidences of maladaptive behavior. These include time-out and carefully delivered reprimands and corrective statements. The maintenance and generalization of treatment effects—similar to other behavioral interventions—is nonexistent in most cases. That is, desirable behavioral effects are evidenced only while contingencies are actively employed; long-term maintenance of treatment effects has never been empirically demonstrated. The largest intervention study for children with ADHD conducted to date, the Multimodal Treatment Study, cogently illustrates this point. Children assigned to the comprehensive psychosocial treatment group participated in an 8-week summer treatment program and subsequently received ongoing teacher-administered behavioral interventions throughout the school year, with additional paraprofessional assistance for the initial 3 months. Poststudy results revealed that children were not significantly improved relative to a treatment-as-usual control group (i.e., a group receiving typical community-based services) and were significantly worse relative to a medication-only (psychostimulant) group (Jensen et al., 2001).

These findings are not particularly surprising given the suspected neurobiological nature of the disorder. They highlight the fact that extant interventions for ADHD are maintenance treatments that require continuous monitoring and adjustment to optimize effectiveness.

Recent efforts to improve the classroom functioning of children with ADHD focus on innovative instructional designs, computer-assisted instruction, and environmental management. The instructional design thrust focuses on altering aspects of academic tasks, such as the presentation format, types of materials, length, and timing, to better capture the child's attention and optimize learning time. Extant research indicates that stimulating tasks that can be completed within a brief time period and that vary the presentation format, interspersed with nonacademic assignments, are associated with improved attention and completion rates (for a review, see DuPaul & Stoner, 2003). Initial attempts to develop computer-assisted interventions for ADHD are promising but require replication with larger numbers of children for extended periods of time (e.g., an entire school year). Computer-based, comprehensive

curriculums, all-day classroom management, and school-home communication programs have been proposed but unrealized to date (Rapport, 1998).

Attempts at environmental management date back to Cruickshank and Dolphin's (1951) initial attempt to isolate children with hyperactivity in three-sided cubicles to reduce stimulation based on the suspicion of a defective attentional filtering system. This practice continues today; children with ADHD are frequently placed away from other children and near the teacher's desk to minimize distraction. Extant research, however, has never consistently demonstrated that children with ADHD are more easily distracted than sex- and age-matched controls. In fact, a majority of studies specifically designed to study this phenomenon have failed to find significant between-group differences in distractibility (Kessler, 1980).

Home-based contingency management systems are widely used, wherein parents provide daily incentives or mild punishment based on children's behavior at school. This type of system usually entails children's receiving checkmarks, tokens, or other forms of visual feedback (e.g., daily ratings) throughout the school day following incidences or periods of appropriate behavior and/or academic accomplishment. Parents review a daily summary of the child's school day and mete out agreed upon consequences. These types of systems are noteworthy for increasing communication and feedback between school and home but have several inherent disadvantages and are generally less robust relative to school-based systems. The most significant disadvantage is the extended delay between the child's behavior (adaptive or maladaptive) and receipt of consequences. Temporal proximity is an important part of any behavioral reinforcement scheme, and particularly relevant for children with ADHD for several reasons. Children with ADHD typically exhibit poor delay skills and suboptimal working memory and organizational abilities (children fail to remember specifics about the day, and parents receive daily reports inconsistently). Extant research also convincingly demonstrates that immediate consequences are significantly more effective than delayed consequences for children with ADHD. Other disadvantages of home-based programs include the inability of many parents to provide consistent consequences and the negative emotional carryover effects associated with returning home to aversive reprimands in the context of an already strained parent-child relationship.

PARENT-CHILD INTERVENTIONS

Behavior management training is nearly always recommended for parents of children with ADHD. The reason is rather straightforward. Most parents have never received formal training in child development or child management unless they were raised in a large family or attended college and majored in psychology, child development, or education. As a result, most have only anecdotal information about normal development, and know even less about how to manage maladaptive behavior.

The thrust of behavior management programs is threefold. A first initiative is to educate parents concerning the use of effective behavior management techniques (e.g., reinforcement, time-out, extinction). Subsequent sessions focus on instructing parents in how to exploit this knowledge to decrease maladaptive and increase adaptive functioning throughout the day. The final stage focuses on teaching parents how to generalize this knowledge to different settings and situations and *preplan* for potentially aversive situations (e.g., extended car rides, grocery shopping). Considerable emphasis is placed on assigning homework tasks, preplanning for the upcoming

week, and reviewing and suggesting strategic techniques for recent parent-child difficulties. Most comprehensive programs also emphasize implementing organizational techniques at home (making charts, arranging folders and backpacks, establishing a designated homework area and schedule) and teaching parents how to use constructive verbal communication techniques with their child. Collectively, parent behavioral management training is usually quite effective, but like other ADHD interventions, is a maintenance treatment that requires ongoing adjustments and continuous effort. Detailed behavior management programs are available from several sources (e.g., Barkley, 2006).

Case Description

Case Introduction

Sean was a 10-year-old male referred by a rural school system for a comprehensive clinical diagnostic evaluation and second opinion. He was previously seen by a licensed clinical psychologist, who concluded that he met diagnostic criteria for ADHD based on parent and teacher rating scales, a 50-minute parent interview, a brief interview with the child, and the absence of anxiety based on a normed child anxiety rating scale. Sean's parents requested special accommodations by the school to address their son's chronic and worsening difficulties. The school system sought to ensure that the ADHD diagnosis was accurate before scheduling an Individualized Educational Assessment Plan (IEP) meeting to determine appropriate educational goals, interventions to accomplish these goals, and assessment procedures.

Presenting Complaints

Sean's parents reported chronic and worsening school difficulties. Attending school each day was becoming increasingly problematic "because of his ADHD." Discussions with school personnel indicated that Sean was experiencing difficulties in multiple areas of functioning. His ability to pay attention was variable; he could pay attention for extended time intervals some days, yet appeared highly distractible and unfocused on other days. Sean's gross motor activity level was equally perplexing. The classroom teacher reported that he was usually able to sit and stay in his seat without signs of excessive motor activity, but became fidgety and even hyperactive at other times. Sean had no close friends in school and only one or two in his neighborhood despite the availability of children his age in both settings. He frequently came to school late and ate lunch by himself in the school cafeteria. Peer relationships were mixed: He appeared to interact well with other children but characteristically elected to avoid companionship.

History

Historical review of records indicated long-standing difficulties at home and in school, despite above-average intelligence. School problems included attentional difficulties, impulsivity, and sporadic hyperactivity. Records also indicated difficulties with peer relationships, poor organization skills, difficulties

completing academic assignments on a routine basis, and a growing dislike for school.

Assessment

Teacher and Parent Ratings Scales

Broad- (CBCL, TRF, CSI) and narrow-band (ADHD Rating Scale) rating scales completed by the classroom teacher and parents revealed a mixed pattern of results. Teacher ratings for the TRF adaptive functioning indices indicated above-average learning and school performance but below-average functioning in areas related to happiness and effort. Internalizing dimension TRF scores were moderately elevated, indicating possible anxiety and social withdrawal. Externalizing dimension scores were moderately elevated for inattentiveness and hyperactivity. The *DSM* clinical syndrome scale scores were elevated for ADHD and anxiety disorder.

Parent endorsements were between 1.5 and 2 standard deviations above the mean for ADHD-related symptoms (inattention, impulsivity-hyperactivity) based on age and sex norms. The Externalizing broad-band scale was significantly elevated due to endorsement of ADHD, ODD, and CD behavior problems. The CSI was significantly elevated for symptoms related to ADHD, but also included endorsements of behavioral and emotional problems related to Generalized Anxiety Disorder, Separation Anxiety Disorder, and specific phobias. Collectively, parent and teacher ratings presented a mixed picture of ADHD-like symptoms (primarily by parent endorsement) and anxiety symptoms.

Behavioral Assessment: Classroom Observations

Unobtrusive classroom observations were scheduled to obtain information concerning Sean's ability to pay attention, complete academic assignments, and participate in classroom discussions and peer interactions. Sean and two typically developing male classmates were observed over a 2-day period as an initial step to minimize reactivity. Sean was unacquainted with the consulting clinical psychologist.

Behavioral observations from the Direct Observation Form (Achenbach & Edelbrock, 1986) revealed a mixed and variable pattern of syndrome scale scores. The Withdrawn-Inattentive and Hyperactive scales were moderately elevated for some observation intervals, but within the normal range for other recording periods. Observations of on-task behavior ranged from 40% to 100% across the 2 days. Written narratives revealed that Sean could read at his desk for 30 contiguous minutes, complete a reading assignment without difficulty, and occasionally volunteer to answer questions posed by the classroom teacher. On other occasions, the teacher needed to prompt him to pay attention. Sean worked cooperatively with other children during small group work. He requested to go to the bathroom on several occasions during both observation days, which the teacher attributed to excessive water consumption due to the high elevation, low humidity climate.

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Behavioral Assessment: Playground and Lunchroom Observations

Observations of Sean's behavior on the school's playground were recorded using the ADHD School Observation Code (Gadow, Sprafkin, & Nolan, 1996) for approximately 30 minutes per day over a 2-day time span. The instrument was developed particularly for observations of children with externalizing disorders in school settings. Results revealed no incidences of physical aggression, noncompliance, or verbal aggression, and lower than normal appropriate social behavior.

Sean sat near, but not next to, other children while eating lunch in the cafeteria. He ate slowly, picked at his food, and appeared ensconced in thought throughout the lunch period. Collectively, behavioral observations failed to show the elevations for aggressive behavior, noncompliance, and inappropriate social behavior typically reported for children with ADHD.

Psychoeducational Assessment

The Wechsler Intelligence Scale for Children—Revised results revealed that Sean's intellectual abilities were within the very superior range, with no significant discrepancies noted in higher order factor scores or individual subtests except for coding and digit span, which were moderately lower. The Kaufman Test of Educational Achievement (Kaufman & Kaufman, 1983) results revealed above-grade and -age expectancy achievement in mathematical applications (98th percentile) and computation (77th percentile) and reading comprehension (99th percentile) and decoding (63rd percentile). Spelling achievement was average and below expectancy based on assessed intelligence. Observations of his behavior during the assessment yielded an erratic pattern. He demonstrated excellent concentration and low motor activity throughout most of the assessment, but exhibited excessive motor activity and moderate agitation during several timed tests.

Semi-Structured Clinical Interview

The K-SADS was administered separately to Sean and his parents. Parents endorsed all items relevant to ADHD, with an early onset and continuing, worsening course. ODD items were also endorsed with high frequency, with onset at 7 years and a progressive, worsening course. Separation anxiety criteria were fully met, but follow-up probes indicated that Sean did not complain of somatic symptoms prior to school days or experience other common symptoms of Separation Anxiety Disorder while attending school. Several panic attack symptoms were endorsed (shortness of breath, accelerated heart rate, occasional trembling and shakiness, feelings of unreality), but a negative history of discrete episodes of spontaneous panic attacks was reported. Evidence for Simple and Social Phobia was negative except for airplanes (related to a fear of dying). Review of generalized anxiety symptoms yielded endorsements of most items. No evidence of other disorders, including mood and thought disturbance, was revealed. Overall, Sean's parents described him as a "worrier" with multiple fears and concerns.

The child interview was remarkable. Sean admitted experiencing some difficulties with concentration and completing academic assignments, but denied

other symptoms characteristic of ADHD, mood disorders, thought disorders, CD, ODD (except for arguing with and disobeying parents), Posttraumatic Stress Disorder, and other anxiety disorders until reviewing obsessive-compulsive symptoms. He described a chronic and worsening history of obsessional thinking, particularly thoughts concerning contamination, and, to a lesser extent, "getting things right." Symptom onset coincided with an outbreak of body warts that required careful hygiene and regular washing at 7 to 7.5 years of age.

Sean currently washes his hands between 20 and 30 times daily after touching various objects or thinking about germs. Morning and nighttime rituals are laborious and complex and accompanied by excessive worry concerning whether the ritual—particularly morning bathing—was performed correctly. Myriad other rituals were detailed, such as not permitting his silverware to touch anything off his plate, having his parents wrap his lunch in a prescribed manner to avoid contamination, checking under tables at restaurants for gum, and touching one hand or foot an equal number of times while avoiding sidewalk cracks.

Sean's symptoms were particularly disabling at school. He feels clean for approximately .5 hours before requesting a bathroom break to wash his hands. His inconsistent completion of in-seat academic assignments and sporadic hyperactivity reflects his obsessional thinking that things must be exactly right and completed in a prescribed manner. For example, he checks and rechecks math problems for correctness, frequently beginning with the first problem even if he has completed a full page of problems. He also flips back to previously read pages to check whether he missed reading a word. These checking behaviors interfere with his ability to complete in-class assignments and tests. He becomes highly anxious that he won't be able to complete the task in time, is forced to abandon his checking rituals, and rushes through the remainder of the assignment or test. Other Obsessive-Compulsive Disorder (OCD) symptoms accounted for parent-endorsed behavioral difficulties; for example, his inability to stay at a friend's house overnight was related to his need to engage in daily rituals and the potential for embarrassment rather than separation fears.

Case Conceptualization

The onset, course, and duration of behavioral and academic problems were consistent with ADHD. Teacher scale endorsements suggested the presence of ADHD, anxiety, and affective disturbance problems. Parent ratings, coupled with parent clinical interview data, revealed a pattern of overendorsed clinical symptomatology; epidemiological evidence indicates an extremely low probability for greater than three co-occurring clinical disorders in a child. Parental overendorsement frequently signifies parental psychopathology. Behavioral observations produced a mixed pattern of results: Sean's concentration, reflective problem solving approach, and tenacity were exceptional for a 10-year-old boy, but deteriorated under particular timed test situations. This pattern is characteristic of anxiety rather than ADHD. A diagnostic picture of OCD was crystallized following the child clinical interview, and highlights the fact that children are often the most salient source for examining internalizing problems. Sean's parents had no idea of the intrusive nature or impairing extent of his illness.

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Course of Treatment, Assessment of Progress, Complicating Factors, and Follow-Up

Additional assessments were undertaken to detail the full range of Sean's obsessive-compulsive clinical features using highly specialized OCD instruments (e.g., Yale-Brown Obsessive Compulsive Scale). A full clinical report, coupled with a recommendation for cognitive behavior therapy, was forwarded to the school board. Appropriate treatment facilities were unavailable in Sean's community, and the school system paid for in-patient treatment at an out-of-state psychiatric hospital. Sean and his family relocated following his discharge from the hospital to enable him to receive booster therapy sessions, which are nearly always required for severe OCD. As a result, follow-up care consisted of ensuring that appropriate clinical information was forwarded to the new treatment facility and helping the parents locate an appropriate treatment facility.

TREATMENT IMPLICATIONS OF THE CASE

The described case highlights the need to conduct a comprehensive diagnostic assessment for referred children. Empirically supported treatments present the sine qua non for children with OCD but must often be modified to account for the unique features of the child's presentation and other living situations. Weekly monitoring of OCD symptoms using psychometrically sound instruments is recommended.

RECOMMENDATIONS FOR CLINICIANS

Most practicing clinical psychologists will be unable to conduct direct observations of referred children owing to practice and reimbursement limitations. The described case, however, highlights the importance of obtaining information from multiple sources, including a semi-structured interview with the child. Cover all sections in the basic interview, rather than bypassing sections based on the child's clinical presentation or parent report. No one in Sean's life had any suspicions concerning his OCD symptoms, nor the impairing nature of the disorder.

RECOMMENDATIONS FOR STUDENTS

Students interested in child psychopathology must develop competency with a wide range of clinical assessment instruments. Some training programs do not mandate learning how to conduct structured and semi-structured clinical interviews with children, and others fail to teach students how to ask questions, probe responses, or use examples appropriate for children of different ages, sexes, and cultural backgrounds. It is incumbent upon you to learn these techniques from appropriate workshops and training sites to the greatest extent possible.

SUMMARY

Misdiagnosis and overdiagnosis of ADHD has increased exponentially in recent years due to myriad factors. Among the most influential are the nonpathognomic nature of

ADHD symptoms (e.g., inattention), unrealistic time constraints permitted for conducting a comprehensive diagnostic evaluation, and an overreliance on rating scales and nonstandardized clinical office interviews. Evidence-based diagnostic practice procedures, whereby valid information is obtained from multiple sources pertaining to a child's past and current functioning, are recommended to yield incremental benefit for clinical psychology practice.

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