Lifespan Persistence of ADHD: The Life Transition Model and Its Application

Atilla Turgay, MD†; David W. Goodman, MD; Philip Asherson, MRCPsych, PhD; Robert A. Lasser, MD; Thomas F. Babcock, DO; Michael L. Pucci, PhD; and Russell Barkley, PhD, for the ADHD Transition Phase Model Working Group

ABSTRACT

Background: The understanding that attention-deficit/hyperactivity disorder (ADHD) often persists throughout life has heightened interest of patients, families, advocates, and professionals in a longitudinal approach to management. Such an approach must recognize and address known patient- and systems-based challenges of long-term mental health treatment, shifting of clinical presentations of ADHD, and commonality of psychiatric comorbidity with ADHD.

Objective: The ADHD Life Transition Model is a step toward developing criteria to optimize recognition and clinical management of ADHD (eg, response, remission) across an individual's lifespan and across diverse medical subspecialties. To support therapeutic efficiency and adaptability, our proposed model highlights periods when external resources for managing ADHD are reduced, cognitive and behavioral stressors are increased, and individuals may be reevaluating how they perceive, accept, and adhere to ADHD treatment. Such a model aims to support the clinical community by placing in context new findings, which suggest that the prevention of adult psychopathology in individuals with pediatric ADHD may be possible.

Conclusions: The ADHD Life Transition Model seeks to improve care for individuals with ADHD by (1) underscoring that ADHD persists beyond childhood in at least two-thirds of patients, (2) raising awareness of the need to approach ADHD from a chronic illness standpoint, and (3) increasing mental health professionals' diligence in symptom recognition and management of ADHD across developmental phases from childhood through adulthood.

J Clin Psychiatry 2012;73(2):192–201

Submitted: *October 8, 2010; accepted: November 2, 2011.*
Online ahead of print: *January 10, 2012 (doi:10.4088/JCP.10m06628).*
†Deceased
Corresponding author: *David W. Goodman, MD, Johns Hopkins at Green Spring Station, 10751 Falls Rd, Ste 306, Lutherville, MD 21093 (dgoodma4@jhmi.edu).*

The ADHD Transition Model Working Group convened in April 2009 to develop a framework supporting recognition and continuing management of individuals with ADHD from childhood through adulthood. The American Academy of Child and Adolescent Psychiatry, the National Institute for Health and Clinical Excellence in the United Kingdom (UK), and the European Network Adult ADHD indicate that ADHD is a chronic condition for many, with persistence into later life.[1–3] The Working Group approached lifelong management of ADHD as analogous to managing other chronic medical conditions that begin in childhood and cause ongoing impairment into adulthood.

ADHD AS A CHRONIC ILLNESS

Attention-deficit/hyperactivity disorder is most often detected in childhood but persists into adulthood for approximately two-thirds of these patients.[1,4] According to the US National Comorbidity Survey Replication, an estimated 4.4% of adults meet ADHD *DSM-IV-TR* diagnostic criteria,[5] with worldwide estimates between 1.2% and 7.3%, depending on locality.[4,6] Methodological differences (eg, impairment criteria, diagnostic criteria,[7,8] data sources) may account for worldwide variability in estimated ADHD prevalence.[9]

The neurobiology of ADHD is underscored by its high risk of inheritance (76%),[10–16] along with reports of structural and functional neuropathology in children, adolescents, and adult patients.[17–25] Attention-deficit/hyperactivity disorder's core symptoms (eg, inattentiveness, impulsivity, and hyperactivity), as well as symptoms of impaired mood regulation,[26] also tend to persist throughout life. Nevertheless, clinical presentation changes significantly over the course of development.[27,28] Overt signs of hyperactivity/impulsivity decline with increasing age, while inattentiveness continues largely unchanged.[29] Adults with ADHD may experience "inner" hyperactivity, marked by feelings of internal restlessness, an inability to relax, and difficulty sitting still for long periods. Impulsivity in adulthood may be marked by temper outbursts, impatience, driving too fast, or sexual promiscuity.[30] Consequently, older patients most likely exhibit fewer "childhood" symptoms than required by *DSM-IV-TR* criteria (6 core symptoms),[29,31] while remaining significantly impaired.[32,33] Given these developmental differences in symptom expression, the widely used *DSM-IV-TR*[8] and *ICD-10*[34] diagnostic criteria, developed to identify pediatric patients, may significantly limit the detection of adolescent and adult ADHD.[4,35] Proposed changes[36] for *DSM-5* (expected in 2013) include age-adjusted diagnostic criteria for ADHD; those for adult ADHD may include more relevant manifestations, reduced symptom count threshold, and better-defined real-world impairments in adults.

The need for a longitudinal, developmental approach toward ADHD detection and management is timely, not only because of growing insights into its persistence into adulthood[1,4,5] but also because of the potential for minimizing adult psychopathology by optimally treating ADHD during childhood and across the lifespan.[4,9] The current Life Transition Model

Clinical Points

- For many individuals, attention-deficit/hyperactivity disorder (ADHD) spans from childhood through adult life, resulting in ongoing impairments and functional impact.
- Optimal management requires an understanding of the presentation of symptoms and impairments within developmental phases and changing environmental demands.
- The ADHD Life Transition Model is aimed at raising awareness of phase-specific presentations and providing a basis for developing rational, prospective approaches to the symptoms and impairments at each transition phase.

describes the changing symptom manifestations, needs, issues, barriers to treatment, and potential solutions for effective management of ADHD from childhood through adulthood. The model is intended to help psychiatrists and other mental health care providers develop stronger clinical acumen in recognizing the manifestations, functional impact, and needs of their patients with ADHD throughout life. By applying such a conceptual framework to ADHD management, patients and health care providers can collaboratively make changes to management regimens during key life transitions to enhance treatment persistence and minimize potential negative outcomes.

LIFE TRANSITION MODELS APPLIED TO CHRONIC DISORDERS

Chronic conditions that can result in the need for transitional management from childhood and adolescence into adulthood include medical disorders (eg, asthma, sickle cell anemia, diabetes), neurologic disorders (eg, muscular dystrophy, cerebral palsy), and psychiatric conditions (eg, depression, schizophrenia, autism, ADHD).[37] Responding to the national Healthy People initiative, the American Academy of Pediatrics, the American Academy of Family Physicians, and the American College of Physicians–American Society of Internal Medicine issued a consensus statement outlining critical first steps to ensure successful transitioning of young people to adult-oriented care.[38] These included identifying patients with such needs; identifying core knowledge/skills and training-program development for health care providers; preparing/maintaining portable and up-to-date medical summaries that provide a common knowledge base for providers treating each patient; creating a transition plan by age 14 with each youth and family; providing consistent and equivalent primary and preventive care; and ensuring affordable, continuous health insurance coverage.[38] In the mental health care field, chronic care approaches to schizophrenia have been implemented based on strong evidence for improved patient outcomes[39,40]; one ongoing trial is examining a systems-based program to improve comprehensive, long-term schizophrenia management.[40] Key elements of these efforts include patient-defined needs, barriers, and clinical goals; multidisciplinary interventions; intensive education of psychiatrists and mental health professionals regarding evidence-based practices; and involvement of stake holders, ranging from patients to policy makers, to bring about system-wide changes in care.[39,40] Similar efforts will most likely be needed for widespread adoption of a chronic care approach to ADHD.

Currently, little is known about progress in providing chronic care services and their effect on outcomes. The general[41,42] and disorder-specific[43–46] literature includes opinion-based and experiential discussions defining factors influencing transition, proposed training programs,[47] and guidelines for chronic care services.[48–50] A national survey of 18,198 youths (aged 12–17 years) with special health care needs found that only 41% of respondents met predefined criteria for receiving services for transition to adult life.[51] In the future, research will need to focus on costs, benefits, and long-term outcomes with chronic care of patients with ADHD.

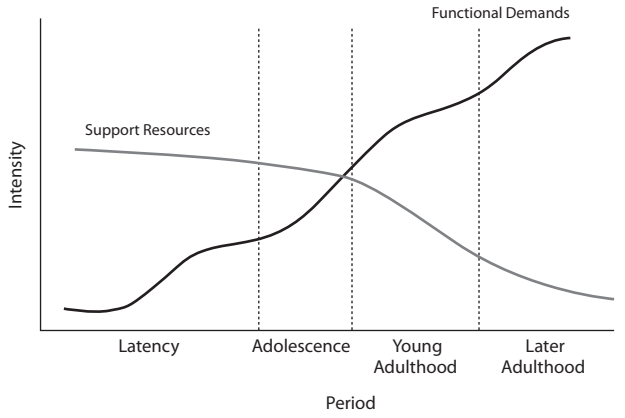
TRANSITION MODELS APPLIED TO ADHD

Because clinical presentation and the patient's understanding of the disorder, symptom awareness, and personal priorities and concerns regarding ADHD differ with age and developmental stage,[29] detection and treatment must be adjusted accordingly.[52,53] The Life Transition Model's framework defines crucial transition points (eg, childhood into adolescence and adolescence into young adulthood) when patients may make life-influencing decisions with positive or negative effects.[52,54] During sensitive transitional periods, a care plan is needed that provides increased support and patient education, as well as the development of patient-defined goals and self-management skills,[55] without gaps in treatment access.

ADHD LIFE TRANSITION MODEL AND DEMAND-RESOURCE IMBALANCE

How one functions adequately in daily life to carry out necessary tasks may be conceptualized as a balance between environmental demands and available resources (Figure 1).[56] Environmental demands include academic, occupational, financial, and social activities and functions. These can be thought of according to what is considered developmentally normal for age and setting; demands tend to increase in number, scope, and complexity with increasing age and level of independence. Resources used to meet these demands include internal/external processes, materials, and interpersonal relationships. Internal resources comprise working memory and the ability to wait one's turn, sustain focus, and plan and prioritize tasks to complete assignments or reach goals. External resources include people (eg, parents, siblings, physicians, teachers, friends) and objects (eg, alarm clocks, medication, calendars, reminders). Internal resources

Figure 1. Illustrative Conceptual Diagram of Resource-Demand Imbalance Over the Life Course of ADHD



Abbreviation: ADHD = attention-deficit/hyperactivity disorder.

gradually develop with age as the environmental demands increase. Adult levels of functioning emerge to permit independence from external support provided by family and teachers, and, when balanced, available resources are applied to successfully meet demands. Functional impairments should not emerge. When demands tax available resources, both internal and external, functional impairments will most likely be evident.[57]

Attention-deficit/hyperactivity disorder is associated with functional impairments across several domains of life, regardless of age or sex, an indicator that available resources are inadequate to meet everyday demands. In young children, impairments are seen in school and home, where they spend most of their time.[58,59] As patients grow older and daily academic and social demands become more complex, impairments can result in more serious, longer-term consequences. Compared with normal controls, young adults with ADHD have an increased risk of pregnancy and sexually transmitted diseases,[60] as well as more frequent traffic citations and automobile accidents.[61,62] Serious functional impairments in adults with ADHD include educational and occupational underachievement relative to intelligence, increased psychiatric comorbidity, substance use disorders, unemployment, arrest, and divorce versus normal controls.[63–65] The importance of mood regulation difficulties is increasingly recognized as a factor in impairments of ADHD associated with comorbid personality disorder and aggression.[26]

The psychopathological trajectory for individuals with ADHD may be amenable to intervention.[66,67] In a cohort of young adult males with ADHD followed prospectively for 10 years, patients receiving stimulant treatment were less likely than untreated peers to develop major depressive disorder (MDD), anxiety disorder, or disruptive behavior disorder and were less likely to repeat a school grade.[66] A short interval between diagnosis and treatment appears to be a factor predictive of lower MDD risk later in life.[67] Older adults with ADHD not receiving childhood stimulant treatment were 3 times more likely to be unemployed than counterparts who received treatment.[68] Future research is warranted to test the hypothesis that, with optimal treatment of cognitive and emotional symptoms of ADHD, there can be regular, repeated educational and interpersonal successes, which may affect susceptibility to events that might otherwise lead to clinical psychopathology later in life.

THE LIFE TRANSITION MODEL FOR PERSISTENTLY IMPAIRING ADHD

A Life Transition Model addresses patient and physician awareness of changing environmental demands during transitions from childhood to adolescence, and from adolescence to adulthood. An understanding of the illness and its symptom-related impairments may improve flexibility to alter treatment strategies that may be critical to adequate management. Parent-based management in childhood can be appropriately and gradually revised as maturation occurs. As in many chronic diseases,[69] access to care, supportive peer and family relationships, and a health system that addresses chronic illness management strategies are also important. The following discussion addresses the unique challenges and opportunities for the management of ADHD during 3 key developmental transitions.

Transitioning From Childhood Into Adolescence

In childhood, parents are responsible for obtaining medical care and maintaining treatment regimens. Timely diagnosis of ADHD is critical; children with ADHD whose symptoms go unrecognized or untreated often present as adolescents or adults with poorer outcomes, marked by greater risk of psychiatric illness[67] and unemployment[68] compared with treated children. The lowest levels of environmental demands and the highest levels of external support from family and teachers are encountered during the childhood years, providing ample opportunity to control ADHD symptoms and minimize potential negative effects of the disorder. For many pediatric patients with ADHD, parents and teachers control and manage their daily routine. They ensure that the ADHD treatment regimen is maintained and basic physical needs are fulfilled, and that children attend school and complete assignments. Social relationships also present low-level demands, requiring basic social skills such as taking turns, cooperating, and playing in an age- and situation-appropriate manner. Many pediatric patients with ADHD who receive consistent, adequate treatment exhibit good symptom control and show academic and social performance that is age appropriate. The situation can change, however, during the transition into adolescence (from 12 through 17 years of age), a period of dramatic physical, cognitive, and sexual maturation.[70]

During this period, demand-resource imbalances can emerge (see Figure 1), as teens with ADHD experience increased cognitive and social demands. Attention-deficit/hyperactivity disorder–related impairments may develop in peer and parental relationships and in academic performance. Although there is increasing independence from

parental support, some academic external supports, such as tutoring, alternative coursework, and additional time permitted for assignments and tests may be maintained during adolescence. Parents still provide basic needs and health care, and they still manage (to varying degrees) daily routine to ensure that school assignments and other responsibilities are fulfilled. At the same time, overt symptoms of physical hyperactivity begin to abate during adolescence, and teenage patients tend to underestimate their symptoms,[71] question their ADHD diagnosis, and reject support from parents. Not surprisingly, adolescents with ADHD exhibit low levels of adherence to and persistence with prescribed treatments.[71,72]

Despite their high treatment discontinuation rates, many adolescents continue to meet ADHD diagnostic criteria and/or exhibit significant functional impairments.[73] Adolescents with ADHD (compared with their peers without ADHD) are at heightened risk for having fewer friends, repeating grades, dropping out of high school, being suspended or expelled from school, abusing drugs or alcohol, being arrested, getting pregnant, having sexually transmitted diseases, and being fired from a job.[60,64,74] Patient management during adolescence can be further complicated by coexisting oppositional defiant disorder, conduct disorder, mood disorders, substance use disorder, personality disorders, and depressive and anxiety disorders.[71] Convergent lines of evidence from ADHD research and the study of temperament and personality have led to heightened interest in the impact of childhood ADHD on personality development and personality disorders in later life.[75–78] Little is known, however, on how management of ADHD in childhood may affect development of subsequent personality disorder.

Transitioning Into Young Adulthood

The transition into young adulthood (from 18 to 25 years of age) is a time for establishing lasting personal relationships outside the immediate family, beginning to become financially self-supporting, and choosing an occupation or career (Table 1).[79–94] Young adults are increasingly responsible for structuring and managing their time and activities. For some, this is the first time they must function completely independently of parental support.

Table 1. ADHD Life Transition Model Issues and Assessments

Transition Phase	Environmental Demands	Supportive Resources (internal, external)	Potential Health Professional	Issues for Examination	Assessment Tools
Into adolescence: 12–17 years	Independent school work Increased peer affiliation Dating/sexual activity Driving Increased independence from parent	Parents/family Teachers Self/internal resources Electronic devices	Pediatrician Family practitioner Social worker Psychologist Child psychiatrist School nurse Substance abuse counselor	Motor vehicle operations School performance Social and intimate relationships Sexual activity Risk-taking behavior Time management Substance use, including tobacco Risk factors for chronic illness	ADHD Rating Scale IV[79] Conners' Parent/Teacher Rating Scale-Revised[80] Vanderbilt ADHD Diagnostic Parent and Teacher Scales[81,82] Health Utilities Index[83] Youth Quality of Life Instrument-Research Version[84] Behavior Rating Inventory of Executive Functioning-Adult Version[85] Weiss Functional Impairment Rating Scale–Self-Report[86] Academic Performance Rating Scale[87]
Into young adulthood: 18–25 years	Post–high school education/training Living away from parent's home Emerging financial independence Work Dating/sexual activity Friendship	Parents/family Teachers Mnemonic devices Self/internal resources Electronic devices	Primary care provider College health service Obstetrician-gynecologist Internist Family practitioner Psychiatrist Neurologist Social worker Psychologist Substance abuse counselor	Employment Advanced education adaptation Legal issues Mood and anxiety symptoms/disorders Substance use, including tobacco Social and intimate relationships Risk factors for chronic illness	ADHD Rating Scale IV with adult prompts[79] Conners' Adult ADHD Rating Scale[88] Adult ADHD Self-Report Scale v1.1 Symptom Checklist[89] Adult ADHD Quality of Life Scale[90] Youth Quality of Life Instrument-Research Version[84] Behavior Rating Inventory of Executive Functioning-Adult Version[85] Stanford Test of Academic Skills (task)[91]
Into (or first diagnosis in) later adulthood: ≥ 25 years	Financial independence Work Marriage Children Friends Community (church, social, charity associations)	Spouse Self/internal resources Mnemonic devices Electronic devices	Primary care provider College health service Obstetrician-gynecologist Internist Family practitioner Psychiatrist Neurologist Social worker Psychologist	Legal issues Mood and anxiety symptoms/disorders Substance use, including tobacco Social and intimate relationships Financial issues	ADHD Rating Scale IV with adult prompts[79] Conners' Adult ADHD Rating Scale[88] Adult ADHD Self-Report Scale v1.1 Symptom Checklist[89] Adult ADHD Quality of Life Scale[90] ADHD Impact Module for Adults[92] Brown ADD Rating Scale for Adults[93] Endicott Work Productivity Scale[94]

Abbreviation: ADHD = attention-deficit/hyperactivity disorder.

The young adult is faced with critical decisions about college or entry into the workforce. Such choices can positively or negatively influence their course of life for years to come. It should be noted that for some children and adolescents with ADHD, symptoms diminish through adolescence into adulthood due to either alleviation of neurobiological maturational underdevelopment[95] or the development of effective coping skills making impairments less evident. For these young adults, the diagnostic criteria for ADHD may no longer apply because symptoms have subsided and/or impairments are not evident. However, young adult patients who experience continuing ADHD symptoms are highly vulnerable during this period. They are often no longer treated by their pediatricians; many lack access to medical insurance or regular health care; and many no longer live in their parents' households. Moreover, there may be a perceived stigma associated with the need for continued parental or medical support, and social or peer pressure, as well as internal psychodynamic conflicts about accepting a persistent mental illness, may exist. This may influence whether treatment and support are sought or maintained. Peer pressure to experiment with or abuse drugs or alcohol also puts young adults with ADHD at increased risk for substance use disorders compared with their peers without ADHD.[71] Although stimulant misuse is highly prevalent among young adults,[96] available evidence indicates that childhood stimulant treatment does not increase risk for subsequent substance use disorders,[97–99] and it may actually reduce this risk in late adolescence. The acknowledged risk of stimulant misuse among young adult patients must be balanced against the direct real-world consequences of poorly managed ADHD during the young adult years (eg, financial problems, arrests, substance use, early pregnancy, low academic achievement), which may endure for decades.[60,100]

Transitioning Into or Receiving the First Diagnosis in Later Adulthood

As young adults transition into later adulthood (from 25 years of age and beyond; see Table 1), environmental demands continue to increase in number, scope, and complexity, as individuals focus more fully on work, marriage, children, friendships, and relationships in the broader community. The external adult manifestation of ADHD symptoms is marked by little overt hyperactivity but continuing impulsivity and inattentiveness,[29] as well as poor emotional regulation. This makes it difficult to reconcile adult clinical presentation with diagnostic criteria that were developed to characterize the childhood presentation, unless appropriate age-adjusted criteria are considered. Adult hyperactivity may manifest as discomfort sitting through meetings or waiting in line, speeding while driving,[33,101] impulsivity or impatience, overreacting to frustration, temper outbursts, quitting a job or school, binge drinking, or sexual promiscuity. Inattention may be seen as complaints of procrastination, missing deadlines, difficulty planning and organizing, forgetfulness, a low boredom threshold, and inconsistent motivation.[32,33,101] Moreover, societal accommodations for ADHD behaviors tend to diminish in adulthood; allowances provided to younger students with ADHD (eg, extended time on tests, additional breaks) are typically not present in the workplace.[102]

As young adults with undiagnosed ADHD enter later adulthood, the increasing environmental demands from work and family and diminishing resources (Figure 1) may exacerbate symptoms and result in new functional impairments, leading to an adult ADHD diagnosis. Furthermore, because ADHD was underdiagnosed and undertreated in past years, there remains a large cohort of individuals with childhood ADHD that was never diagnosed and treated.[103] Newly diagnosed and treated adults with ADHD face psychological and emotional adjustments, as do their partners and family; such adjustments may involve introspective review of the past, psychological and emotional acceptance of the diagnosis, and consideration of the impact of ADHD.[104] Some untreated patients may develop compensatory strategies that "manage" their ADHD symptoms by adjusting daily functional demands.[33,101] Older patients may have more control through established daily routine and self-selection of occupations and social situations in which ADHD symptoms cause minimal impairment or, in some instances, may even predispose to success.[105] They may also avoid settings (eg, college) that accentuate ADHD symptoms.[33]

Compensation in one aspect of life/functioning, however, does not preclude impairments in others,[33] and adult ADHD symptom severity is significantly correlated with overall severity of impairments.[106] Adults with ADHD exhibit poor outcomes across multiple functional domains, including higher rates of recreational drug use, more workplace difficulties, and problems with relationships, compared with adults without ADHD.[64] They also require more medical care than matched controls, including general medical outpatient care and emergency department visits, as well as care for comorbid psychiatric disorders.[65,107] Internalizing psychiatric comorbidities such as anxiety disorders and MDD are 3- to 8-fold more prevalent in adults with ADHD compared with their counterparts without ADHD.[5] It is unclear, in many cases, whether these psychiatric comorbidities arise from undertreated ADHD, shared genetic and environmental risk factors, or a combination of these factors.[108] Adults receiving a first ADHD diagnosis and treatment in adulthood may require psychotherapy to address psychological issues, including regret over lost life opportunities, guilt from illness-related actions, and acceptance of the labels and stigma associated with persistent mental illness.

Developing a Transition Plan With Patients

During key life transitions, shifting and increasing functional demands may overwhelm the patients' internal and external resources. It is important for physicians and family members to proactively anticipate additional need for support. They can work toward increasing the patient's knowledge about ADHD and its impairments and instill confidence and motivation for self-management.[55] Unfortunately, during these periods, patients are most likely to

disengage from care.[72] Even without active disengagement, in some areas there may be a lack of clinical services for adult ADHD.[109] A central therapeutic goal, however, is to foster patient awareness and acceptance of illness-related symptoms, and an understanding of how inadequate management can result in reduced quality of life. Patients should be actively taught to recognize their own ADHD symptoms and any resulting impairments, and how these symptoms manifest when they are taking or not taking medication. Clinicians can expect some resistance, particularly in adolescents who frequently cite peer interactions and a desire for independence as reasons for discontinuing medications.[110] Many patients who stop taking medication in high school report resuming treatment in college when faced with greater demands, although many do so only "when needed."[110] Pharmacotherapy on an as-needed basis for ADHD, with its attendant use of short-acting (immediate-release stimulant) agents, may not be the optimal strategy for many patients because of the impact of multiple symptom clusters across multiple domains of life over the course of a day, especially when one considers the lower degree of compliance and adherence that may exist with such treatment compared with the compliance/adherence that may be attained with a simple, once-daily medication plan.[111] In addition, some adults may resist long-term treatment over concerns that medication will alter their personality, or fears of committing to lifelong management.[110,112] Consequently, health professionals must continually stress the importance of adherence to offset potential future risks of nontreatment.[62,102]

Two of the biggest challenges in developing adequate therapeutic support for older ADHD patients are the availability of trained health care providers and patient access to services. Because of the pediatric focus of ADHD treatment, there are no well-established models for transition to adult care. Furthermore, there remains a shortage of providers comfortable with managing adult ADHD, partly fueled by lack of formal ADHD training in medical residencies.[113] Treatment frequently involves prescribing controlled substances, and data suggest family medicine physicians are less comfortable than pediatricians about prescribing ADHD medications.[114] Also, in countries where health insurance is not required or provided, young adults are often uninsured[115] and may lack access to regular, affordable health care.[71,115] With ADHD-related occupational impairment, they may be entering the workforce at a low wage and, importantly, without adequate health benefits. In the most impaired cases, they may end up in a forensic setting. A recent study of male prisoners in the UK indicated that 14% had adult ADHD but were currently undiagnosed and untreated.[116]

In-depth discussion of the benefits, challenges, and risks of various treatment modalities for ADHD, including pharmacotherapy and psychosocial interventions such as cognitive-behavioral therapy (CBT) and other recently described options, is beyond the scope of this review. With specific regard to key life transition periods, both pharmacotherapy and behavioral interventions should be considered as part of a comprehensive treatment plan. Briefly, first-line recommended pharmacotherapy for ADHD in children, adolescents, and adults consists of psychostimulants, such as once-daily forms of methylphenidate and amphetamine or, in certain cases, a nonstimulant such as atomoxetine.[1,117] Patients in a transitional period are also most likely to require behavioral interventions aimed at helping them meet new and increased environmental demands as well as specific developmental goals, cope with interpersonal crises, and develop age-appropriate symptom awareness and self-management skills.

Available data document potential benefits of CBT in children,[118] adolescents,[119] and adults.[53,120–122] A novel metacognitive approach has demonstrated improvement in a controlled trial.[123] Psychotherapeutic approaches may be particularly useful during the transition phases through adolescence when, as discussed earlier, there is resistance to social influence from parents and adults, refusal of continued pharmacotherapy, and greater reliance on peer interactions. In children with ADHD, a number of behavioral interventions have shown good efficacy in randomized controlled trials; those that target organizational and time-management skills, externalizing behaviors (eg, aggression, defiance), and social skills[124–127] are particularly relevant to teens with ADHD going through a difficult developmental period. A novel school-based program for adolescents, the Challenging Horizons Program,[128] integrating peer interactions and greater autonomy of choice with established behavior management techniques, has demonstrated improvements in academic outcomes for teens with ADHD compared with those receiving community care. Cognitive-behavioral therapy has also demonstrated significant efficacy for reducing core ADHD symptoms in adults.[129] In 1 trial, the positive effects of CBT in adult patients were maintained for up to 9 months after treatment, a result that suggests this type of intervention provides individuals with an additional internal resource or skill to better self-manage their ADHD symptoms over time. It should also be borne in mind that, for many patients with ADHD at any life stage, it is also necessary to assess for and treat common psychiatric comorbidities, such as substance use disorders, oppositional defiant disorder, and anxiety and mood disorders.

DISCUSSION AND RECOMMENDATIONS

Approximately two-thirds of patients with ADHD are affected across their lifespan. At key transitions, treatment approaches must shift to help patients successfully negotiate increased environmental demands by providing increased external supportive resources and fostering development of greater internal resources (eg, better symptom control, self-management skills) to successfully achieve maturational milestones. Significant challenges to maintaining chronic, long-term care can be found at many levels. Patient-based barriers include increased risk-taking behavior, poor organization and emotional control, lack of insight/symptom recognition, and emergence or evolution of comorbidities. Physician-based barriers such as unfamiliarity with ADHD

symptoms in adolescents and adults and lack of experience with effective pharmacotherapies and behavioral treatments may contribute to suboptimal management. Family, friends, and employers of adults with ADHD may not recognize symptoms or may believe that people outgrow ADHD. Too often, adult ADHD symptoms are attributed to lack of motivation or personality factors, so medical assessment is missed. There are additional health care system barriers, such as the lack of established diagnostic and treatment guidelines to help patients transition from pediatric through adult-care settings and the continuing lack of sufficient clinical services for adults with ADHD. Additionally, lack of awareness on the part of government agencies, social service agencies, and the judicial system, encompassing law enforcement and local courts, contribute to inadequate and, often, inappropriate responses when patients with ADHD seek services from or interact with these bureaucracies.

The Life Transition Model offers a framework for care at specific periods of vulnerability. Physicians, both primary care and specialists, might feel more compelled to inquire and confident to intervene, advocating for optimal management. The Working Group suggests that physicians should remain diligent in identifying signs of suboptimal ADHD management at each transition phase (Table 1). Physicians and therapists should recognize these signs as opportunities to discuss treatment goals, benefits, risks, and options to foster collaborative interactions with the patient and family. These discussions can help patients develop, recognize, and harness a desire to control their symptoms, furthering self-management and treatment acceptance. The physician can provide insight into the potential for meaningful, negative long-term consequences of discontinued management. Moreover, at critical transition phases, it may also be advisable for physicians to establish an open-door policy for patients reassessing their treatment options. To overcome existing limitations in care, alternative strategies to improve knowledge about ADHD among physicians, parents, and patients need to be identified and more fully developed and implemented. Strategies may include wider availability and access to continuing medical education, focused residency training, public education programs, online information, and telemedicine.[69]

Drug names: amphetamine (Adderall, Vyvanse), atomoxetine (Strattera), methylphenidate (Daytrana, Ritalin, and others).

Author affiliations: Toronto ADHD Clinic, University of Toronto, Toronto, Ontario, Canada (Dr Turgay); Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, Baltimore, Maryland (Dr Goodman); MRC Social Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, London, United Kingdom (Dr Asherson); Shire Development Inc, Wayne, Pennsylvania (Drs Lasser and Babcock); SCI Scientific Communications and Information, Parsippany, New Jersey (Dr Pucci); and Department of Psychiatry, Medical University of South Carolina, Charleston, and Department of Psychiatry, SUNY Upstate Medical University, Syracuse, New York (Dr Barkley).

Potential conflicts of interest: **Dr Turgay** received research grant support or served as a consultant or speaker for AstraZeneca, Canadian Counseling Foundation, Canadian Independent Films Institute, Canadian Psychiatric Association, CellTech, Eli Lilly, GlaxoSmithKline, Hospital for Sick Children, Janssen-Cilag, Janssen-Ortho, Lundbeck, Nestlé, Novartis, Ontario Ministry of Children's Services, Ontario Psychiatric Association, Purdue Pharma, Sanofi-Aventis, Shire Canada, Shire UK, Shire US, The Scarborough Hospital, Turkish Medical Research Council, University of Ottawa, and Wellesley Foundation Canada. **Dr Goodman** has received research support from Forest Labs, Shire, McNeil, Cephalon, New River Pharmaceuticals, and Lilly; has received honoraria from Forest Labs, Lilly, Shire, McNeil, Wyeth, Synermed Communications, Veritas Institute, CME Inc, WebMD, Medscape, JB Ashton Associates, Audio-Digest Foundation, American Professional Society of ADHD and Related Disorders, Temple University, Neuroscience Education Institute, and Excerpta Medica; has been a speaker for Forest Labs, Shire, McNeil Pediatrics, and Wyeth; has been a consultant for Forest Labs, Lilly, Shire, McNeil, New River Pharmaceuticals, Thomson Reuters, Clinical Global Advisors, Avacat, Med-IQ, and Novartis; and receives royalties from MBL Communications. **Dr Asherson** has received grant/research support from Shire and Janssen-Cilag and has served as a speaker and consultant to and received honoraria from Eli Lilly, Flynn Pharma, Janssen-Cilag, and Shire. **Dr Lasser** is an employee of Shire. **Dr Babcock** is an employee of and a stock shareholder in Shire. **Dr Pucci** is an employee of SCI Scientific Communications & Information, Parsippany, New Jersey. SCI was funded by Shire Development Inc for support in writing and editing this article. **Dr Barkley** is a speaker/consultant for Eli Lilly and Shire, and a speaker for Janssen-Ortho, Janssen-Cilag, and Novartis; has served as an expert witness for Lilly Canada; and receives book royalties from Guilford Publications.

Funding/support: Shire Development Inc provided funding to SCI Scientific Communications & Information, who supported the writing and editing of this article and provided assistance in formatting, proofreading, copy editing, and fact checking.

Role of sponsor: Although Shire Development was involved in the topic concept and fact checking of information, the authors independently approved the content of this article; the ultimate interpretation and the decision to submit it for publication in *The Journal of Clinical Psychiatry* were made by the authors independently.

Acknowledgments: The authors thank Lenard A. Adler, MD, of New York University School of Medicine and New York VA Harbor Healthcare System for his participation in the ADHD Transition Phase Model Working Group, convened in April 2009, and for his valuable input in the conceptual development of this article. Bryan Dirks, MD, and Brian Scheckner, PharmD, of Shire Development, also reviewed and edited this article for scientific accuracy. Dr Adler has received grant/research support from Shire, Eli Lilly, National Institute of Drug Abuse, Chelsea Therapeutics, and the Department of Veterans Affairs Cooperative Studies; has served on the advisory board and been a consultant for Major League Baseball, Shire, Alcobra, and Theravance; and has received royalty payments (as inventor) since 2004 from New York University for license of adult ADHD scales and training materials. Dr Dirks is an employee of Shire and holds stocks and/or stock options in Johnson & Johnson and Shire. Dr Scheckner is an employee of Shire and holds stocks and/or stock options in Shire.

REFERENCES

1. Pliszka S; AACAP Work Group on Quality Issues. Practice parameter for the assessment and treatment of children and adolescents with attention-deficit/hyperactivity disorder. *J Am Acad Child Adolesc Psychiatry*. 2007; 46(7):894–921.
2. Atkinson M, Hollis C. NICE guideline: attention deficit hyperactivity disorder. *Arch Dis Child Educ Pract Ed*. 2010;95(1):24–27.
3. Kooij SJ, Bejerot S, Blackwell A, et al. European consensus statement on diagnosis and treatment of adult ADHD: The European Network Adult ADHD. *BMC Psychiatry*. 2010;10(1):67.
4. Simon V, Czobor P, Bálint S, et al. Prevalence and correlates of adult attention-deficit hyperactivity disorder: meta-analysis. *Br J Psychiatry*. 2009;194(3):204–211.
5. Kessler RC, Adler L, Barkley R, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry*. 2006;163(4):716–723.
6. Fayyad J, De Graaf R, Kessler R, et al. Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. *Br J Psychiatry*. 2007;190(5):402–409.
7. Taylor E, Döpfner M, Sergeant J, et al. European clinical guidelines for hyperkinetic disorder—first upgrade. *Eur Child Adolesc Psychiatry*. 2004; 13(suppl 1):17–30.
8. American Psychiatric Association. Attention-deficit and disruptive behavior disorders. In: *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision. Washington, DC:

© Copyright 2012 Physicians Postgraduate Press, Inc.

American Psychiatric Association; 2000: 85–93.
9. Polanczyk G, de Lima MS, Horta BL, et al. The worldwide prevalence of ADHD: a systematic review and metaregression analysis. *Am J Psychiatry*. 2007;164(6):942–948.
10. Franke B, Neale BM, Faraone SV. Genome-wide association studies in ADHD. *Hum Genet*. 2009;126(1):13–50.
11. Tahir E, Yazgan Y, Cirakoglu B, et al. Association and linkage of DRD4 and DRD5 with attention deficit hyperactivity disorder (ADHD) in a sample of Turkish children. *Mol Psychiatry*. 2000;5(4):396–404.
12. Kustanovich V, Ishii J, Crawford L, et al. Transmission disequilibrium testing of dopamine-related candidate gene polymorphisms in ADHD: confirmation of association of ADHD with DRD4 and DRD5. *Mol Psychiatry*. 2004;9(7):711–717.
13. Bobb AJ, Addington AM, Sidransky E, et al. Support for association between ADHD and two candidate genes: *NET1* and *DRD1*. *Am J Med Genet B Neuropsychiatr Genet*. 2005;134B(1):67–72.
14. Durston S, Fossella JA, Mulder MJ, et al. Dopamine transporter genotype conveys familial risk of attention-deficit/hyperactivity disorder through striatal activation. *J Am Acad Child Adolesc Psychiatry*. 2008;47(1):61–67.
15. Roman T, Schmitz M, Polanczyk GV, et al. Further evidence for the association between attention-deficit/hyperactivity disorder and the dopamine-beta-hydroxylase gene. *Am J Med Genet*. 2002;114(2):154–158.
16. Roman T, Schmitz M, Polanczyk GV, et al. Is the alpha-2A adrenergic receptor gene (ADRA2A) associated with attention-deficit/hyperactivity disorder? *Am J Med Genet B Neuropsychiatr Genet*. 2003;120B(1):116–120.
17. Valera EM, Faraone SV, Murray KE, et al. Meta-analysis of structural imaging findings in attention-deficit/hyperactivity disorder. *Biol Psychiatry*. 2007;61(12):1361–1369.
18. Plessen KJ, Bansal R, Zhu H, et al. Hippocampus and amygdala morphology in attention-deficit/hyperactivity disorder. *Arch Gen Psychiatry*. 2006;63(7):795–807.
19. Soliva JC, Carmona S, Fauquet J, et al. Neurobiological substrates of social cognition impairment in attention-deficit hyperactivity disorder: gathering insights from seven structural and functional magnetic resonance imaging studies. *Ann N Y Acad Sci*. 2009;1167(1):212–220.
20. Ginsberg LD, Jain R, Murphy WR, et al. Response and symptomatic remission with open-label coadministration of guanfacine extended release and stimulants for ADHD. Poster presented at: the 163rd Annual Meeting of the American Psychiatric Association; May 22–26, 2010; New Orleans, LA.
21. Makris N, Biederman J, Valera EM, et al. Cortical thinning of the attention and executive function networks in adults with attention-deficit/hyperactivity disorder. *Cereb Cortex*. 2007;17(6):1364–1375.
22. Seidman LJ, Valera EM, Makris N, et al. Dorsolateral prefrontal and anterior cingulate cortex volumetric abnormalities in adults with attention-deficit/hyperactivity disorder identified by magnetic resonance imaging. *Biol Psychiatry*. 2006;60(10):1071–1080.
23. Bush G, Valera EM, Seidman LJ. Functional neuroimaging of attention-deficit/hyperactivity disorder: a review and suggested future directions. *Biol Psychiatry*. 2005;57(11):1273–1284.
24. Rubia K, Overmeyer S, Taylor E, et al. Hypofrontality in attention deficit hyperactivity disorder during higher-order motor control: a study with functional MRI. *Am J Psychiatry*. 1999;156(6):891–896.
25. Bush G, Frazier JA, Rauch SL, et al. Anterior cingulate cortex dysfunction in attention-deficit/hyperactivity disorder revealed by fMRI and the Counting Stroop. *Biol Psychiatry*. 1999;45(12):1542–1552.
26. Skirrow C, McLoughlin G, Kuntsi J, et al. Behavioral, neurocognitive and treatment overlap between attention-deficit/hyperactivity disorder and mood instability. *Expert Rev Neurother*. 2009;9(4):489–503.
27. Barkley RA. Behavioral inhibition, sustained attention, and executive functions: constructing a unifying theory of ADHD. *Psychol Bull*. 1997; 121(1):65–94.
28. Pennington BF, Ozonoff S. Executive functions and developmental psychopathology. *J Child Psychol Psychiatry*. 1996;37(1):51–87.
29. Biederman J, Mick E, Faraone SV. Age-dependent decline of symptoms of attention deficit hyperactivity disorder: impact of remission definition and symptom type. *Am J Psychiatry*. 2000;157(5):816–818.
30. Weiss G, Trokenberg-Hechtman L. *Hyperactive Children Grown Up, ADHD in Children, Adolescents, and Adults*. 2nd ed. New York, NY: The Guilford Press; 1996.
31. McGough JJ, Barkley RA. Diagnostic controversies in adult attention deficit hyperactivity disorder. *Am J Psychiatry*. 2004;161(11):1948–1956.
32. Gibbins C, Weiss M. Clinical recommendations in current practice guidelines for diagnosis and treatment of ADHD in adults. *Curr Psychiatry Rep*. 2007;9(5):420–426.
33. Weiss MD, Weiss JR. A guide to the treatment of adults with ADHD. *J Clin Psychiatry*. 2004;65(suppl 3):27–37.
34. Lee SI, Schachar RJ, Chen SX, et al. Predictive validity of *DSM-IV* and *ICD-10* criteria for ADHD and hyperkinetic disorder. *J Child Psychol Psychiatry*. 2008;49(1):70–78.
35. Barkley RA, Fischer M, Smallish L, et al. The persistence of attention-deficit/hyperactivity disorder into young adulthood as a function of reporting source and definition of disorder. *J Abnorm Psychol*. 2002; 111(2):279–289.
36. American Psychiatric Association. Attention Deficit/Hyperactivity Disorder. 314.0x. Summary of changes under consideration for ADHD. http://www.dsm5.org/ProposedRevisions/Pages/proposedrevision.aspx?rid=383. Accessed November 11, 2011.
37. New York State Department of Health. Resource Directory for Children and Young Adults with Special Health Care Needs. http://www.health.state.ny.us/publications/0548.pdf. Accessed November 11, 2011.
38. American Academy of Pediatrics; American Academy of Family Physicians; American College of Physicians-American Society of Internal Medicine. A consensus statement on health care transitions for young adults with special health care needs. *Pediatrics*. 2002;110(6, pt 2): 1304–1306.
39. Dixon LB, Dickerson F, Bellack AS, et al; Schizophrenia Patient Outcomes Research Team (PORT). The 2009 schizophrenia PORT psychosocial treatment recommendations and summary statements. *Schizophr Bull*. 2010;36(1):48–70.
40. Brown AH, Cohen AN, Chinman MJ, et al. EQUIP: implementing chronic care principles and applying formative evaluation methods to improve care for schizophrenia: QUERI Series. *Implement Sci*. 2008;3(1):9.
41. Tuchman LK, Slap GB, Britto MT. Transition to adult care: experiences and expectations of adolescents with a chronic illness. *Child Care Health Dev*. 2008;34(5):557–563.
42. Kulig J. Advances in medical management of asthma, headaches, and fatigue. *Med Clin North Am*. 2000;84(4):829–850, vi.
43. Brumfield K, Lansbury G. Experiences of adolescents with cystic fibrosis during their transition from paediatric to adult health care: a qualitative study of young Australian adults. *Disabil Rehabil*. 2004;26(4):223–234.
44. Escher JC. Transition from pediatric to adult health care in inflammatory bowel disease. *Dig Dis*. 2009;27(3):382–386.
45. Nasr SZ. Cystic fibrosis in adolescents and young adults. *Adolesc Med*. 2000;11(3):589–603.
46. Spencer CH, Fife RZ, Rabinovich CE. The school experience of children with arthritis: coping in the 1990s and transition into adulthood. *Pediatr Clin North Am*. 1995;42(5):1285–1298.
47. Hagood JS, Lenker CV, Thrasher S. A course on the transition to adult care of patients with childhood-onset chronic illnesses. *Acad Med*. 2005; 80(4):352–355.
48. Scal P. Transition for youth with chronic conditions: primary care physicians' approaches. *Pediatrics*. 2002;110(6, pt 2):1315–1321.
49. McPherson M, Weissman G, Strickland BB, et al. Implementing community-based systems of services for children and youths with special health care needs: how well are we doing? Pediatrics. 2004;113(5 suppl): 1538–1544.
50. Reiss J, Gibson R. Health care transition: destinations unknown. *Pediatrics*. 2002;110(6, pt 2):1307–1314.
51. Lotstein DS, Ghandour R, Cash A, et al. Planning for health care transitions: results from the 2005–2006 National Survey of Children With Special Health Care Needs. *Pediatrics*. 2009;123(1):e145–e152.
52. Schmidt S, Petermann F. Developmental psychopathology: attention deficit hyperactivity disorder (ADHD). *BMC Psychiatry*. 2009;9(1):58.
53. Young S, Amarasinghe JM. Practitioner review: non-pharmacological treatments for ADHD: a lifespan approach. *J Child Psychol Psychiatry*. 2010;51(2):116–133.
54. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *Int J Epidemiol*. 2002;31(2):285–293.
55. Bodenheimer T, Lorig K, Holman H, et al. Patient self-management of chronic disease in primary care. *JAMA*. 2002;288(19):2469–2475.
56. Lazarus RS. Coping theory and research: past, present, and future. *Psychosom Med*. 1993;55(3):234–247.
57. Folkman S, Moskowitz JT. Coping: pitfalls and promise. *Annu Rev Psychol*. 2004;55(1):745–774.
58. Hoza B. Peer functioning in children with ADHD. *Ambul Pediatr*. 2007; 7(1 suppl):101–106.
59. Reiff MI, Stein MT. Attention-deficit/hyperactivity disorder evaluation and diagnosis: a practical approach in office practice. *Pediatr Clin North Am*. 2003;50(5):1019–1048.
60. Barkley RA, Fischer M, Smallish L, et al. Young adult outcome of

hyperactive children: adaptive functioning in major life activities. *J Am Acad Child Adolesc Psychiatry*. 2006;45(2):192–202.
61. Barkley RA, Guevremont DC, Anastopoulos AD, et al. Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: a 3- to 5-year follow-up survey. *Pediatrics*. 1993;92(2):212–218.
62. Barkley RA, Cox D. A review of driving risks and impairments associated with attention-deficit/hyperactivity disorder and the effects of stimulant medication on driving performance. *J Safety Res*. 2007;38(1):113–128.
63. Biederman J, Petty CR, Fried R, et al. Educational and occupational underattainment in adults with attention-deficit/hyperactivity disorder: a controlled study. *J Clin Psychiatry*. 2008;69(8):1217–1222.
64. Biederman J, Faraone SV, Spencer TJ, et al. Functional impairments in adults with self-reports of diagnosed ADHD: a controlled study of 1,001 adults in the community. *J Clin Psychiatry*. 2006;67(4):524–540.
65. Sobanski E. Psychiatric comorbidity in adults with attention-deficit/hyperactivity disorder (ADHD). *Eur Arch Psychiatry Clin Neurosci*. 2006;256(suppl 1):i26–i31.
66. Biederman J, Monuteaux MC, Spencer T, et al. Do stimulants protect against psychiatric disorders in youth with ADHD? A 10-year follow-up study. *Pediatrics*. 2009;124(1):71–78.
67. Daviss WB, Birmaher B, Diler RS, et al. Does pharmacotherapy for attention-deficit/hyperactivity disorder predict risk of later major depression? *J Child Adolesc Psychopharmacol*. 2008;18(3):257–264.
68. Halmøy A, Fasmer OB, Gillberg C, et al. Occupational outcome in adult ADHD: impact of symptom profile, comorbid psychiatric problems, and treatment: a cross-sectional study of 414 clinically diagnosed adult ADHD patients. *J Atten Disord*. 2009;13(2):175–187.
69. Glasgow RE, McKay HG, Piette JD, et al. The RE-AIM framework for evaluating interventions: what can it tell us about approaches to chronic illness management? *Patient Educ Couns*. 2001;44(2):119–127.
70. Erikson EH. *Identity and the Life Cycle*. New York, NY: W W Norton & Company, Inc; 1980.
71. Wolraich ML, Wibbelsman CJ, Brown TE, et al. Attention-deficit/hyperactivity disorder among adolescents: a review of the diagnosis, treatment, and clinical implications. *Pediatrics*. 2005;115(6):1734–1746.
72. McCarthy S, Asherson P, Coghill D, et al. Attention-deficit hyperactivity disorder: treatment discontinuation in adolescents and young adults. *Br J Psychiatry*. 2009;194(3):273–277.
73. Biederman J, Faraone S, Milberger S, et al. Predictors of persistence and remission of ADHD into adolescence: results from a four-year prospective follow-up study. *J Am Acad Child Adolesc Psychiatry*. 1996;35(3):343–351.
74. Barkley RA. *Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment*. 3rd ed. New York, NY: Guilford Press; 2006.
75. Anckarsäter H, Stahlberg O, Larson T, et al. The impact of ADHD and autism spectrum disorders on temperament, character, and personality development. *Am J Psychiatry*. 2006;163(7):1239–1244.
76. Rettew DC, McKee L. Temperament and its role in developmental psychopathology. *Harv Rev Psychiatry*. 2005;13(1):14–27.
77. Nigg JT, Goldsmith HH, Sachek J. Temperament and attention deficit hyperactivity disorder: the development of a multiple pathway model. *J Clin Child Adolesc Psychol*. 2004;33(1):42–53.
78. Williams ED, Reimherr FW, Marchant BK, et al. Personality disorder in ADHD, part 1: assessment of personality disorder in adult ADHD using data from a clinical trial of OROS methylphenidate. *Ann Clin Psychiatry*. 2010;22(2):84–93.
79. DuPaul GJ, Power TJ, Anastopoulos AD, et al. *ADHD Rating Scale-IV: Checklists, Norms, and Clinical Interpretation*. New York, NY: Guilford Press; 1998.
80. Conners CK. *Conners' Rating Scales-Revised Technical Manual*. North Tonawanda, NY: Multi-Health Systems Inc; 1997.
81. Wolraich ML, Hannah JN, Baumgaertel A, et al. Examination of *DSM-IV* criteria for attention deficit/hyperactivity disorder in a county-wide sample. *J Dev Behav Pediatr*. 1998;19(3):162–168.
82. Wolraich ML, Lambert W, Doffing MA, et al. Psychometric properties of the Vanderbilt ADHD diagnostic parent rating scale in a referred population. *J Pediatr Psychol*. 2003;28(8):559–567.
83. Horsman J, Furlong W, Feeny D, et al. The Health Utilities Index (HUI): concepts, measurement properties and applications. *Health Qual Life Outcomes*. 2003;1(1):54.
84. Patrick DL, Edwards TC, Topolski TD. Adolescent quality of life, part 2: initial validation of a new instrument. *J Adolesc*. 2002;25(3):287–300.
85. Roth RM, Isquith PK, Gioia GA. *Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A)*. Lutz, FL: Psychological Assessment Resources, Inc; 1999.
86. Weiss M. *Weiss Functional Impairment Rating Scale Self-Report (WFIRS-S)*. Vancouver, British Columbia: University of British Columbia; 2000.
87. DuPaul GJ, Rapport MD, Perriello LM. Teacher ratings of academic skills: the development of the Academic Performance Rating Scale. *School Psych Rev*. 1991;20(2):284–300.
88. Conners CK, Erhardt D, Sparrow E. *Conners' Adult ADHD Rating Scales (CAARS). Technical Manual*. New York, NY: Multi-Health Systems; 1999.
89. Adler L, Kessler RC, Spencer T. with the World Health Organization. Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist Instructions. http://webdoc.nyumc.org/nyumc/files/psych/attachments/psych_adhd_checklist.pdf. Accessed November 11, 2011.
90. Brod M, Johnston J, Able S, et al. Validation of the Adult Attention-Deficit/Hyperactivity Disorder Quality-of-Life Scale (AAQoL): a disease-specific quality-of-life measure. *Qual Life Res*. 2006;15(1):117–129.
91. *Stanford Test of Academic Skills*. 4th ed. Boston, MA: Psychological Corporation; 1996.
92. Landgraf JM. Monitoring quality of life in adults with ADHD: reliability and validity of a new measure. *J Atten Disord*. 2007;11(3):351–362.
93. Brown TE. *Brown Attention-Deficit Hyperactivity Disorder Scales for Adolescents and Adults*. San Antonio, TX: The Psychological Corporation; 1996.
94. Endicott J, Nee J. Endicott Work Productivity Scale (EWPS): a new measure to assess treatment effects. *Psychopharmacol Bull*. 1997;33(1):13–16.
95. Shaw P, Lerch J, Greenstein D, et al. Longitudinal mapping of cortical thickness and clinical outcome in children and adolescents with attention-deficit/hyperactivity disorder. *Arch Gen Psychiatry*. 2006;63(5):540–549.
96. Wilens TE, Adler LA, Adams J, et al. Misuse and diversion of stimulants prescribed for ADHD: a systematic review of the literature. *J Am Acad Child Adolesc Psychiatry*. 2008;47(1):21–31.
97. Biederman J, Monuteaux MC, Spencer T, et al. Stimulant therapy and risk for subsequent substance use disorders in male adults with ADHD: a naturalistic controlled 10-year follow-up study. *Am J Psychiatry*. 2008;165(5):597–603.
98. Wilens TE, Faraone SV, Biederman J, et al. Does stimulant therapy of attention-deficit/hyperactivity disorder beget later substance abuse? A meta-analytic review of the literature. *Pediatrics*. 2003;111(1):179–185.
99. Wilens TE, Adamson J, Monuteaux MC, et al. Effect of prior stimulant treatment for attention-deficit/hyperactivity disorder on subsequent risk for cigarette smoking and alcohol and drug use disorders in adolescents. *Arch Pediatr Adolesc Med*. 2008;162(10):916–921.
100. Barkley RA. Global issues related to the impact of untreated attention-deficit/hyperactivity disorder from childhood to young adulthood. *Postgrad Med*. 2008;120(3):48–59.
101. Wilens TE, Dodson W. A clinical perspective of attention-deficit/hyperactivity disorder into adulthood. *J Clin Psychiatry*. 2004;65(10):1301–1313.
102. Gotlieb EM, Gotlieb JS. Helping adolescents with attention-deficit/hyperactivity disorder transition toward adulthood. *Adolesc Med State Art Rev*. 2009;20(1):203–222, xi.
103. Wong IC, Asherson P, Bilbow A, et al. Cessation of attention deficit hyperactivity disorder drugs in the young (CADDY)—a pharmacoepidemiological and qualitative study. *Health Technol Assess*. 2009;13(50):iii–iv, ix–xi, 1–120.
104. Young S, Gray K, Bramham J. A phenomenological analysis of the experience of receiving a diagnosis and treatment of ADHD in adulthood: a partner's perspective. *J Atten Disord*. 2009;12(4):299–307.
105. Levander A, Raccuia I. *Entrepreneurial Profiling (Stimuli, Reaction, Action). A Cognitive Approach to Entrepreneurship*. Stockholm, Sweden: Stockholm School of Entrepreneurship; 2001.
106. Kooij JJS, Buitelaar JK, van den Oord EJ, et al. Internal and external validity of attention-deficit hyperactivity disorder in a population-based sample of adults. *Psychol Med*. 2005;35(6):817–827.
107. Secnik K, Swensen A, Lage MJ. Comorbidities and costs of adult patients diagnosed with attention-deficit hyperactivity disorder. *Pharmacoeconomics*. 2005;23(1):93–102.
108. Lara C, Fayyad J, de Graaf R, et al. Childhood predictors of adult attention-deficit/hyperactivity disorder: results from the World Health Organization World Mental Health Survey Initiative. *Biol Psychiatry*. 2009;65(1):46–54.
109. National Institute for Health and Clinical Excellence. Attention deficit hyperactivity disorder: Diagnosis and management of ADHD in

children, young people, and adults. NICE Clinical Guideline 72. http://www.nice.org.uk/nicemedia/pdf/ADHDFullGuideline.pdf. Accessed November 11, 2011.
110. Meaux JB, Hester C, Smith B, et al. Stimulant medications: a trade-off? the lived experience of adolescents with ADHD. *J Spec Pediatr Nurs*. 2006;11(4):214–226.
111. Cramer JA, Mattson RH, Prevey ML, et al. How often is medication taken as prescribed? A novel assessment technique. *JAMA*. 1989; 261(22):3273–3277.
112. Williamson P, Koro-Ljungberg ME, Bussing R. Analysis of critical incidents and shifting perspectives: transitions in illness careers among adolescents with ADHD. *Qual Health Res*. 2009;19(3):352–365.
113. Adler L, Shaw D, Sitt D, et al. Issues in the diagnosis and treatment of adult ADHD by primary care physicians. *Prim Psychiatry*. 2009; 16(5):57–63. http://www.primarypsychiatry.com/aspx/articledetail.aspx?articleid=2089. Accessed November 11, 2011.
114. Fremont WP, Nastasi R, Newman N, et al. Comfort level of pediatricians and family medicine physicians diagnosing and treating child and adolescent psychiatric disorders. *Int J Psychiatry Med*. 2008;38(2): 153–168.
115. Callahan ST, Cooper WO. Uninsurance and health care access among young adults in the United States. *Pediatrics*. 2005;116(1):88–95.
116. Young S, Gudjonsson GH, Wells J, et al. Attention deficit hyperactivity disorder and critical incidents in a Scottish prison population. *Pers Individ Dif*. 2009;46(3):265–269.
117. Canadian ADHD Resource Alliance. Canadian ADHD Practice Guidelines. CAP-Guidelines 3rd edition. http://www.caddra.ca/cms4/pdfs/caddraGuidelines2011.pdf. Accessed November 11, 2011.
118. Pelham WE Jr, Fabiano GA. Evidence-based psychosocial treatments for attention-deficit/hyperactivity disorder. *J Clin Child Adolesc Psychol*. 2008;37(1):184–214.
119. Evans SW, Serpell ZN, Schultz BK, et al. Cumulative benefits of secondary school-based treatment of students with attention deficit hyperactivity disorder. *School Psych Rev*. 2007;36(2):256–273.
120. Virta M, Vedenpää A, Grönroos N, et al. Adults with ADHD benefit from cognitive-behaviorally oriented group rehabilitation: a study of 29 participants. *J Atten Disord*. 2008;12(3):218–226.
121. Safren SA, Otto MW, Sprich S, et al. Cognitive-behavioral therapy for ADHD in medication-treated adults with continued symptoms. *Behav Res Ther*. 2005;43(7):831–842.
122. Bramham J, Young S, Bickerdike A, et al. Evaluation of group cognitive behavioral therapy for adults with ADHD. *J Atten Disord*. 2009;12(5): 434–441.
123. Solanto MV, Marks DJ, Mitchell KJ, et al. Development of a new psychosocial treatment for adult ADHD. *J Atten Disord*. 2008;11(6): 728–736.
124. Pfiffner LJ, Yee Mikami A, Huang-Pollock C, et al. A randomized, controlled trial of integrated home-school behavioral treatment for ADHD, predominantly inattentive type. *J Am Acad Child Adolesc Psychiatry*. 2007;46(8):1041–1050.
125. Tamm L, Hughes C, Ames L, et al. Attention training for school-aged children with ADHD: results of an open trial. *J Atten Disord*. 2010; 14(1):86–94.
126. So CY, Leung PW, Hung SF. Treatment effectiveness of combined medication/behavioural treatment with Chinese ADHD children in routine practice. *Behav Res Ther*. 2008;46(9):983–992.
127. van den Hoofdakker BJ, Nauta MH, van der Veen-Mulders L, et al. Behavioral parent training as an adjunct to routine care in children with attention-deficit/hyperactivity disorder: moderators of treatment response. *J Pediatr Psychol*. 2010;35(3):317–326.
128. Schultz BK, Evans SW. Preventing failure among middle school students with attention deficit hyperactivity disorder: a survival analysis. *School Psych Rev*. 2009;38(1):14–27. http://www.nasponline.org/publications/spr/pdf/spr381schultz.pdf. Accessed November 11, 2011.
129. Safren SA, Sprich S, Mimiaga MJ, et al. Cognitive behavioral therapy vs relaxation with educational support for medication-treated adults with ADHD and persistent symptoms: a randomized controlled trial. *JAMA*. 2010;304(8):875–880.