

The Consequences of Attention-Deficit/ Hyperactivity Disorder in Adults

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Until recently, attention-deficit/hyperactivity disorder (ADHD) was a diagnosis reserved for children and adolescents as it was believed to dissipate before adulthood. New evidence, however, supports the persistence of ADHD beyond adolescence, and it is now recognized as a chronic neurobehavioral disorder in adults. Adults with ADHD have difficulties with school, work, family interactions, and social activities. Although treatments are available for adult ADHD, many patients never receive an accurate diagnosis that would afford them appropriate therapeutic intervention. If left untreated, adult ADHD can cause significant personal, social, and economic burdens that can have a negative impact on overall quality of life. This article discusses how ADHD presents in adults and the effects of the disorder on educational, occupational, interpersonal, and social functioning. Currently available treatments for ADHD in adults are also reviewed. (*Journal of Psychiatric Practice* 2007;13:318-327)

KEY WORDS: attention-deficit/hyperactivity disorder (ADHD), adult ADHD, substance use disorder, dopamine, quality of life

Attention-deficit/hyperactivity disorder (ADHD) is a common childhood disorder, with an estimated worldwide incidence of 8%–12%,¹ yet it is now known that ADHD often persists into adulthood. The estimated prevalence of adult ADHD in the United States is 4.4%, so that this disorder affects more than nine million people.² Studies have reported an association between a specific genotype found in individuals with ADHD and the dopamine transporter.³ Other candidate genes that may be associated with ADHD have been identified in the norepinephrine and serotonin systems.⁴ A familial pattern has been documented by case-control studies indicating that children of adults with ADHD are themselves at increased risk for developing the disorder.⁵ For example, Palacio et al.⁶ determined a high rate of heritability of ADHD among members of the genetically isolated Paisa community in Columbia; one-third of families with a child being evaluated for ADHD contained other family members with ADHD as well as comorbid conduct disorder, oppositional defiant disorder, nicotine dependence, and alcohol abuse.

According to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision (DSM-IV-TR), symptoms of ADHD begin in childhood (onset by age 7) and continue into adulthood.⁷ Because the diagnostic criteria are based on studies conducted in indi-

viduals who were 4–17 years of age, the terms used to describe the symptoms may not represent true adult presentations and thus may complicate the diagnosis in adults.⁸ In addition, these criteria are not validated for the adult population, and adherence to them may result in an underdiagnosis of some individuals who might benefit greatly from intervention.⁹

Three ADHD subtypes are recognized in the DSM-IV-TR: inattentive, hyperactive/impulsive, and combined. ADHD not otherwise specified is reserved for patients whose symptoms were not noted until or after age 7. To make a diagnosis of the predominantly inattentive subtype, at least 6 of 9 symptoms of inattention must be present; to make a diagnosis of the predominantly hyperactive-impulsive subtype, 6 of 9 hyperactive-impulsive symptoms must be present; for the combined sub-

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ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN ADULTS

type of ADHD to be diagnosed, criteria for both the preceding subtypes must be met.¹⁰ The diagnostic process for ADHD in adults can involve multiple steps, including discussing current symptoms (rating scales can be used) and childhood history, conducting a general psychological evaluation, assessing functional impairment, taking a family psychiatric history, and obtaining objective assessment from a spouse.^{11,12}

Although diagnostic criteria for ADHD are the same for children and adults, the presentation of the disorder differs between them (Table 1).^{7,13} In children, the ratio of boys to girls diagnosed with ADHD is approximately 3:1,¹⁴ whereas in adults the male-to-female ratio is almost 1:1.¹³ This difference in gender distribution may reflect referral patterns more than an actual difference in prevalence in adults.¹³

In addition to differences in presentation, an age-dependent decline in symptoms has also been described.^{15,16} Symptoms of hyperactivity and impulsivity decline more rapidly with age than do symptoms of inattention.¹⁵ As an individual with ADHD grows older, deficits in executive functions—a complex process regulating self-sufficiency, responsible behavior, organization, social skills, and planning/concern for the future—become more salient relative to attentional problems. In adults with ADHD, these deficits are exhibited by difficulty with sustained attention, working memory, and verbal fluency.⁸

The diagnosis of ADHD in adults is often complicated by the presence of comorbid conditions that may deflect the focus of the diagnostician. The rate of lifetime comorbidity has been estimated at 80% in patients with ADHD.¹¹ A retrospective analysis of data from more than 2000 adults with ADHD matched 1:1 with individuals who did not have ADHD identified asthma, anxiety, bipolar disorder, depression, drug or alcohol use, and antisocial behavior as frequent comorbidities.¹⁷ These data are consistent with other research that has identified a significant association between adult ADHD and other psychiatric diagnoses, particularly depression, bipolar disorder, anxiety, and substance use disorder (SUD).^{2,14,18} Some comorbidities are less common in

Table 1. ADHD symptom evolution from childhood to adulthood^{7,13}

	<i>Childhood</i>	<i>Adulthood</i>
Inattention	Difficulty sustaining attention	Difficulty sustaining attention (meetings, reading, paperwork)
	Failure to pay attention to details	Makes careless errors
	Appears not to listen	Easily distracted/forgetful
	Lacks follow through	Poor concentration
	Cannot organize	Difficulty finishing tasks
	Loses important items	Disorganized/misplaces items
Hyperactivity	Squirming, fidgeting	Inefficiencies at work
	Cannot stay seated	Internal restlessness
	Cannot wait turn	Difficulty sitting through meetings
	Runs/climbs excessively	Works more than one job
	Cannot play/work quietly	Works long hours
	"On the go"/driven by motor	Self-selects very active job
Impulsivity	Talks excessively	Overwhelmed
		Talks excessively
	Blurts out answers	Impulsive job changes
	Cannot wait in line	Drives too fast
	Intrudes/interrupts others	Interrupts others
		Easily frustrated

women; for example, men have a higher rate of conduct disorder and antisocial personality disorder.¹⁹

Many adults with ADHD never receive a diagnosis; their symptoms are instead attributed to motivational or intellectual deficits. The lack of a precise physiologic marker for ADHD further increases the difficulty of making an accurate diagnosis. However, data are now accumulating that provide insight into the neurobiologic aspects of ADHD. Functional magnetic resonance imaging (fMRI) and positron emission tomographic (PET) images have identified consistent findings, such as smaller, less-active circuits that control attention,¹⁴ among patients with ADHD compared with controls. In addition, the dopamine-binding transporter responsible for inactivation and recycling of dopamine appears to have altered binding potential in individuals with ADHD.

Volkow et al. used PET to evaluate the metabolism and dopamine receptor binding of the stimulant methylphenidate. They determined that more than half of the dopamine transporters were blocked by methylphenidate, thus significantly enhancing the extracellular availability of dopamine.²⁰ More specifically, changes in glucose metabolism in the frontal, temporal, and cerebellar regions and basal ganglia following methylphenidate administration were directly related to dopamine D₂ receptor availability in these areas of the brain; they thus determined that changes in dopamine concentration will either increase or decrease metabolism in cortical and subcortical brain regions.²¹ Evaluation of ADHD using fMRI confirms these findings, suggesting that ADHD dysfunction originates in the prefrontal cortex, caudate, and putamen,²² leading to simple and complex cognitive dysfunction in the adult with ADHD.²³

IMPACT OF ADHD IN ADULTS

At School or Work

Adults with ADHD often function below their ability for much of their lives. Some adults with ADHD who have high IQs and advanced education may experience difficulty completing college or achieving career milestones, as academic and job demands limit their ability to compensate for their ADHD symptoms.²⁴

Grade retention and a higher rate of suspension or expulsion from school are common among individuals with ADHD,¹¹ who also have less likelihood of graduating from high school or obtaining a college degree.²⁵ Barkley et al. found a 3-fold increased likelihood of failing a grade or suspension and an 8-fold increased likelihood of school expulsion or dropout among adolescents who were diagnosed with ADHD in childhood as compared with adolescents without ADHD.²⁶ In a community survey by Biederman et al. of 1001 adults (500 adults with ADHD and 501 gender- and age-matched controls), those with ADHD reported being less likely to handle a large academic workload, concentrate on their schoolwork, or organize their assignments.²⁵

Difficulties arising in the workplace may lead the adult with ADHD to seek professional intervention.¹⁰ Symptoms such as an inability to concentrate or follow complex instructions, poor listening skills, and low frustration tolerance result in a high job turnover rate, lower work-performance ratings, and a greater chance of job loss. Thus, adults with ADHD often have difficulty finding and maintaining employment, a predicament that

can persist unless appropriate treatment is sought. In the Biederman survey, academic difficulties characterized by problems with attention, concentration, and organization persisted into adulthood. The subjects with ADHD were less likely to be employed, especially full time, and those who were employed had changed jobs more frequently over the preceding 10 years than control subjects.²⁵

Some adults with ADHD have achieved success by choosing active careers that are not compromised by the limitations of ADHD rather than sedentary employment requiring attention to detail.¹¹ Others may have more than one job to accommodate the need for motion and activity.

At Home

Significant impairment in the family environment has also been described in adults with ADHD, who typically have difficulty relating to others,¹⁰ and whose constant activity can lead to tension in the family.¹¹ As ADHD tends to be familial, this tension can be compounded when children or other family members also have ADHD. The difficulties encountered by adults with ADHD in establishing and maintaining routines can result in poor day-to-day supervision—including treatment regimens—and confound many family activities.

In the Biederman community sample survey, adults with ADHD described having poor relationships with their parents.²⁵ Not surprisingly, adults with ADHD often have strained or unstable relationships with significant others and poor perceptions of their ability to provide emotional support. Poor listening skills and the tendency to interrupt also affect the ability of the adult with ADHD to sort out problems when they arise.¹¹

In Society

When questioned, adults with ADHD who participated in the Biederman survey perceived that they did not fit in with peers, were not liked by other adults, and reported a greater tendency toward antisocial behavior.²⁵ Stimulus-seeking behavior is common in adolescents and adults with ADHD and can have a significant social impact.¹² ADHD in adults is associated with an increased risk of adult criminal activity and incarceration. In a study of 129 prison inmates, 45% had ADHD as defined by DSM-IV-TR criteria.²⁷ A history of hyperactivity/impulsivity or early conduct problems in men was predictive of both official arrests and self-reported crimes.²⁸ Another epidemiologic study of 102 prison inmates at a single institution

found a rate of diagnosable ADHD of more than 25%.²⁹ Conduct disorders may also increase the likelihood that an individual with ADHD will participate in more serious crimes.

Driving Impairment

Driving is a complex skill that involves 3 levels of functioning,³⁰ and individuals with ADHD may have deficiencies in one or more of these levels. The first, and lowest, level consists of the basic mental functions necessary for driving: attention, concentration, reaction time, visual scanning, spatial perception, and visual-motor coordination. The skills needed for maneuvering in traffic comprise the next function level: tracking, adjusting speed for the context, turning on headlights during reduced visibility, and making decisions about passing. The strategic level is the highest and includes planning the route, assessing conditions, and timing the excursion.

Adolescents with ADHD often demonstrate risk-taking behavior that also places them at risk while driving.³⁰ Studies have demonstrated that adolescents and young adults with ADHD experience more frequent traffic accidents, incur greater vehicular damage, and have more traffic violations than peers without the disorder.³⁰⁻³² Self-assessments by subjects with ADHD are similar to those by matched controls without the disorder, indicating that they tend to overestimate their driving ability.³³

Studies have evaluated the impact of treatment on the driving abilities of individuals with ADHD. In one study of 12 male subjects with ADHD, a positive correlation was identified between dosage of controlled-release methylphenidate and improvements in driving performance, as assessed by an on-road test.³⁴ This result suggests that the use of stimulants may reduce the risk of negative driving incidents in people with ADHD.³⁵ Similar results were obtained by Kay et al. in a 6-week, randomized, single-center, double-blind, placebo-controlled, crossover study. The investigators evaluated the effects of an extended-release formulation of mixed amphetamine salts on driving performance in 15 adults with ADHD. The subjects performed better in driving safety and had lower citation rates, fewer tailgating incidents, and fewer driving-out-of-lane demarcations when taking medication than when taking placebo.³⁶

Substance Abuse

An association between ADHD and SUD has been identified. However, because investigations into the details of this relationship have involved naturalistic rather

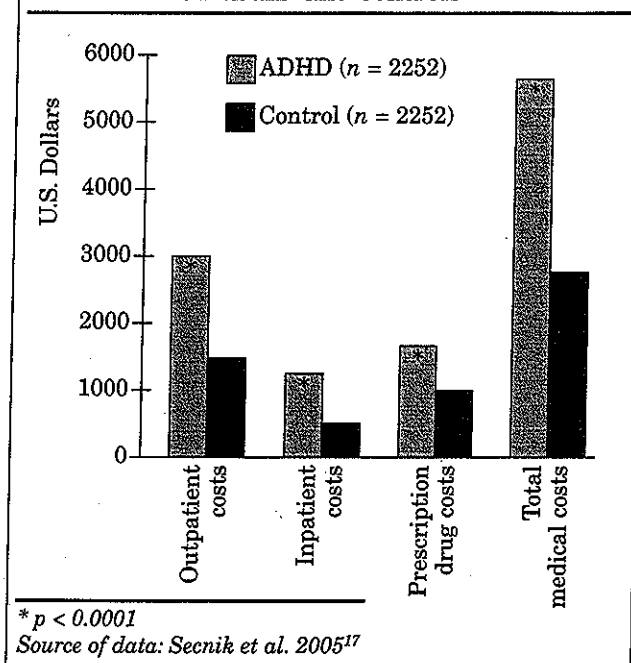
than randomized controlled trials, determining where the two conditions overlap is difficult.³⁷ In general, between one fourth and one third of adolescents who are substance abusers also display symptoms that meet the diagnostic criteria for ADHD.³⁸ This is also true of adults with ADHD, in whom rates of alcohol use and dependence range from 17% to 45% and rates of drug use and dependence range from 9% to 30%. An association between ADHD and nicotine use was identified by Kollins et al., who found that symptoms of inattention and hyperactivity/impulsivity significantly increased the risk of smoking cigarettes.³⁹ Biederman et al. also found a link between cigarette smoking and future SUDs in youths with ADHD; those who smoked were significantly more likely to drink alcohol and use illicit drugs than youths with ADHD who did not smoke ($p < 0.05$).⁴⁰ The link to substance use seems to be even stronger when the individual with ADHD also has conduct disorder or bipolar disorder.^{37,38}

Substance use begins earlier in adults with ADHD,³⁷ and their SUDs are more severe.³⁸ Similar to findings among the general population, adults with ADHD generally prefer marijuana over stimulants or cocaine. In a study of cocaine abusers with ADHD, cocaine worsened ADHD symptoms in 74% of subjects and improved symptoms in the remaining 26%.⁴¹ Individuals with ADHD experience a lower SUD remission rate, but those who do remit have a longer duration of SUD prior to remission than those without ADHD.

The recognized association between SUD and ADHD has raised questions as to whether it is appropriate to treat ADHD with stimulants and whether close proximity to a drug of potential abuse increases risk-taking behavior. However, a meta-analysis of published studies evaluating the impact of early medication treatment for children with ADHD found that treatment was actually protective: children who received early treatment had a significantly decreased risk of SUD later in life.⁴² This effect was stronger in adolescence than in adulthood.

The association between ADHD and SUD raises an additional concern regarding possible diversion or abuse of prescribed therapy. In a recent study, Wilens et al. identified 98 older adolescents and adults who were receiving psychotropic medications and determined the prevalence of comorbid ADHD in this sample.⁴³ More than half of the patients (56%) were identified as having ADHD, 11% of whom reported having sold their medications; however, none of the patients without ADHD who were receiving psychotropic treatment for other conditions had sold their medications. In the group with ADHD, 22% reported having misused their

Figure 1. Cost comparisons between patients with ADHD and controls



medication versus only 5% of those without comorbid ADHD. Twice as many patients with ADHD reported having gotten high on their prescribed medications compared with controls (10% versus 5%).

Economic Impact

Adult ADHD is associated with increases in medical utilization of more than 50%, not including treatment for ADHD itself, compared with controls.¹² Analysis of claims data from more than 400 adults with ADHD demonstrated that greater healthcare utilization was noted not only for ADHD treatment but also for non-ADHD care. Compared with controls, adults with ADHD had significantly more accident claims (38% versus 18%, $p < 0.05$) and significantly higher costs associated with those accidents (\$483 versus \$146, $p < 0.05$).⁴⁴

Another retrospective study used a large database to analyze claims data for 4504 adults (2252 with ADHD and 2252 matched controls).¹⁷ Figure 1 presents a comparison of costs associated with outpatient and inpatient service utilization for the 2 groups. Estimates of lost work days were also higher in individuals with ADHD than in controls (absenteeism 4.33 versus 1.13 days, $p < 0.01$).

The economic burden of ADHD also extends to family members of individuals with ADHD, who had 1.6

times as many medical claims as matched controls and showed the same pattern as seen in adults with ADHD. These increased expenses included both direct and indirect medical costs.⁴⁵

By conducting telephone interviews with adults who either had been diagnosed with ADHD or lived with someone who had the disorder, and comparing their responses with age- and gender-matched controls, researchers were able to estimate the impact of ADHD on employment and household income.⁴⁶ Almost twice as many individuals in the control group were employed full time compared with those in the ADHD group (59% versus 33.9%, $p < 0.001$). Household income for adults with ADHD aged 25 years or older was significantly lower than that of controls ($p < 0.05$). This was true regardless of level of education, with the exception of individuals in both groups who had not completed high school. These data suggest that the loss of income resulting from ADHD can be estimated to be between \$67 billion and \$116 billion annually.

TREATING ADHD IN ADULTS

Pharmacotherapy for ADHD

Medications used to treat adults with ADHD include stimulant and nonstimulant medications that have been approved for this indication by the U.S. Food and Drug Administration (FDA), as well as some nonapproved products. Methylphenidate and amphetamine medications are further distinguished by the vehicle of delivery, which (together with individual variability) determines the duration of action. Atomoxetine is the only nonstimulant medication approved for the treatment of ADHD in adults. Although bupropion and desipramine have not been approved by the FDA for the treatment of adult ADHD, they have demonstrated a positive effect in randomized controlled trials in adults with ADHD.^{47,48}

Methylphenidate. The only methylphenidate preparation approved by the FDA for treatment of adult ADHD is dexmethylphenidate extended release (d-MPH XR), the efficacy of which was established in a 5-week, randomized, double-blind, fixed-dose study involving 221 adults.⁴⁹ The subjects were randomly assigned to one of four treatment arms: placebo, d-MPH XR 20 mg/day, d-MPH XR 30 mg/day, and d-MPH XR 40 mg/day. The study design took tolerability into consideration by starting with a dose of 10 mg/day d-MPH XR at week 1 and then titrating up by 10-mg weekly increases to the

designated final dose. The primary efficacy measure was change in the total score on the DSM-IV ADHD Rating Scale (ADHD-RS) (investigator rated).⁵⁰ At the end of the 5-week trial, the changes versus placebo (negative scores reflect greater improvement) in ADHD-RS total scores were -13.7 for d-MPH XR 20 mg ($p = 0.006$), -13.4 for d-MPH XR 30 mg ($p = 0.012$), -16.9 for d-MPH XR 40 mg ($p < 0.001$), and -7.9 for placebo. Equal improvement was noted in the inattention and hyperactivity/impulsivity domains in each active treatment arm. The secondary efficacy measures, the Connors Adult ADHD Rating Scale (CAARS)-Self Report⁵¹ and the Clinical Global Impressions-Improvement (CGI-I)⁵² scale, showed significant improvement across all doses of active drug. In this acute trial, adverse events with an incidence greater than 10% included headache, decreased appetite, insomnia, dry mouth, nausea, a jittery feeling, and anxiety.

The 5-week acute trial was followed by a 6-month, open-label extension trial. All subjects (both those who had received active treatment and those who had received placebo in the acute phase study) were started on d-MPH XR 10 mg/day and then individually titrated to a maximum dose of d-MPH XR 40 mg/day.⁵³ Change on the ADHD-RS from enrollment in the extension phase of the study to completion was the primary outcome measure and CGI-I was the secondary measure. Both groups of subjects—those who had received d-MPH XR and those who had received placebo during the acute phase of the trial—showed significant reductions on the ADHD-RS. The total reduction in ADHD-RS scores from the start of the acute trial to the end of the extension phase was 25.9 in the patients who had received d-MPH XR in the acute phase and 22.4 in those who had received placebo during the acute phase.

Amphetamine. The only amphetamine medication approved by the FDA for the treatment of adult ADHD is an extended-release formulation of mixed amphetamine salts (MAS XR). In a 4-week, randomized, double-blind, placebo-controlled, forced-dose-titration trial, 255 subjects were randomized to one of 4 arms: placebo, MAS XR 20 mg/day, MAS XR 40 mg/day, and MAS XR 60 mg/day.⁵⁴ With regard to scores on the ADHD-RS, there was a total mean placebo-adjusted difference of -6.6 in the MAS XR 20 mg group ($p = 0.001$); -7.2 in the MAS XR 40 mg group ($p < 0.001$); and -7.8 in the MAS XR 60 mg group ($p < 0.001$). Although the initial analysis showed no dose-response relationship, a post hoc analysis using baseline severity demonstrated a dose response; statistically significant improvements were

observed with MAS XR 60 mg compared with placebo ($-11.1, p = 0.0007$) and MAS XR 20 mg ($-8.2, p = 0.001$). The most common treatment-emergent adverse events were dry mouth, anorexia/decreased appetite, insomnia, headache, weight loss, dizziness, and agitation.⁵⁴

Subjects from this acute trial could then enter an open-label extension trial: 223 subjects were started on MAS XR 20 mg/day, and the dose was then optimized. Most of the dose changes occurred over the first 3 months with little change thereafter. Sustained improvement was noted over 18 months, supporting the notion that tolerance to the medication did not develop.⁵⁵

Atomoxetine. The only nonstimulant approved by the FDA for the treatment of ADHD in adults is atomoxetine. The approval is based on two adult trials that included a total of 536 subjects in identical randomized, controlled-design, 10-week studies.⁵⁶ Based on change on the CAARS as the primary measure for improvement, atomoxetine was significantly more effective in reducing ADHD symptoms in both the inattentive and hyperactive/impulsive domains. The effect sizes of 0.35 and 0.40 in the adult trials were smaller than the effect size of 0.7 seen in a study of atomoxetine in children and adolescents with ADHD.⁵⁷ The larger placebo effect in the adult trials may explain the lower effect size. With twice-daily dosing in the acute trials, adverse events reported more frequently than placebo were dry mouth, insomnia, nausea, constipation, decreased appetite, dizziness, sexual difficulties, and urinary retention.

At the end of the acute trials, 384 subjects entered the open-label extension trial to evaluate ongoing efficacy, tolerability, and safety. Doses ranged from 60 to 120 mg/day, with a mean daily dose of 98.6 mg. Results demonstrated that atomoxetine maintained symptom improvement.⁵⁸

Psychotherapy

Although medication has been a primary focus in the treatment of ADHD, psychotherapies specifically tailored to patients and their families offer complementary benefits by providing new skill sets and insights. Psychotherapy is most effective when there is collaboration between the therapist and the patient. This collaboration is facilitated by mutual agreement on the target symptoms. Figure 2 presents an outline of specific therapeutic techniques appropriate for different target symptoms.⁵⁹

Safren et al. studied cognitive-behavioral therapy (CBT) in a controlled trial of adult patients with ADHD

who were stable on medication.⁶⁰ The CBT used in this study is conceptualized as forming three modules: 1) organizational and planning skills; 2) reduced distractibility; and 3) cognitive restructuring. Mean ADHD-RS scores declined 14.2 points for CBT plus medication versus 5.2 points for the medication-only group ($p < 0.01$). Improvement was noted on all assessment scales in the CBT plus medication group, and this group had more treatment responders than the group receiving medication alone (56% versus 13%; $p < 0.02$).

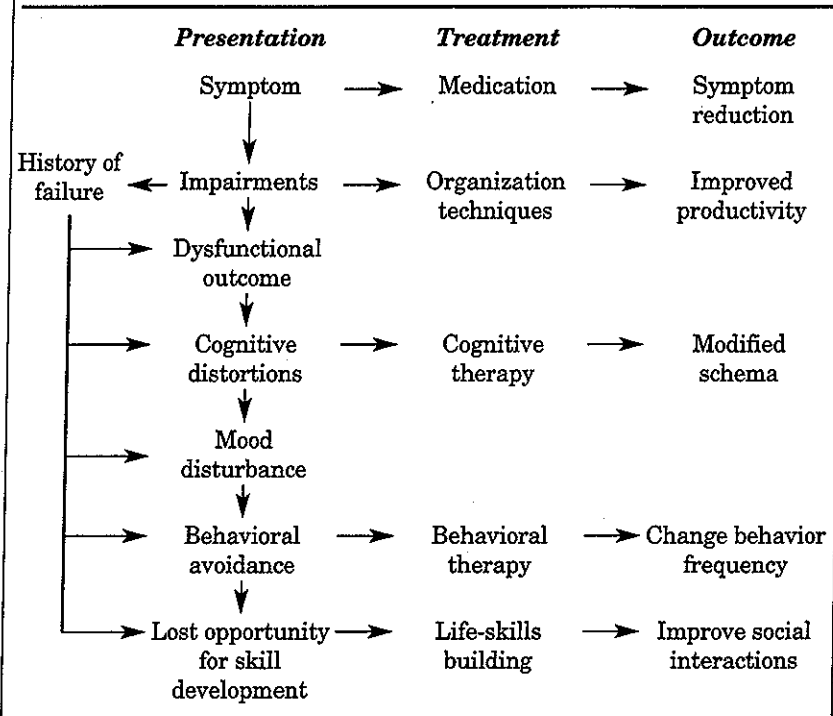
Rostain and Ramsay enrolled 43 adults with ADHD and treated them in an open-label trial with a stimulant and CBT.⁶¹ Only 7 subjects had no comorbid psychiatric disorders. In addition to a stimulant titrated over 3 weeks, subjects received sixteen 50-minute individual CBT sessions over 6 months. The CBT addressed two broad areas: 1) behavioral coping strategies, and 2) dysfunctional thoughts and beliefs. Based on ratings of much or very much improved on the CGI-I, 67% of the subjects were considered improved by the clinician, and 70% showed moderate to significant improvement on the Brown Attention-Deficit Disorder Scale-Adult Version.^{61,62} This study had the limitation of an open design with motivated, highly educated patients.

At this time, there is a small but growing body of research on effective psychotherapeutic approaches to complement pharmacotherapy. Although symptom reduction is one measure by which treatment efficacy can be determined, we ultimately want treatment to result in higher daily functioning and improvement in quality of life (QOL) for patients and families.

QUALITY OF LIFE

The chronic, psychosocially disabling nature of ADHD significantly increases the likelihood of psychiatric, social, legal, and family problems in adulthood.²⁶ Biederman et al. found that the prolonged functional impairments associated with adult ADHD led to limited optimism, as shown by increased school failure, occupational impairment, substance use, and traffic violations.²⁵ These findings are consistent with previous

Figure 2. Comprehensive role of the therapist



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research^{26,63-67} that has evaluated the impact of childhood/adolescent ADHD as it persists into adulthood. A structured work environment that demands prolonged attention and concentration probably continues to be aversive for individuals with ADHD during their adult years. This diminishes the likelihood that individuals with ADHD will achieve higher-level education and stable employment compared with individuals without ADHD; however, this aversion does not necessarily preclude academic milestones or gainful employment. Adult ADHD is also characterized by higher rates of drug/substance abuse and antisocial personality disorder,⁶³⁻⁶⁵ leading to increased arrests for the possession, use, and sale of illegal drugs.⁶⁷

The significant personal, social, and economic burden associated with adult ADHD, especially if the disorder is undiagnosed and untreated, can reduce the individual's overall QOL. In a comparison of QOL between adults with undiagnosed ADHD and controls without ADHD, Able et al. found that the undiagnosed ADHD cohort had a higher rate of functional and psychosocial impairment than adults without ADHD.⁶⁸

Only after an accurate and timely diagnosis of ADHD has been made can an appropriate therapeutic intervention be prescribed to mitigate the impact of the disorder.

Combined medication and behavioral interventions can dramatically improve the symptoms of adult ADHD. Left untreated, the significant academic, employment, family, social, and economic consequences of ADHD are exacerbated.^{69,70}

The impact of the treatment of ADHD on QOL has been evaluated with both stimulant and nonstimulant medications. In a study of adults with ADHD who received treatment with the nonstimulant atomoxetine, scores on measures of overall mental health improved significantly from below-average levels at baseline, suggesting that atomoxetine improved the patients' perceived QOL.⁷¹ In a 10-week, open-label evaluation of MAS XR in adults with ADHD enrolled in a community-practice study, significant improvements in QOL were observed on a patient-completed health survey measuring general health, physical and mental health, vitality, and social, emotional, and physical role functioning.⁷² Comparable improvement following stimulant treatment was observed in another evaluation of these data⁷³ using a patient-completed survey of ADHD-specific QOL, the ADHD Impact Module for Adults, that measures the subject's perceptions in domains that included living with ADHD, performance and daily functioning, and relationships/communication.⁷⁴

CONCLUSIONS

The relatively recent establishment of ADHD as a valid diagnosis in adults suggests that the number of adults seeking professional attention for the disorder will continue to increase. Clinicians need to recognize the differences in symptom presentation in adult versus childhood ADHD, as well as the significant long-term personal, social, and economic consequences of adult ADHD. The associated symptoms of inattention, impulsivity, and hyperactivity can reduce the likelihood of school and work achievements, diminish self-esteem, and damage interpersonal relationships. ADHD can dramatically reduce the QOL of the adult, especially if the disorder is unrecognized. However, early and accurate diagnosis of adult ADHD, followed by appropriate intervention, can dramatically improve long-term outcome in individuals with this disorder.

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ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN ADULTS

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ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN ADULTS

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