

ADHD in Adolescents: Developmental Transitions and Treatment Implications

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Sources:

Barkley, R. A. (2006). *Attention deficit hyperactivity disorder: a handbook for diagnosis and treatment* (3rd ed.). New York: Guilford.

Barkley R. A., Murphy, K. R., & Fischer, M. (2008). *ADHD in Adults: What the Science Says*. New York: Guilford

Objectives

- Identify the major issues involved in the impact of ADHD on the transition from childhood to adolescence
- Focus on the impact of ADHD on the various domains of major life activities, socio-emotional development, and health outcomes during this transition
- Discuss the implications of these impaired major life activities for treatment planning at this age

Qualifying Issues

- Results reflect only what is known about the ADHD-Combined (and Hyperactive) Subtypes; Inattentive subtype (or that called SCT, sluggish cognitive tempo) remains to be studied for mental health outcomes in any follow-up research into adolescence
- May not represent teenage girls with ADHD adequately given their under-representation in most follow-up studies. This is being corrected with two large ongoing studies of girls at Harvard/MGH by Biederman and colleagues and at UC-Berkeley by Hinshaw & colleagues.

Generic Issues Associated with Transition to Adolescence

- Increased physical size and neurological maturation
- Increasing maturation of sexuality
- Increasing desire to individuate from parents; decreasing influence of parents on teen behavior
- Increasing time away from home & parents
- Increasing number of domains of major life activities to which the teen must adapt
 - Sex, driving, peers, money & work, community activities, crime, drugs
- Greater involvement with and influence of peers
- Most of these are adversely affected by delay in self-regulation associated with ADHD

What is the Persistence of ADHD into Adolescence?

■ By parent reports:

- 50% persistence (1970-80s) using clinical symptoms
- 70-80% persistence to age 15 using DSM criteria

■ Qualifying issues

- Depends on whom you ask (self vs. parents):
 - 3-8% Full disorder (self-report using DSM3R) by age 20
 - 46% Full disorder (parent reports using DSM3R) by age 20
- Depends on what diagnostic criteria you use:
 - 12% - Using 98th percentile (+ 2SDs; self-report)
 - 66% - Using 98th percentile (parent report)
 - 85-90% remain functionally impaired
 - Who to believe? Parent reports have greater veracity – they correlate more highly with various domains of major life activities than do self reports

How do symptoms change by adolescence?

- Hyperactivity declines more steeply than does inattention and related executive function (EF) deficits
- Motor restlessness becomes a more internalized subjective sense of feeling a need to be busy all the time
- The inattentive/EF symptoms have a greater impact on school functioning than HI symptoms; increases with age
- Impulsivity is more related to impaired nonacademic domains:
 - development of ODD
 - drug experimentation
 - speeding while driving
 - risky sexual behavior, taking on dares from peers
 - impulsive verbal behavior
 - reactive aggression

Symptom Transitions (continued)

- But inattention also has adverse impacts on non-academic functioning :
 - Poor attention to traffic density and speed while in community auto traffic settings
 - Greater risk for pedestrian/cycling accidents in traffic settings
 - Greater crash risk as drivers (in vehicle distractions are most contributory)
 - Accelerated use of nicotine after experimentation
 - Self-medication ???
 - Poor follow through on chores and other home responsibilities
 - Poorer work performance in part-time employment settings
 - Inattention to others' comments and needs in social activities

Emerging Impact of EF Deficits

- Poor working memory (remembering to do things)
 - Less follow through on promises and commitments to others
 - Increasing adverse impact of reading-listening-viewing comprehension deficits, especially in school & work settings
- Impaired planning, anticipation, and preparatory behavior; not ready for the future as it arrives
 - Reduced valuing of future rewards relative to peers
 - Consequently, don't persist toward future goals and show poor delay of gratification
- Deficient sense of time and time management
 - A restricted temporal window relative to peers
- Poor emotion regulation (related to poor inhibition)
 - Deficient control of anger & frustration most impairing
- Decreased fluency (rapid assembly of ideas into coherent verbal reports and behavior)

Developmental Risks

- ADHD children have these risks but unclear how much they persist into adolescence:
 - *Greater Risk for Language Disorders*
 - Expressive: 10-54% Pragmatic deficits in 60%
 - Excessive speech, reduced fluency, less logical, coherent, & organized
 - Delayed internalization of language
 - Reduce capacity for rule-governed behavior
 - *Low Average Intelligence (7-10 point deficit)*
 - An apparent failure to keep pace with peers in acquiring knowledge but could also result from poor executive functioning that partly affects IQ
 - *More Adaptive Disability* – 1 to 2 SD difference between IQ and adaptive functioning (self-sufficiency), particularly in communication and socialization domains

Academic Impairments Increase by Adolescence

- Overall poorer school performance (90%+)
- Greater inattention to class work
- Reduced productivity is greatest problem
- Accuracy is only mildly below normal (85%)
- More disruptive class behavior
- Decreased accountability to others for doing work
 - Less able to handle increased demands for self-regulation and time management as:
 - number of classes/teachers increase
 - time between classes is reduced
 - responsibility for getting-performing assignments increases
 - assignments become longer and more complex
- Increased homework further taxes attention and EF deficits (and need for parental involvement)

Academic Impact (continued)

- Decreasing academic achievement on testing relative to peers (10-15 pt. deficit)
- Persistence of childhood learning disabilities into adolescence in most cases (24-70%)
 - Reading (8-39%); (effect size (ES) = 0.64)
 - Spelling (12-30%) (ES = 0.87)
 - Math (12-27%) (ES = 0.89)
 - Handwriting (60%+)
 - Reading, viewing, & listening comprehension deficits
 - Likely due to impact of ADHD on working memory

Academic Impact (Continued)

- More grade retention by adolescence (20-45)
- More are placed in special education classes by high school (25-50%)
- More suspended before or during high school (40-60)
 - Reflects disciplinary action; more associated with CD
- Greater expulsion rate (10-18)
- Higher drop out rate (23-40)
- Lower Class Ranking in high school (66% vs. 53%)
- Lower Grade Average in high school
- Fewer enter college (22 vs. 77%)
 - Lower college graduation rate (5-10 vs. 35%)

Parent-Teen Relations

- Increased parent-teen conflict & parent stress
 - Worsened by the presence of ODD or CD
 - Contributes to greater inter-parental conflict
- Greater use of commands and hostility by parents
- Reduced responsiveness, more hostility, and parental avoidance from teens
- More lax parental discipline of teens on some occasions while very harsh on others
- Greater opportunities for conflict to arise around friends, school, appearance, chores, driving, use of alcohol, tobacco, & drugs, leisure time activities, bedtime, and even type and volume of music

Peer Relationships in Teens

- Up to 70% may have no close friends by 3rd grade
- Demonstrate less sharing, cooperation, turn-taking
- Are more intrusive, disruptive of ongoing social interactions of others
- Display more clowning, showing off, and silliness in social settings
- Show more anger & frustration, especially if provoked
- Show reduced empathy and guilt

More Peer Problems

- Increasingly likely to affiliate with deviant peer groups if social rejection continues into adolescence
- Problems are most serious in the ODD/CD subgroup
- More likely to be bullied and to be bullies
- More likely to be beaten up, mugged, or assaulted with a weapon by late adolescence
- Girls show an increased risk of being sexually abused

Sexual-Reproductive Risks

- No Higher Incidence of Sexual Disorders
- Begin Sexual Activity Earlier (15 vs 16 yrs.)
- More Sexual Partners (13.6 vs. 5.4)
 - % having more than 4 partners by age 20 (60 vs. 28%)
 - More Partners in Prior Year (2.4 vs. 1.6)
- Spend Less Time with Each Partner
- More Casual Sex (outside relationships)(37 vs. 19%)
- Less Likely to Employ Contraception
- Greater Risk for Teen Pregnancies (24-38 vs. 4-5%)
 - 32% males, 68% females
- Ratio for Number of Births before age 20(37:1)
 - 54% Do Not Have Custody of Offspring
- Higher Risk for STDs (17 vs. 4%)
- Overall riskier sexual behavior

Child & Adolescent Antisocial Activities (by age 20; Milwaukee Study)

Self-reports for lifetime occurrences

Antisocial Activities	Hyper Mean	Control Mean	Hyper %	Control %
Stolen Property	18.6	5.1	85	64
Stolen Money	6.0	2.3	50	36
Disorderly Conduct	18.5	8.3	69	53
Assaulted with Fists	13.8	4.1	74	52
Assaulted with a Weapon	2.7	0.3	22	7
Carries Concealed Weapon	15.1	4.9	38	11
Illegal Drug Possession	234.5	130.6	51	42*
Illegal Drug Sales	14.3	4.5	24	20*
Breaking and Entering	2.1	0.5*	20	8
Sets Fires	0.4	0.1*	15	6
Runaway from home	3.9	2.0*	31	16

Dimensions of Antisocial Acts

■ Predatory:

- Mugs, fights, carries & uses weapons
- Related chiefly to CD

■ Self-sufficiency:

- Runs away, steals money, prostitution
- Associated with CD

■ Drug-related:

- Possesses, uses, & sells drugs; steals
- Related to both CD and ADHD

Judicial Costs of ADHD (by age 20)

- ADHD children followed through adolescence are more than twice as likely to be arrested as control children (48% vs. 20%)
- Mean judicial costs have been estimated to be \$8,814 per ADHD case vs. \$341 per control. Regression modeling placed the total criminal costs at \$37,830 per ADHD case having CD.

Data from the Milwaukee follow-up study as reported in the paper by Secnik, Swensen, Buesching, Barkley, Fischer, & Fletcher (submitted for publication).

Driving Risks in ADHD Teens

- Poorer steering, slower braking reaction time
- Rated by self, others, and driving instructors as using fewer safe driving habits
- More likely to drive before legally licensed (age 16 in US)
- More accidents (and more at faults) (2-3x risk)
 - % with 2+ crashes: 40 vs. 6
 - % with 3+ crashes: 26 vs 9
- More citations (Speeding - mean 4-5 vs. 1-2)
- Worse accidents (\$4200-5000 vs \$1600-2200)
 - (% having a crash with injuries: 60 vs 17%)
- More Suspensions/Revocations (Mean 2.2 vs 0.7)
 - (% suspended: 22-24 vs. 4-5%)
- Greater adverse impact of alcohol on driving

Medical Risks

- Children with ADHD have medical risks that are unstudied in teens. These probably continue to adolescence in some form, but how?
 - Seizures – 2.5x increase in risk
 - Sleep problems (39-56%); mainly delayed onset and greater night waking leading to shorter sleep time
 - Developmental Coordination Disorder (50+%)
 - Deficient movement skills relative to peers*
 - More left-sided incoordination in both ADHD cases and siblings
 - Some research implies improved gross motor coordination but remaining fine motor incoordination into adolescence
 - Reduced Physical Fitness, Strength, & Stamina. What is impact on teens?
 - Accident Proneness 57%+
 - 1.5 to 4x risk of injuries (greater in ODD)
 - 3x risk for accidental poisonings
 - Why? Impulsive, risk-taking, less coordinated, more oppositional, and less parental monitoring
 - Does this continue to adolescence? Probably, given that it has recently been found in adults with ADHD as well
 - 2-3 times the medical costs of normal children or those with non-ADHD behavior problems (also greater maternal medical and job-related costs – sick days, absenteeism, etc.)**
- Poorer oral health practices including lower likelihood of dental brushing each evening, more dental visit behavior problems, and more dental decay at age 11. It is unclear if this persists to adolescence.

*Hervey, W. J. et al. (2007). *Journal of Abnormal Child Psychology*, 35, 871-882.

**Haackart-van Roijen, L. et al. (2007). *European Child & Adolescent Psychiatry*, 16, 316-326

**Leibson, C. et al. (2001). *Journal of the American Medical Association*, 285, 60-66.

Comorbid DSM-IV Disorders Arising by Late Childhood or Teen Years

- Oppositional Defiant Disorder (40-84%; M = 55%)
- Conduct Disorder (15-56%)
- Anxiety Disorders (20-35%); increases over time
- Major Depression (25-35%); especially in teen years
- No elevated rates of PTSD except in comorbid ODD and especially in Bipolar cases (22-24%)
- Autistic Spectrum Disorders (22%)
 - 41% of ASD cases have ADHD
- Bipolar Disorder (0-27%; likely 6-10% max.)
 - Not documented as elevated in any follow-up studies to adolescence or later date (2-3% in my study)
 - A one-way comorbidity? (80-97% BPDs have ADHD but only 2-3% of ADHD cases have BPD)

Treating Family Conflicts

- ADHD medications reduce impulsive behavior, emotional dyscontrol, and aggressive behavior and antisocial acts
- Parent and family interventions often required
 - Behavioral parent training in teen management (*Defiant Children*)
 - Problem-solving, communication training (*Defiant Teens*)
 - Multi-systemic therapy where available
 - Family relocation to better neighborhoods advisable
- Increase parental monitoring of teen peer activities
- If psychopathy (callous-unemotional traits) is present there is limited or no response to behavior therapy alone – medication is necessary in combination with behavioral treatments*
- Avoid group treatment of teens due to deviancy training by aggressive peers
- Involvement of social service and juvenile justice agencies is likely
- Mood stabilizers, atypicals, or antihypertensives may be needed for highly aggressive/explosive cases or BPD

Treating Educational Issues

- Early screening and identification of ADHD cases at school entry
- Pre-referral assistance to regular classroom teachers on sound behavior management tactics
- Pre-referral curriculum adjustments
- If necessary, eventual referral for formal special educational services
- Daily behavior report card and school “coaching”
- Earlier and more sustained use of medication management across the day as necessary; extended release delivery systems should be the standard of care
- Vocational assessment and job skills training during high school

Managing Driving Risks

- Longer learner's permit period
- Graduated licensing approach
 - Daytime with adults, night-time with adults, alone, with peers, full independence (3 months, gradual)
- No (!) cell phone use/text messaging while driving
- Greater supervision of vehicle use by parents
 - Charting, random spot checking on destinations, critical incident cameras in vehicle (DriveCam Inc., San Diego, CA), or GPS car monitoring devices (MobileTeen GPS, AIG Insurance Co.).
- Behavior contracting for safe and responsible driving
 - (*Barkley Safe Driving Program, Compact Clinicals, Kansas City, MO*; Maureen Synder's book on ADHD and driving, addwarehouse.com)
- Medication management
 - Extended release formulations are preferred
- Avoid alcohol use while driving

Health Risk Management

■ Risky sexual activities:

- Greater awareness of problems by primary care professionals
- Greater parental supervision of teen activities
- Formal sex education programs
- Discuss contraception with teens and parents
- Medication management to reduce impulsive conduct
- HPV inoculation of girls

■ Health and lifestyle problems:

- Increase regular exercise
- Increase preventive medical/dental care visits
- Assistance with cessation or managing legal substances
 - Smoking cessation, alcohol abuse treatments
- Referral for drug detox and rehab programs as required

Conclusions

- ADHD persists into adolescents in 70-80% of cases diagnosed in childhood
- ADHD is associated with numerous childhood and teen impairments in major life activities and social and emotional development
- ADHD is a 24/7 disorder requiring medical management longer across the day and into adolescence than has heretofore been the case
- ADHD is more impairing than most outpatient psychiatric disorders of adolescence
- Interventions need to target more domains than just education given the pervasive adverse impact of ADHD in other major life activities