

The neurobiology of ADHD: Implications for Adolescence

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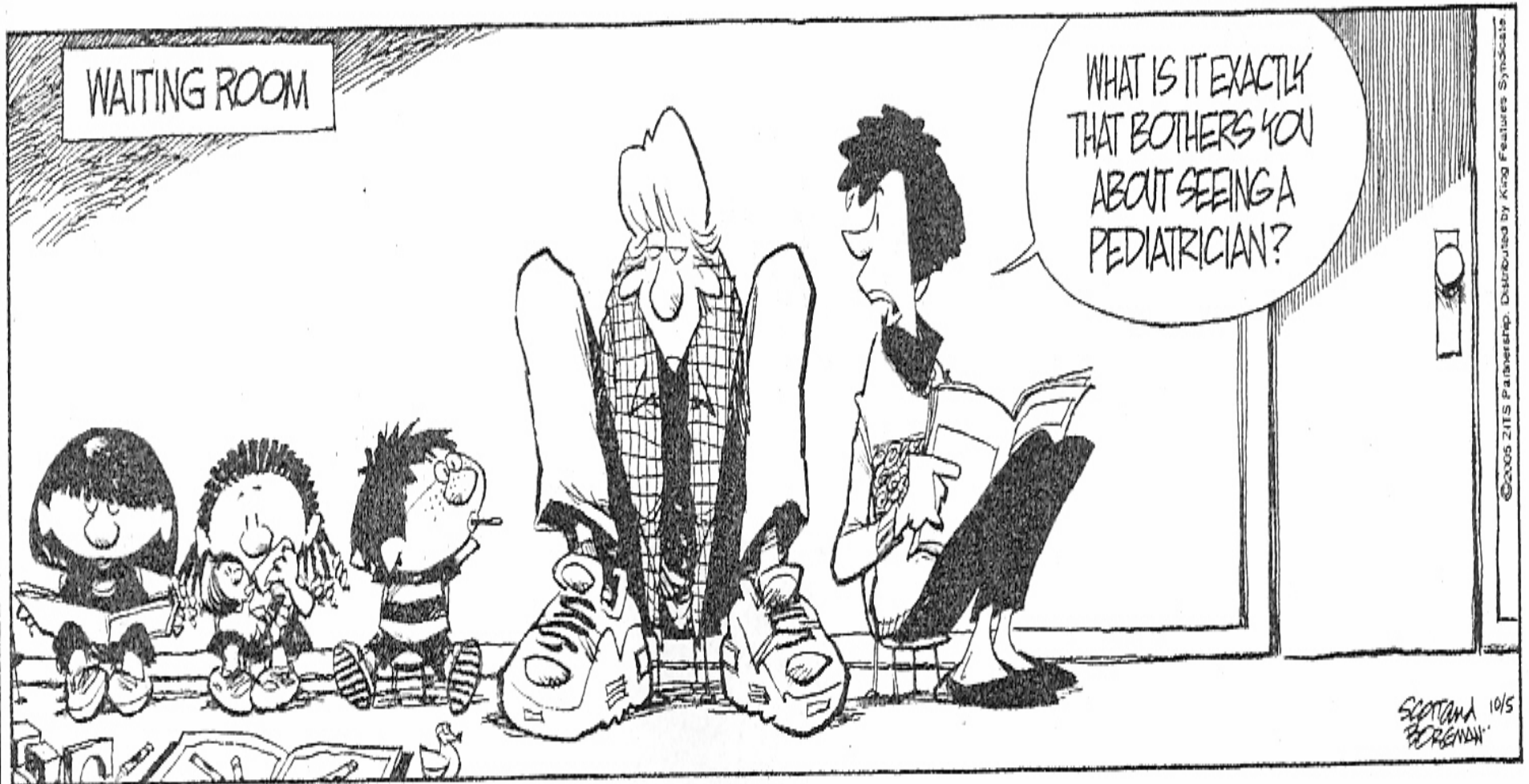


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Definition

Developmentally inappropriate degrees of:

- impulsivity
- inattention
- and often hyperactivity



Comorbidities

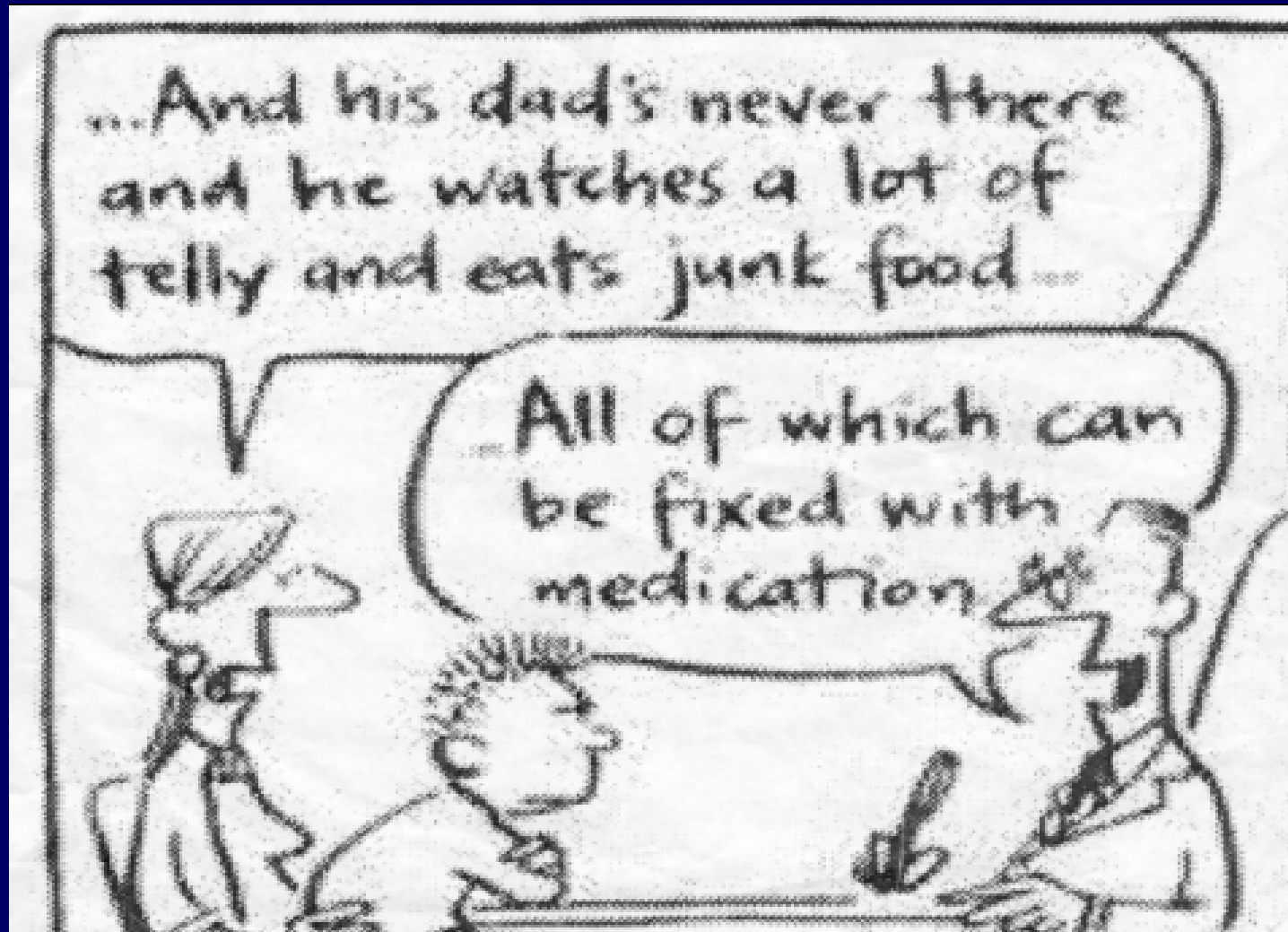
- Learning difficulties
- Oppositional defiant disorder / Conduct disorder
- Anxiety
- Depression
- Neurodevelopmental deficits
 - auditory processing
 - perception / motor planning

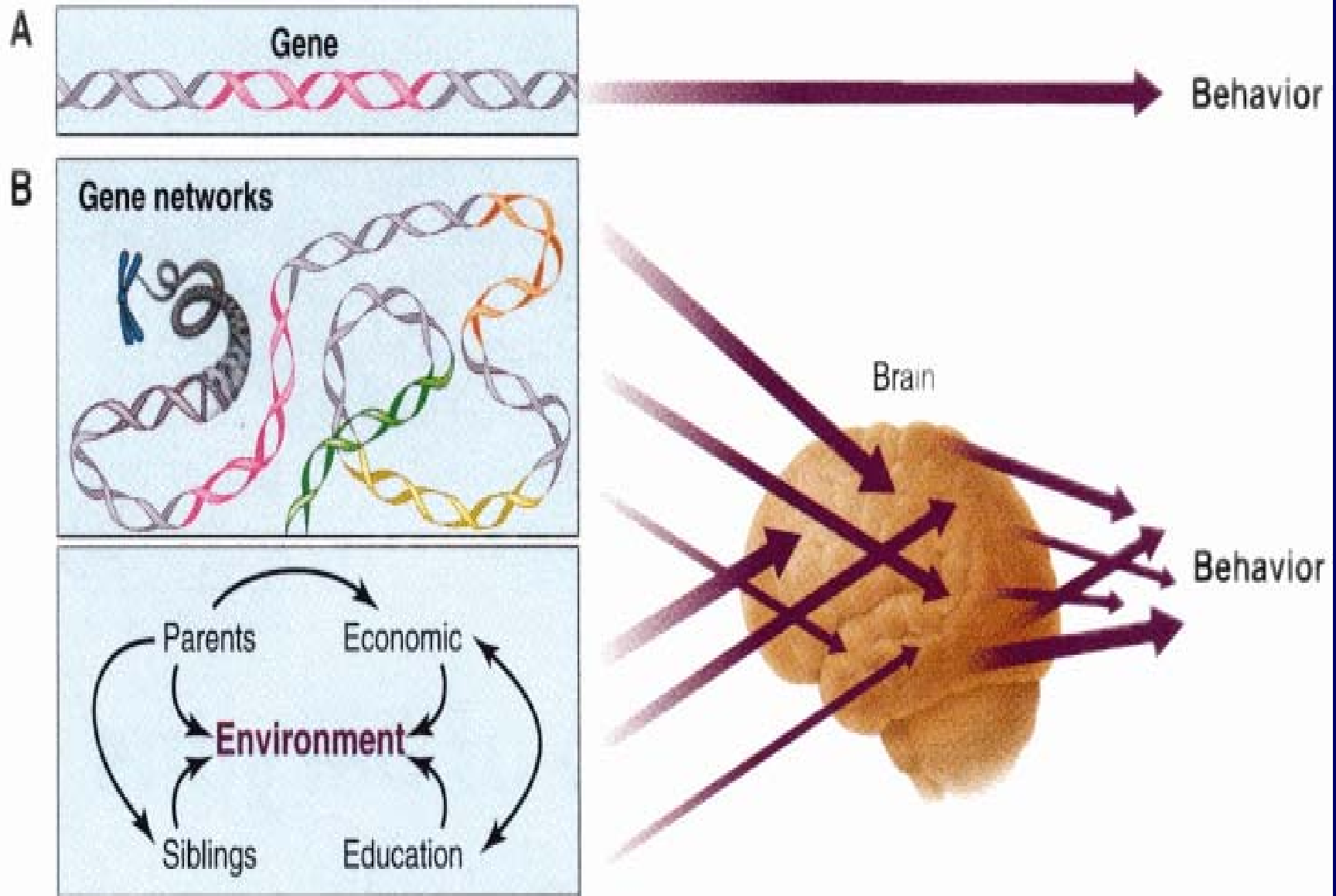


The neurobiology of ADHD

- Fronto-striato-cerebellar circuitry
(Castellanos & Tannock Nature 2002)
- Total cerebral volume and cerebellar vol. 3% smaller than controls (vol. MRI)
- Activate more diffuse areas than controls during cognitive tasks (fMRI)
(Castellanos JAMA 2002)







Hamer. Science, 2002



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Genetics

- Heritability > 70%

(Faraone 2000, Hay & Levy 2002)

- Neurotransmitters with candidate polymorphisms:

- dopamine, noradrenaline, serotonin, glutamate
- genome-wide scans so far unsuccessful

(Fisher Am J Human Gen 2002)



Environment

- Toxins

- prenatal tobacco

- (Thapar Am J Psychiatry 2003; Kahn J Peds 2003)*

- prenatal alcohol - inconclusive

- (Linnet Am J Psychiatry 2003)*

- lead

- Diet

- salicylates, amines, colourings, preservatives

- dairy, wheat (gluten)

- allergy



Environment

- Acquired brain injury (*Herskivitz Radiology 1999*)
- Early deprivation
(*Kreppner J Abnorm Child Psychol 2001*)
- Psychosocial disadvantage (*Biederman 1995*)
- Stroke - putamen (*Max JAACAP 2002*)
- Television (*Christakis Pediatrics 2004*)



Genetics

Environment

ADHD

Developmental
stage

Functional impairments

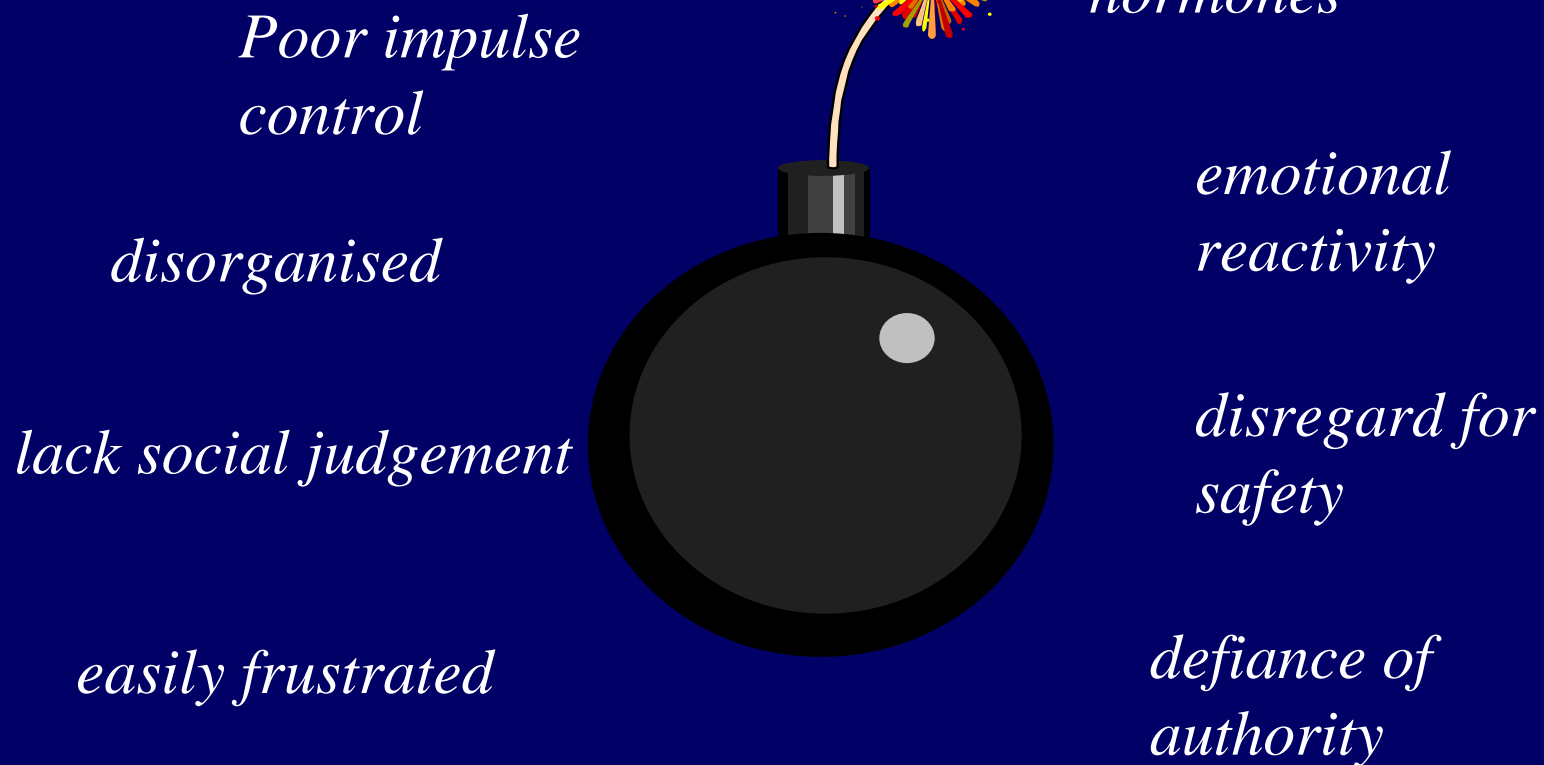


Long-term outcome

- Improvement with time, but continues to affect fabric of daily life in most cases
 - 75% continue to have problems into adolescence, 50% into adulthood (*Ingram 1999*)
- Health care costs double controls (*Chan 2002*)
- Increased risk
 - academic failure / school drop-out
 - delinquency, crime & incarceration
 - unemployment
 - relationship difficulties
 - injuries eg MCA
 - substance abuse - 2 X risk (*Biederman 1997*)
 - antisocial personality disorder (*Weiss 1986*)



ADHD and adolescence



Brain development in adolescence

- Prefrontal cortex grey matter still maturing
- On-going developmental of executive (higher cognitive) function
 - information processing
 - emotional regulation
 - abstract reasoning
 - cognitive flexibility
 - strategic thinking, goal setting



Impact of having ADHD

- Home
- School
 - classroom
 - playground
- Recreation



Home

- Conflict - parents, sibs
- Socioeconomic disadvantage
- Parental mental health, subst abuse
- Limited community supports



Classroom

- An unhappy place for kids with ADHD
 - organisational demands
 - academic underachievement
 - ↑ cognitive demands
 - expectation of independence eg project work
 - trouble
 - no extra supports



Playground

- Often an unhappy place for kids with ADHD
 - conflict / exclusion - “bully-victims”
 - isolation



Street

- Impulsivity
- Poor social judgement (easily led)
- Low self-esteem
 - trouble with law
 - substance abuse
 - sexually exploited – preg, STIs
 - reckless driving



Management of ADHD

- medication
- behaviour mod
- educational strategies
- individual therapy
 - eg. CBT
- group therapy
 - social skills, anger management
- family therapy



Stimulant medication

- Most effective treatment of CORE symptoms
- Young person a partner in treatment plan
 - requires motivation, good self-concept, family stability
- Protective against substance abuse

(Wilens 2003)



Misuse of medication

- 55 adolescents/ young adults with ADHD
(mean age 20) (*Wilens 2006*)
- self-report questionnaire
 - 11% reported selling
 - 22% reported misusing
 - risk: conduct disorder, substance use disorder
- new long-acting preparations less abusable



Medication

– potential difficulties

- driving
- vocations eg defence force
- overseas travel
- pregnancy



Stopping medication

- no withdrawal
- ideally a mutually negotiated decision
 - monitor response
- often not planned
 - many adolescents just stop
 - some come back and ask to go back on



Treatment principles

- Manipulate environment
 - modified curriculum, trade, sports / hobbies
- Self-management
 - gradually increase autonomy as YP demonstrates capacity for reflection / self-monitoring



Transition to adult care

- not easy!



Working effectively with kids with ADHD

- Like working with any other adolescents, only harder!
 - sensitivity
 - creativity
 - authority
- Promote strengths
- Preserve (pro)social connectedness, self-esteem

