ADHD in adults
Assessment & Treatment

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Conflict of interest dr. Sandra Kooij

none
Subjects

1. Assessment:
   - Neurobiology & prevalence
   - ADHD, gender & lifespan perspective
   - Clinical picture, comorbidity, differential diagnosis
   - Assessment using DIVA-5
   - The lifespan ADHD clinic

2. Treatment:
   - Psycho-education
   - Medication, light therapy
   - Coaching/CBT/relationship therapy
   - Super Brains app
Neurobiology of ADHD

• Highly heritable (80% of variance explained by genetic factors)

• Neurobiological disorder:
  – brain 5% smaller and less active
  – 8 candidate genes, esp. dopaminergic (DRD2,4,5, DAT1)
  – ADHD as an inhibition deficit (no brakes) based on dopamine deficiency
  – Methylphenidate: dopamine agonist; acts as inhibitor of associations, moodswings, restlessness and impulsivity

Thapar 1999; Faraone 2005; Castellanos 2002; Bush 2006; Kessler 2006; Kooij 2005
ADHD symptom scores in twin studies: highly heritable

Heritability

- Boomsma 2003
- Martin 2002
- Kuntsi 2001
- Coolidge 2000
- Thapar 2000
- Willcutt 2000
- Hudziak 2000
- Nadder 1998
- Levy 1997
- Sherman 1997
- Silberg 1996
- Gjone 1996
- Thapar 1995
- Schmitz 1995
- Stevenson 1992
- Edelbrock 1992
- Gillis 1992
- Goodman 1989
- Matheny 1980
- Willerman 1973
Developmental trajectories of brain volumes
(Castellanos et al., JAMA, 2002)
Anterior Cingulate (Cognitive Division) Fails to Activate in ADHD

Normal Controls

ADHD

Bush et al., Biol. Psychiatry, 1999

MGH-NMR Center & Harvard- MIT CITP

1 x 10^{-3}

y = +21 mm

1 x 10^{3}

1 x 10^{-2}

1 x 10^{2}

1 x 10^{3}
The brain in ADHD compared to NCs:

Smaller, Hypoactive & Impaired functioning
ADHD IS NOT OUTGROWN ...
Prevalence of ADHD through the lifespan

**Children:**
- USA: 4 - 8%

**Adults:**
- USA: 4 - 5%
- 10 countries (mean): 3.4%

**Older people:**
- Sweden: 3.3%
- Netherlands: 2.8 - 4.2%

Faraone 2003; Kessler 2006; Murphy & Barkley, 1996; Kooij 2005; Fayyad 2017; Guldberg 2013; Michielsen 2012
ADHD in old age

An epidemiological study by M. Michielsen, E. Semeijn, H. Comijs, D.J.H. Deeg, A. Beekman, J.J.S. Kooij

Semeijn 2013a,b, 2014, 2015
Prevalence of ADHD in older people in the general Dutch population

Age: 61-95 years: lower prevalence of ADHD in the older old; women: 59%

<table>
<thead>
<tr>
<th></th>
<th>Syndromatic ADHD</th>
<th>Symptomatic ADHD</th>
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<tbody>
<tr>
<td></td>
<td>%</td>
<td>95% CI</td>
</tr>
<tr>
<td>Total</td>
<td><strong>2.8</strong></td>
<td><strong>0.86–4.64</strong></td>
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<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>3.0</td>
<td>-0.20–6.12</td>
</tr>
<tr>
<td>Women</td>
<td>2.6</td>
<td>0.38–4.72</td>
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</tbody>
</table>

Michielsen 2012
LASA study in old age

- The prevalence and comorbidity with anxiety and depression in older people with ADHD, show similar patterns as in younger age groups.

- Regarding physical health there are indications that older people with ADHD may have worse health outcomes and may die younger.

- Lower income, less intimate relationships, less family relationships, more loneliness and depression in older people with ADHD.

- Personality characteristics partly explained by depression in ADHD.

- Depression related to (accumulation of) adverse life events and conflicts.
Can ADHD be treated in older people?

- 15 case studies: patients (m, f), age 67-81 yrs
- ADHD from childhood, diagnosis in (grand)children, who respond favorable to medication for ADHD
- Lifespan restlessness, irritability, impulsiveness and distractedness leading to impairment
- Successfully treated with stimulants in old age
- Monitoring cardiovascular side effects before and during treatment
- Proposal for assessment and treatment published in 2016

Wetzel 2008; Da Silva & Louza, 2008; Standaert, Kok & Kooij, 2010; Kooij ea 2016; Manor ea, 2011
ADHD is not outgrown in older people

Impairment is not diminishing

Similar prevalence rates

Similar medication response

Needed: RCT’s!

Needed: Lifespan clinics!
ADHD & gender
Gender differences in children and adults

Childhood: M >> F

Adulthood: M = F

Underdiagnosis in girls
Girls have more ADD

Prevalence (%)

Girls with ADHD (n=140)
Boys with ADHD (n=140)

Combined
Hyperactive/ impulsive
Inattentive

Biederman 1994, 2004
Causes of underdiagnosis of ADHD in girls

Referral bias → ADD subtype

Internalising comorbidity (depression, anxiety, premenstrual dysphoric disorder)
Complaints girls and women with AD(H)D

ADD

- Chaotic
- Distracted
- PMDD
- No Overview
- Moodswings
- Tired
- Low self-esteem
- Lazy
- Panic
- Depressed
- Overwhelmed
- Unmotivated
Room with a view?
Girls are not disruptive …

Inattention takes continuous mental effort, leading to exhaustion …

… but may be chronically tired!
BOOKS on GIRLS & WOMEN & ADHD
Clinical picture of ADHD

Lifetime symptoms of Attention-Deficit/Hyperactivity Disorder:

• **Inattention:** distracted, chaotic, forgetful, late, difficulty making decisions, organising and planning, no sense of time, procrastination

• **Hyperactive:** (inner) restlessness, tense, talkative, busy; coping by: excessive sporting/alcohol abuse/avoiding meetings

• **Impulsive:** acting before thinking, impatient, difficulty awaiting turn, jobhopping, binge eating, sensation seeking

In addition lifetime:

• **Moodswings** (5x/day) and **Anger outbursts** (in 90%)

And:

• **Mind wandering:** non-stop task unrelated thoughts, worrying

Decrease of hyperactivity in adults

Hyperactivity is adjusted, compensated for, or experienced as more ‘inner restlessness’:

- Avoiding meetings where you have to sit still
- Excessive sporting
- Hectic job full of change
- Cannabis / alcohol / tranquillisers against restlessness
- Talkativeness, inner restlessness

The decrease in marked outward visible hyperactivity has presumably been the reason why we mistakenly have thought that ADHD was outgrown
Inattention most invalidating symptom in adults

Adults need more attention than children:

• Procrastination
• Chaos
• Difficulty organising
• Being late
• Difficulty reading and remembering
• Forgetting things or appointments
• And yet using no watch or agenda!
Impairment in adult ADHD

In clinical as well as epidemiological samples compared to controls:

- Learning problems (60%)
- Less graduated
- Lower education
- Lower income
- Less employed, more sickness leave
- More job changes (longest job 5 yrs)
- More often arrested, divorced and more social problems
- More driving accidents, teenage pregnancies, suicide attempts
- Higher mortality rates
- Higher obesity and asthma rates
- Higher (mental) health care costs

Biederman 2006; Kooij 2001, 2005, 2010; Barkley 2002; Manor 2010
Adult ADHD is highly comorbid with circadian based disorders

75% has comorbidity (mean 3 disorders):

- Depression *(60% SAD)* 25-50%
- Anxiety 25%
- Substance Use Disorders 20-45%
- Personality Disorders 6-25%
- Eating Disorders *(BN)* 9%
- Binge eating 86%
- Obesity 30%
- Sleep problems, DSPS pattern 75%

Comorbidity in adults with ADHD

ADHD comes seldom alone:

- 75% at least one other disorder
- 33% two or more

Mean: 3 comorbid disorders

Outline Diagnostic Assessment

- Early onset in life
- Chronic persistent course
- Chronic impairment or compensation/coping causing secondary impairment

Mainstay of ADHD diagnosis is: **CHRONICITY**

The period that ADHD symptoms are remembered will be longest in older adults
Assessment is comprehensive

- Lifetime ADHD symptoms and impairment (DIVA 2.0)
- Collateral information parent/spouse on ADHD
- Comorbidity: anx/depr/bipolar/sud/sleep personality/autism/physical (MINI Plus)
- Biography
- DSM-IV classification & treatment proposal including order of treatment
Diagnostic Assessment

- 3 hour interview with patient, spouse and family, including:
  - Childhood onset and lifetime ADHD symptoms and impairment (DIVA 2.0)
  - Comorbidity (Mini Plus)
  - Advice: order and content of proposed treatment
DSM-5 changes in ADHD

- Subtypes = now Presentation types
- Cutoff adolescents & adults 5/9
- NEURO-DEVELOPMENTAL DISORDERS
- ADHD + ASS
  - Age of onset < 12 years
  - More examples of behaviour
  - Impairment in ≥ 2 situations, but more situations given
- Severity
DIVA-5 Diagnostic Interview for Adult ADHD

DIVA 2.0 Translated in 20 languages

All DIVAs free online: www.divacenter.eu

ALSO: DIVA 2.0 App
DIVA-5

Diagnostisch Interview voor ADHD bij volwassenen (3e editie; DIVA-5)
DIVA-5

- DIVA-5 is the updated version of DIVA 2.0, that was developed to facilitate appropriate and careful diagnostic assessment of ADHD in adults
- This semi-structured diagnostic instrument needs interpretation by a (trained) clinician
- *DIVA should therefore not be used by patients for self report*

- DIVA-5 is free of charge in order to lower the threshold for careful diagnostic assessment worldwide
DIVA 2.0 is a structured Diagnostic Interview for ADHD in adults. The DIVA Foundation aims to lower the threshold for proper diagnostic assessment of ADHD in adults. Therefore DIVA 2.0 is translated and distributed free of charge.

Available languages (* app available)

- Brazilian Portuguese (*)
- Catalan
- Danish (*)
- Dutch (*)
- English (*)
- Finnish (*)
- French (*)
- German (*)
- Hebrew (*)
- Hungarian
- Italian (*)
- Japanese
- Norwegian (*)
- Portuguese (*)
- Romanian (*)
- Spanish (*)
- Swedish (*)
- Turkish (*)
- Polish
The DIVA 2.0 (Diagnostic Interview for ADHD in adults) is now available as **DIVA 2.0 App** in both the App store as at Google Play, for Iphone, Android and Ipad!

The DIVA 2.0 App contains the Diagnostic Interview for ADHD in adults; the DIVA 2.0 App adds the total number of DSM-IV criteria for ADHD in both child- and adulthood, for careful diagnostic assessment of ADHD. Data will not be stored, but sent via email, both as text and as SPSS file.

[www.divacenter.eu](http://www.divacenter.eu)
Website www.divacenter.eu

All DIVAs are published online for free, to facilitate careful diagnostic assessment of adult ADHD worldwide

Content divacenter.eu:

- Text ‘DIVA do’s and don’ts’
- English instruction video will be developed
- Development of DIVA 2.0
- DIVA-5
- DIVA Board
- Ongoing translations
- Validation studies: first in Spanish
- Publications on DIVA
- Contact button/information about ADHD in all languages
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www.divacenter.eu
ADHD & comorbidity
Adult ADHD is highly comorbid with circadian based disorders.

75% has comorbidity (mean 3 disorders):

- Depression (60% SAD) 25-50%
- Anxiety 25%
- PTSD risk 3x increased
- Substance Use Disorders 20-45%
- Personality Disorders 15-40%
- ASD (Autism Spectrum Disorders) 20-50%
- Eating Disorders (BN) 9%
- Binge eating 86%
- Obesity 30%
- Sleep problems, DSPS pattern 75%

Mood Disorders in adult ADHD

Mean prevalence of mood disorders in adult ADHD in the general population is 22%:

- **15%** for unipolar depression
- **9.4%** for bipolar disorder

And vice versa, the prevalence of ADHD in the general population is (normal 3-5%):

- **15-20%** in bipolar patients,
- **22%** in dysthymia patients,
- **8%** of depressed patients in the general population

Kessler 2006; Michielsen 2012; Fayyad ea 2017; Viktorin 2017
ADHD prevalence increases in severe depression

NESDA study: N=2053, 3 groups: HC /Depression /Depression + Anxiety:

- ADHD prevalence was 0.4% in healthy controls
- 5.7% in remitted MDD
- And 22.1% in current depression (OR=4.5)

ADHD symptom rates were significantly increased among those with:

- More severe depression (OR=6.8),
- Chronic depression (OR=3.8),
- Earlier age of onset of depressive symptoms (OR=1.5),
- And comorbid anxiety disorders (OR=3.4).

Conclusion: ADHD symptom rates increased across clinical stages of depression, up to 22.5% in chronic depression

Bron 2016
Increased resistance to antidepressants if ADHD is not treated first

• Patients with major depression and ADHD prove to have an increased risk of treatment resistance to antidepressants (OR 2.3) compared with patients with major depression only

• Regular treatment for ADHD would reduce this risk (OR 1.7)

• So this is a plea for treatment of ADHD first…, depending on severity of the depressive disorder

Chen 2016
Treatment of ADHD reduces depression risk

- Swedish Registry Study N= 38,000
- Treatment with ADHD medication is associated with a reduced long-term risk (3 years later) for depression
- The risk is lower for longer duration of treatment with ADHD medication
- Also, ADHD medication is associated with reduced rates of concurrent depression: 20% less common during periods when patients receive ADHD medication compared with periods when they do not

Chang 2016
Treatment of Bipolar Disorder in ADHD patients: Mood stabilizer first

- Methylphenidate (MPH) and Dexamphetamine are first choice medications for ADHD.
- In patients with combined ADHD and bipolar disorder, MPH monotherapy is associated with an increased rate of manic episodes.
- In patients taking mood stabilizers, the risk of mania decreased after starting methylphenidate.
- No evidence for a positive association between methylphenidate and treatment-emergent mania among patients with bipolar disorder who were concomitantly receiving a mood-stabilizing medication.
- Thus careful assessment to rule out bipolar disorder is indicated before initiating monotherapy with psychostimulants.

Viktorin 2017
ADHD or Borderline?

Overlap

• Impulsivity is hallmark of both
• And: frequent moodswings (5x/day) & irritability in 90% of adults with ADHD

Differential diagnosis?

• Inattention and hyperactivity are typical ADHD symptoms, but happen to occur also in most BPD patients
• ADHD starts in childhood, borderline as well, & starts earlier than previously thought, so before adolescence
• History of neglect or sexual abuse typical in borderline, not per se in ADHD

ADHD or Borderline?

Comorbidity

• 16-38% of patients with ADHD also have Borderline personality disorder

• Almost all borderline patients also have ADHD symptoms in childhood and/or current

Current view on ADHD vs Bordeline

• Borderline seems to have a history of ADHD in childhood in most cases
• Symptoms overlap more than the criteria indicate
• Borderline might be a more severe form of ADHD in adulthood
• Borderline: associated with sensation seeking temperament, and avoiding sorrow
Chance of addiction
ADHD vs controls

Wilens, 2003
Substance Use Disorder: Age at onset in ADHD compared to controls

Wilens 1997
Treatment of ADHD in SUD

• Medication treatment of ADHD does not increase chance of SUD
• Medication protects: lowers risk of SUD with stimulant treatment
• Higher dosages needed in SUD patients with ADHD

Wilens 2003; Groenman 2013; Skoglund 2017
ADHD, circadian rhytm, sleep, mood and season

- ADHD
- Late Sleep
- Winter depression
- Over weight

100% → 75% → 30% → 10%

Goikolea 2007, Psychol Med;37 (11):1595-9;
Amons 2006, J Affect Disord;91(2-3):251-5;
Lewy 2006, Proc Natl Acad Sci U S A;103(19):7414-9;
Van Veen 2010, Biol Psychiatry 67(11):1091-6
Bijlenga 2013, J Att Disord; 17(3):261-75
Bijlenga 2013, J Sleep Res. Aug 16 epub
Almost released: Super Brains app for ADHD

• First in Dutch in June, then in English
• For adults, then for children
• During or without treatment
• Information, reminders, agenda support, psycho education, video’s with dr. Brains on symptoms and comorbidities, chattrooms, communities, library, CBT/coaching
• Professionals get training to coach digitally

www.superbrains.nl