Attention/Deficit-Hyperactivity Disorder (ADHD)

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Attention Deficit Hyperactivity Disorder

- Hyperactivity
- Impulsivity
- Inattention

Dysfunction in Attention Motor Control and Perception (DAMP)

- Hyperactivity - Impulsivity - Inattention

ADHD as developmental delay

Quantitative rather than a qualitative difference between children with ADHD and controls

Developmental psychopathology approach

ADHD = DEVELOPMENTAL DELAY

Normally developing children

Children with ADHD

Baby, Preschool, School, Teenage, Adult
ETIOLOGY

- ADHD = frontal dysfunction
  - Individuals with ADHD have poor executive functions (and we know that the executive functions are based in the frontal lobes)
  - EEG shows frontal underactivation
  - MRI shows smaller frontal lobe (right side)
  - fMRI shows less frontal activation among children when asked to perform a task that requires attention or response inhibition.

ETIOLOGY

- Complications prenatally, during delivery or during infancy (e.g., oxygen deprivation during birth)
- Smoking/alcohol (and stress) during pregnancy
- Family and adoption studies have shown that there is a genetic component to ADHD
  - This does not mean that there is ONE ADHD gene. Rather a large number of genes (primarily dopamine related genes) have been shown to be associated with the disorder.

PSYKOSOCIAL FACTORS

Most researchers do not believe that psychosocial factors directly cause the disorder
- They are important for how the disorder is developing over time and the presence of comorbid disorders such as ODD and CD.

Psychosocial factors and ADHD:
- Parental stress (indirectly linked to unemployment, bad psychiatric health). Some studies have linked parental stress during pregnancy to ADHD. However, these effects usually disappear when controlling for genetic effects.
  - Low parental sensitivity
  - Parenting ("goodness-of-fit with the child’s temperament important")

EXECUTIVE FUNCTION DEFICITS AS AN EARLY RISK FACTOR FOR ADHD

Theme 1
Inhibitory control

Verbal working memory
Non-verbal working memory
Self-regulation
Planning

Russel Barkley’s hybrid model of ADHD

A relatively large subgroup of children with ADHD do not have executive function deficits. Executive functions strongly related to emotional and motivational factors. Could this explain additional variance in ADHD symptoms?
- Strongest relations to regulation of positive emotions (also when using children’s self-reports (Rydell, Berlin, & Bohlin, 2003; Rydell, Thorell & Bohlin, 2007)
- Variable reaction times consistently associated with ADHD? State regulation?
- What about possible moderating and mediating factors in the child’s environment such as parent-child attachment, parenting?

The Dual Pathway Model

Neuro-biological Basis
- Executive Circuit
- Reward Circuit

Psychological Process
- Executive Dysfunction
- Delay Aversion

Behavioral Expression
- ADHD

Sonuga-Barke, 2002, 2003

Multiple Pathways

- Minimize delay
- Maximize attention to non-temporal stimulation
- Inattention
- Hyperactivity

Sonuga-Barke, 2002, 2003
Computerized working memory (WM) training can improve both working memory and other cognitive functions, and lead to lower symptom levels in school-aged children with ADHD (Klingberg et al., 2004, 2005).

It has also been demonstrated that WM training leads to increased activity in frontal and parietal cortex among healthy adults (Olesen et al., Nature Neuroscience, 2004).

Training of working memory, which improves working memory capacity, is associated with changes in the density of cortical dopamine D1 receptors (McNab et al., Science).
Effects of WM training in healthy adults
Olesen et al 2004

parietal cortex (intra-, inferior and superior)
caudate nucleus

middle frontal gyrus
thalamus

caudate nucleus

COGNITIVE TRAINING
IN PRESCHOOL CHILDREN
MUMSARNA
**COMPUTERIZED COGNITIVE TRAINING IN PRESCHOOL CHILDREN**

- Significant effects on both verbal and spatial working memory after 5 weeks of training
- Training of inhibitory control did not result in any significant effects
  - Ceiling effects for some measures
  - Problems with manipulating task difficulty?
- Future studies should investigate...
  - ...the effect of genes
  - ...clinical samples of children with ADHD
  - ...other clinical groups
  - ...training of other cognitive functions besides working memory and inhibitory control
  - ...the effect of training in combination with other types of interventions (e.g., medication, parent education)

**MY REFERENCES (IN CHRONOLOGICAL ORDER)**

Executive function deficits as a riskfactor for ADHD


**MY REFERENCES**

Executive functions, ADHD and treatment


ADHD symptoms and EF in relation to social functioning


