NEWSLETTER

INDICE:

Dalle banche dati bibliografiche pag. 2

Tessari L, et al.

ADHD/AUTISM SPECTRUM DISORDER TRAITS AND EXPOSURE TO PESTICIDES: A SYSTEMATIC REVIEW

ADHD Atten Deficit Hyperact Disord. 2019;11:S60-S61 pag. 138

Valeriani M, et al.

P59-F ERP RECORDING SHOWS SUBCLINICAL DIFFERENCES IN ADHD PATIENTS WITH AND WITHOUT TUBEROUS SCLEROSIS.

Clin Neurophysiol. 2019;130:e84 pag. 140

Schwarz E, et al.

REPRODUCIBLE GREY MATTER PATTERNS INDEX A MULTIVARIATE, GLOBAL ALTERATION OF BRAIN STRUCTURE IN SCHIZOPHRENIA AND BIPOLAR DISORDER.

Transl Psychiatry. 2019 Jan;9:12 pag. 141

ISTITUTO DI RICERCHE FARMACOLOGICHE MARIO NEGRI · IRCCS

BIBLIOGRAFIA ADHD MAGGIO 2019

ADHD Atten Deficit Hyperact Disord. 2019;11:S54-S55.

CORRELATION OF THE HEREDITARY CHARACTERISTICS BETWEEN PARENTS AND CHILDREN WITH ADHD THROUGH THE VIRTUAL TOOLS AULA® AND AQUARIUM®.

Garcia Beristain JC, Barrag+ín PrE, Saldivar SA.

Objectives: ADHD is the most frequent neurodevelopmental disorder that presents different clinical manifestations throughout life. The approaches used for the study of ADHD are divided into: genetic, neurochemical, structural and functional. Through different genetic, family and adoption studies, the existence of heritability in ADHD has been demonstrated up to 76%. The diagnosis of ADHD is clinical, there are several subjective scales that can guide us to establish the diagnosis. Efforts to find improved evaluation methods that offer greater ecological validity, as well as better sensitivity and levels of specificity, have led to new techniques for evaluating ADHD that are based on the use of Virtual Reality (VR) as an AULA and AQUARIUM Currently, new technological developments in the field of Virtual Reality offer novel and interesting options in the neuropsychological assessment of many cognitive processes, so that through these tools you can find the hereditary characteristics between parents and children. Correlating hereditary clinical characteristics between parents and children with a diagnosis of Attention Deficit Hyperactivity Disorder through AULA and AQUARIUM tools. Methods: Correlating hereditary clinical characteristics between parents and children with a diagnosis of ADHD through AULA and AQUARIUM tools. Type of study: Descriptive and analytical.

Results: There is concordance between parents and children in the diagnosis of ADHD in 80% of the cases analyzed, the most frequent presentation diagnosed in pediatric age was the combination in terms of concordance between parents and children by type of presentation are patients with presentation where there is significant agreement of 62% with a predominance in the female sex, patients with hyperactive-impulsive presentation presented a 40% concordance with their parents, predominantly male

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Per la ricerca degli articoli pubblicati nella letteratura scientifica nel mese in esame sono state consultate le banche dati Medline, Embase, PsycINFO e PsycArticle utilizzando le seguenti parole chiave (o i loro sinonimi): 'Attention deficit disorder', 'Attention deficit hyperactivity disorder', 'Infant', 'Child', 'Adolescent', 'Human'. Sono qui riportate le referenze considerate rilevanti e pertinenti.

ADHD Atten Deficit Hyperact Disord. 2019;11:S43.

WHEN PARENTS REFUSE PSYCHOPHARMACOTHERAPY FOR ADHD IN THEIR CHILDREN: MINDFULNESS-BASED INTERVENTION AS AN ADD-ON TO BEHAVIOR THERAPY IN AN 8 YEAR BOY WITH ADHD.

Boricevic M, V.

Objectives: The effectiveness of current care-as-usual (psychoeducation, pharmacotherapy and/or cognitive-behavioural therapy) for ADHD is limited and a substantial subgroup of children with ADHD has remaining symptoms and impairment. Research has shown positive effects of Mindfulness-Based Interventions (MBI) for children and adolescents with ADHD.

Methods: A case report presentation of MBI as an add-on to behavior therapy in an 8 year old boy with ADHD whose mother refused pharmacotherapy.

Results: The boy was referred for persistent difficulties with inattention, hyperactivity and impulsivity that were negatively impacting his school work, family and peer interactions. The diagnosis of ADHD with no comorbid disorder was established following multidisciplinary assessment (child and adolescent psychiatrist, clinical psychologist, speech and education specialist, EEG and neuropediatrician). The mother refused pharmacotherapy and behavior therapy (BT) was started. BT partially reduced child conduct problems. MBI as an add-on to behavior therapy was applied and yielded positive results on ADHD symptoms and child overall functioning.

Conclusions: Mindfulness-Based Interventions (MBI) as add-on to behavior therapy may be effective in children with ADHD. However, randomized and controlled (clinical) trials with large samples, standardized interventions, objective measures, and that are generalizable outside the intervention context are needed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S3.

EFFECTS OF METHYLPHENIDATE ON SLEEP IN CHILDREN WITH ADHD.

Ferreira I, Amorim A, Costa C, et al.

Objectives: Sleep disorders are frequent amongst children and adolescents with ADHD and can add to the impairment of the disorder. Stimulant medication like methylphenidate (MPH) can also have an impact on sleep. The goal of our study was to analyse sleep architecture of children with ADHD and the impact of MPH on sleep.

Methods: Retrospective analysis of the clinical records of children with ADHD that performed polysomnography (PSG type I) between January 2016 and December 2018. We divided the sample into two groups: group A, with MPH and group B, without MPH, and compared sleep patterns. To analyse statistical significance, we used StataCorp. 2009. Stata Statistical Software and Wilcoxon Mann Whitney/T-student tests.

Results: Total of 72 patients with ADHD. The most frequent ADHD subtype was inattentive (32%). Comparing sleep architecture between group A (n = 41/55%) and group B (n = 31/41%): mean Sleep efficiency was higher in group B (B 83.8%/A 78.1%) with statistical significance (p = 0.0498). Not statistically significant: Mean sleep latency (A 33.5 min/B 31 min p = 0.8645). Mean duration of Stage N2 (A 58.6 min/B 60.5 min. p = 0.2151), mean duration of Stage N3 (A 27.2 min/B 25.1 min. p = 0.1777), mean REM sleep latency (A 159.8 min/B 180.4 min. p = 0.1812) and mean REM sleep (A 13.2%/ B 13.7%. p = 0.6516). Obstructive sleep apnoea (OSA) was frequent in both groups (group A 82%/B 87%), but differences weren't significant (p = 0.4061).

Conclusions: Our results suggest that MPH does not affect significantly sleep architecture, except for sleep efficiency. Our revision of the literature also found few consistent findings. We highlight the fact that OSA was a predominant feature and should be evaluated in these patients, since it knowledgeably influences sleep architecture. We acknowledge however that finding a relationship between sleep and medication is complex, because other sample characteristics may impact sleep findings, and thus influence results

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ADHD Atten Deficit Hyperact Disord. 2019;11:S54.

IS EVENINGNESS PREFERENCE ASSOCIATED WITH THE PRESENTATION AND SEVERITY OF ADHD? STUDY IN AN ADOLESCENT CLINICAL SAMPLE AND HIGH RISK SIBLINGS.

Galicia E, Arias-Caballero A, Palacios-Cruz L.

Objectives: Describe the role of evenigness preference in the presentation and severity of ADHD in Adolescents and their Siblings.

Methods: Observational Analytic, Cross Sectional design Study sample was obtained from an adolescent outpatient clinic, composed of probands and siblings with and without ADHD. The sample was evaluated with Brief Psychiatric Rating Scale (BPRS-29 items), the Morningness-Eveningness Scale for Children (MESC) and ADHD Rating Scale IV (ADHD-RS IV) by expert clinicians.

Results: Out of the 113 participants, 58 were siblings. Siblings that had an eveningness preference where up to 2.22 times more at risk for ADHD, and, we found that the scores on ADHD RS- IV had a negative correlation with the MESC scores, (+¦ = - 0.42, - 0.21, - 0.49) P<0.05 for probands versus (+¦ = - 0.31, - 0.18, - 0.27), P<0.05 for Siblings, inattention symptoms, hyperactivity/Impulsivity and combined symptoms, respectively.

Conclusions: Eveningness preference may be included as one of the variables to look for in ADHD adolescents and their siblings in order to establish prognostic characteristics like severity of symptoms. Relationship between ADHD-RS -IV and MESC scores, comparison total sample versus siblings with ADHD. (Table presented)

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ADHD Atten Deficit Hyperact Disord. 2019.

IS INCREASED SENSITIVITY TO PUNISHMENT A COMMON CHARACTERISTIC OF ATTENTION DEFICIT/HYPERACTIVITY DISORDER? AN EXPERIMENTAL STUDY OF RESPONSE ALLOCATION IN JAPANESE CHILDREN.

Furukawa E, Alsop B, Shimabukuro S, et al.

Research on motivational processes in attention deficit/hyperactivity disorder (ADHD) focuses on reward. Studies with punishment are limited and findings mixed. This study evaluated the effects of punishment on response allocation in Japanese children with and without ADHD. Thirty-four children meeting DSM-IV criteria for ADHD and 59 typically developing control-group children completed an operant task in which they choose between playing two simultaneously available games. Reward was arranged symmetrically across the games under concurrent variable interval schedules. Asymmetric punishment schedules were superimposed with responses on one game punished four times as often as responses on the other. Children with ADHD showed greater behavioral sensitivity to punishment than controls. They allocated significantly more responses to the less frequently punished alternative and were more likely to play this game on consecutive trials and responded more slowly to the more punished game. Control group children allocated their responses evenly across games. Punishment exerted greater control over the behavior of Japanese children with ADHD than controls, similar to findings with children from Western countries, suggesting this is a common characteristic of the disorder. The behavior of typically developing Japanese children, while demonstrating awareness of punishment, was not controlled by the frequency of its occurrence

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ADHD Atten Deficit Hyperact Disord. 2019;11:S71.

COMPARATIVE EFFICACY OF METHYLPHENIDATE AND ATOMOXETINE ON SOCIAL PROBLEMS IN YOUTHS WITH ADHD.

Shih H-H, Shang C-Y, Fen Gau SS.

Objectives: The present study aimed to directly compare the efficacy of methylphenidate and atomoxetine in improving social problems among children and adolescents with ADHD.

Methods: The study sample included 168 drug-naive children and adolescents 7-16 years of age, with DSM-IV-defined ADHD, randomly assigned to osmotic-release oral system methylphenidate (OROS-methylphenidate) (n = 83) and atomoxetine (n = 85) in a 24 week, open-label, head-to-head clinical trial.

Efficacy measurement was based on Social Adjustment Inventory for Child and Adolescent (SAICA) ratings by mothers and subjects. Evaluation timepoints were set at baseline, week 8, week 16 and week 24.
Results: Both methylphenidate and atomoxetine were effective in improving school functions at week 24 (methylphenidate: Cohen d = - 0.82, p<0.001; atomoxetine: Cohen d = - 0.62, p<0.001) and peer relations at week 24 (methylphenidate: Cohen d = - 0.50, p<0.001; atomoxetine: Cohen d = - 0.33, p = 0.005) by motherreported SAICA. Atomoxetine was effective for behavior problems at home (Cohen d = - 0.41, p<0.001), and methylphenidate was effective for sibling relationships (Cohen d = - 0.24, p = 0.037) and behavior problems at home (Cohen d = - 0.43, p = 0.002). There was no significant difference between the two treatment groups in mean reduction in school functions, peer relationships and home behaviors of SAICA at week 8 and week 24.
Conclusions: Our findings lend evidence to support that both methylphenidate and atomoxetine were effective in improving social problems in children and adolescents with ADHD, including school functions and peer relationships. Comparing the methylphenidate group and the atomoxetine group, there was no between-group difference in improving social function, peer relationships and home behaviors at week 8 and week 24

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ADHD Atten Deficit Hyperact Disord. 2019;11:S45.
FOCUSLOCUS: MANAGEMENT GAMING SYSTEM FOR EDUCATIONAL ACHIEVEMENT AND SOCIAL INCLUSION FOR ADHD.
Sanabra M, Del VA.
Objectives: Design of the study, pre-post evaluation metrics and description of participants (age, gender, IQ and ADHD symptoms).
Methods: Participants were recruited from Hospital Sant Joan de D+®u (HSJD), Centre de Salut Mental Infantil i Juvenil (CSMIJ) from Mollet and from Vilanova. Clinical questionnaires were used for the pre-evaluation (ADHD RS IV, Conners 3, Brief 2, CBCL, CHIP-CE/ PRF, SCARED, SCQ-A/B, YSR and CDI) and standardized tests to evaluate children (K-SADS, CGI, CGAS, WISC-V, CPT-3, ENFEN and CANTAB). Before the study began five participants withdraw from the study and currently during the study ten dropped out. The FocusLocus intervention has been implemented in two modalities: Virtual World Management (VWM) and Multisensory Mixed Reality (MMR).
Results: The pilot recruited children (n = 75) with ADHD diagnosis following inclusion criteria (36% inattentive subtype; 3% hyperactive subtype and 61% combined). Participants (75% boys) aged between 8 and 14 years old (mean age = 10.1; SD = 1.83) and with a mean IQ of 94.6. Participants were pseudo-randomly assigned into four active groups (A, B, C and D) without pharmacological treatment and in one control group (E) following their Treatment As Usual (TAU).
Conclusions: The study is not finished yet; post-evaluations are currently taking place at HSJD using clinical questionnaires and standardized tests. More work has to be done to determine the results of FocusLocus cognitive training intervention

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ADHD Atten Deficit Hyperact Disord. 2019;11:S83-S84.
READING COMPONENTS IN ADHD AND DYSLEXIA: DIFFERENTIAL COGNITIVE PROFILES IN BRAZILIAN ADOLESCENTS.
Seabra A, Branco C, Brito G.
Objectives: ADHD and Dyslexia are among the most frequent developmental disorders in school-aged students, and both often cause an impact on scholar reading performance. Therefore, it is fundamental to trace the differential profile in reading performance in such diagnoses. Competent reading occurs through the interaction of several cognitive processes such as decoding, comprehension and fluency. The study aimed to characterize the performance of students with ADHD and dyslexia.
Methods: We assessed 25 adolescents, aged between 11 and 14 years old, from 6th to 9th year of middle school of public and private schools in Brazil, divided into two groups: the group with ADHD (16 students)

and the group with dyslexia (9 students). The diagnoses were established by a multidisciplinary center and there were no comorbidities for any case. The instruments used were: Comprehension Test of Words and Pseudowords II (TCLPP II) to assess decoding; Reading Fluency Test (TFL) to assess fluency; Cloze Reading Comprehension Test (TCCL) to measure reading comprehension; and the WISC vocabulary subtest to assess auditory comprehension.
Results: Non-parametric analyzes revealed statistically significant differences in measures of textual comprehension, especially in the tasks that involved decoding and fluency processes, evidencing superior performance of the group with ADHD in these tests. Participants with dyslexia had a significantly higher performance in relation to the number of word omissions, that is, they had lower omission errors. There was no significant difference between groups in auditory comprehension.
Conclusions: A differential profile was found in reading performance, consistent with the cognitive deficits classically pointed out in the literature for each diagnosis: phonological deficits in dyslexia, with problems in decoding and fluency; and attentional deficits in ADHD, with omission errors

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ADHD Atten Deficit Hyperact Disord. 2019;11:S28.

ROLE OF GLUTAMIC ACID DECARBOXYLASE (GAD1) GENE POLYMORPHISMS (RS 3749034 AND RS11542313) IN SUSCEPTIBILITY TO ADHD: AN EGYPTIAN STUDY.

Seleem M, Rady H, Hammouda S, et al.

Objectives: ADHD is a common childhood-onset psychiatric disorder and may persist into adulthood. ADHD is a complex and heterogeneous disorder with a strong heritability estimates averaging 75% in children. Recent studies suggested a role for the c-aminobutyric acid (GABA) on ADHD hyperactive/impulsive symptoms due to behavioral disinhibition resulting from inappropriate modulation of glutamatergic and GABAergic signaling. The glutamic acid decarboxylase (GAD1) gene encodes a key enzyme of GABA biosynthesis. The study aims to explore the potential association between (ADHD) and (GAD1) gene polymorphisms (rs3749034 and rs11542313).
Methods: A group of 20 children meeting DSM-5 diagnostic criteria for ADHD and their biological parents were compared with a group of 30 healthy age and gender- matched children. GAD1 SNPs (rs3749034 and rs11542313) were evaluated by Real-time polymerase chain reaction.
Results: Most of our children were boys (85%) in school age (9.4 -¦ 2.6 years). Regarding the rs3749034 SNP, having the GG allele caused the highest risk for the child to have ADHD (OR 29.3), followed by the AG allele (OR 5.6). On the other hand, having the TT or the CT alleles in the rs11542313 SNP both increased the likelihood for the child to have ADHD (OR 4.4 and 3.8 respectively). The rs11542313C allele was over-transmitted from parents to ADHD probands. No preferential transmission from rs3749034 or haplotypes from rs3749034/rs11542313 were observed (P = 0.799 and P = 0.821, respectively).
Conclusions: Our results suggest that the GAD1 gene might be associated with susceptibility to ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S9.

DO WEIGHT, WAIST CIRCUMFERENCE AND FAT TISSUE CONTENT INDICATE INCREASED RISK OF OBESITY IN CHILDREN WITH ADHD?

Bryl E, Hanc T, Mamrot P, et al.

Objectives: One of the most commonly studied indicators of obesity in children with ADHD is BMI which does not give direct information on adiposity. What is more, there are few studies evaluating other obesity related parameters such as waist circumference. The aim of this study was to examine the relationship between ADHD and weight, waist circumference and % of fat tissue.
Methods: The sample included 285 boys and 262 girls aged 6-12 years. IOWA Conners Scale was used to distinguish the groups of children with (inattentive-impulsive-overactive, IO) and without elevated level of ADHD symptoms (control group, CG). The type of ADHD symptoms: inattentive (IN) and hyperactive-

impulsive (HY) and oppositional-defiant disorder (OD) symptoms were controlled. The percentage of fat tissue was assessed using the electric bioimpedance method (TANITA MC-980). Body weight was transformed into the z scores based on WHO growth charts. Waist circumference and % of fat tissue were standardized on age and sex using the mean and 1SD from the sample. The z score >1SD was a criterion indicating an increased weight (IBW), waist circumference (IWC) or fat tissue (IFT). The research was funded by National Science Centre (2016/21/B/NZ5/00492).
Results: IO and IN were not related to IBW and IWC. HY was associated with lower rate of IBW (- 14%) but higher rate of IWC (+ 12%) compared to CG. IWC was also found to be more frequent in OD (+ 8%) compared to CG. IFT was related to HY (+ 25% in comparison to CG) but not to IO, IN and OD.
Conclusions: Regardless of lower body weight, Hyperactive/Impulsive type of ADHD was found to be associated with increased waist circumference and % of body fat, which suggests an increased risk of central obesity in ADHD children. Oppositional-Defiant symptoms may modulate the link between ADHD and obesity

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ADHD Atten Deficit Hyperact Disord. 2019;11:S33.

GENOTYPING OF DRD4 AND DAT1 GENES MAY DIFFERENTIATE SYMPTOMS OF ADHD AND SLUGGISH COGNITIVE TEMPO.

Bolat H, et al.

Objectives: We aimed to investigate neuropsychological differences and genotyping of the DAT1 and DRD4 genes between diagnoses of Sluggish Cognitive Tempo (SCT) and ADHD.
Methods: We examined children aged between 6 and 15 years with the Child Behavior Checklist, the Attention-Deficit/Hyperactivity Disorder Rating Scale-IV and the Barkley SCT rating scale that fulfilled by parents. We used a standardized neuropsychological battery (CNS-VS) containing 5 domain (neurocognitive index, memory, psychomotor speed, reaction time, cognitive flexibility and complex attention) and the continuous performance test (CPT). The DAT1 (40 bp repeat region in the 30 UTR) and DRD4 (48 bp repeat region in the exon 3) genes were genotyped.
Results: We compared 31 cases with SCT w/o ADHD, 67 cases with SCT + ADHD and 146 cases with ADHD w/o SCT with 92 typically developing controls (TD). There was a significant difference between the groups for the DAT1 and DRD4 genes ($p<0.05$). All groups presented higher prevalence of 10R homozygosity for DAT1 gene than TD group ($p<0.05$). In terms of the prevalence of 4R homozygosity for DRD4 gene, only ADHD w/o SCT group was differed significantly from TD group ($p<0.05$). SCT w/o ADHD group had significantly higher prevalence of 7-repeat allele for the DRD4 gene than ADHD w/o SCT group ($p<0.05$). Both ADHD w/o SCT and SCT + ADHD groups had lower scores on psychomotor speed and commission errors than healthy controls, SCT w/o ADHD did not differ in these two indexes.
Conclusions: Our findings suggest that SCT and ADHD groups were distinguished by the prevalence of 4R homozygosity and 7-repeat allele for DRD4 gene and measures of psychomotor speed and commission errors. Alleles that we found higher in SCT cases were associated with unresponsiveness to methylphenidate, previously. We indicate the necessity of investigating the symptoms of SCT in ADHD candidate gene studies and pharmacogenetic studies

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ADHD Atten Deficit Hyperact Disord. 2019;11:S64.

COMBINATION THERAPY WITH STIMULANTS AND NON STIMULANTS IN ADHD: EFFECTIVENESS AND TOLERABILITY.

Gnanavel S.

Objectives: (Figure presented) 1. To identify clinical profile and prescribing pattern of those children and adolescents prescribed a combination of stimulants and non-stimulants for ADHD 2. To evaluate clinical effectiveness and safety profile of this combination.
Methods: We carried out a retrospective review of those children and adolescents attending neurodevelopmental clinics in Northumberland who were prescribed a combination of stimulant

(methylphenidate/ lisdexamfetamine) and non-stimulant medication (atomoxetine). The time frame for the review was January 2017 to December 2018 (24 months).
Results: We identified 18 out of a total of 300 patients who were prescribed the above combination of medication (n = 6%). The mean age of the study population was 13.67 years (SD: 1.24). While 16 out of 18 were on preparations of methylphenidate, other 2 were on lisdexamfetamine (in addition to atomoxetine). The daily dose range for methylphenidate was 27-63 mg (Mean: 36.78; SD: 1.45); 30-50 mg for lisdexamfetamine (Mean: 42.87; SD: 1.29) and for atomoxetine was 10-40 mg (Mean: 32.88; SD: 1.89). The most common diagnoses recorded for these patients include ADHD (n = 11, 61.11%); ADHD with tic disorder (n = 4; 22.22%) and ADHD with ASD (n = 3, 16.67%). Methylphenidate was started first in 14 out of the 18 patients (77.77%) and atomoxetine was started earlier in the other four patients (22.23%). The reasons cited for use of this combination included a transient period of cross tapering one medication with another (n = 10; 55.56%); partial effectiveness of one of the medication (n = 4; 22.22%) and balancing of side effects (including effect on sleep, appetite, anxiety symptoms and tics) (n = 4; 22.22%). Adverse effects were reported in only 1 out of 18 patients (5.56%) who complained of light headedness and giddiness while it was tolerated well in all the other patients. The mean CGI-S score at baseline (at the time of combining medication) was 4.87 (SD: 0.67) and the mean CGI-S score at the subsequent appointment (after combining medication) was 2.24 (SD: 0.23) ($p<0.01$).
Conclusions: This study in addition to the previous literature suggests there is a definite role for combining stimulants with non-stimulants in at least a group of patients with ADHD and that the tolerability to this combination is generally satisfactory. Complementary mechanism of action of these two medication on dopamine and norepinephrine; differing half-life/duration of action and the milder (though similar) side effect of profile of atomoxetine as compared to methylphenidate provides a theoretical rationale for this combination. More prospective studies on patients with ADHD on this combination regimen are required to shed more light on the same. Summary of clinical profile and indications for medication use. (Table presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S43.
FNIRS-BASED NEUROFEEDBACK TRAINING NORMALIZES BRAIN FUNCTIONING IN CHILDREN WITH ADHD.
Blume F, Ehlis A-C, Preussner G, et al.
Objectives: ADHD in children is associated with abnormal brain functioning measured using electroencephalography (EEG) or functional near-infrared spectroscopy (fNIRS), for instance. Abnormalities comprise an underactivation of prefrontal cortical areas as, for example, evidenced by a reduced concentration of oxygenated haemoglobin and an anteriorisation of the P300 brain electrical field under NoGo conditions. In aiming to teach patients self-regulation skills allowing them to regulate brain activity, neurofeedback trainings (NF) specifically target these abnormalities. Effective NF should therefore result in a reduction of ADHD symptoms as well as in a normalisation of brain activity.
Methods: N = 20 children with ADHD participated in 15 sessions of an fNIRS-based NF of the dorsolateral prefrontal cortex (n = 12) or an electromyogram (EMG)-based control training (n = 8). They trained in a virtual reality classroom visualised through a headmounted display. Besides further measures, parents and teachers reported about changes in ADHD symptomatology on the Conners 3 while children completed a Go/NoGo-Task during a combined fNIRS-EEG-measurement before and after the 15 training sessions.
Results: Parents reported significant symptom reductions through the training in both conditions while teachers reported reductions on trend level only. Children's response inhibition (i.e. commission errors in the Go/NoGo-Task) did neither improve in the fNIRS -, nor in the EMG-condition. Inhibition-associated brain activity normalised in the fNIRS-condition only, manifesting itself in an increasing frontal field component of the NoGo-P300, for instance.
Conclusions: The results suggest that both, fNIRS-based NF and an EMG-based control training effectively reduced ADHD symptoms in children with substantially larger effects reported by parents, however. Additionally, fNIRS-based NF, but not an EMG-based control training, effectively normalised brain functioning. This normalisation did however not extend to the children's performance during the Go/ NoGo-

Task. Implications and directions for future research will be discussed. Please note that this is an ongoing study and results may therefore change as the sample size increases

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ADHD Atten Deficit Hyperact Disord. 2019;11:S55.

WHAT IS THE RELATION BETWEEN ATTACHMENT AND ADHD? A THEORETICAL REVIEW.

Garcia RC, Lineros LR, Mart+¡n GaL, et al .

Objectives: Since the development of Attachment Theory of John Bowlby, systematic research on the patterns of attachment has occurred in a slow rhythm. In the last decade, a numerous of publications about institutionalized children and attachment occurred. However, few studies have been published as to the patterns of attachment in clinical general population (where there is a lower risk for negligence and Attachment Disorders as described in DSM-5/ ICD-11) and its association with child psychopatology, specifically ADHD in school age children. The aim of this study is to do a nonsystematic bibliographic review of the possible association between attachment difficulties and ADHD in school age children.

Methods: Review of literature was performed using Medline, Cochrane, Pubmed and UpToDate databases with the keywords ADHD, Child Psychiatry, Attachment Disorders, Secure Attachment and Insecure Attachment.

Results: Most of the studies that have been performed make the hypothetic connection between difficulties in attachment and ADHD. Some review studies (Storebo 2013) of attachment and ADHD have been conducted. Major factors that justify the difficulty of making a clear association between attachment and ADHD were identified. Factors as the ambiguous criteria of patterns of attachment classification; the difficulty of having a homogenous and reliable scale to classify attachment competences; and differences in studies which consider ADHD full criteria compared to others that consider ADHDlike symptoms.

Conclusions: Prospective studies in Child and Adolescent Psychiatry, specifically in attachment difficulties and ADHD, are needed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S26.

CESSATION OF COHABITATION DURING PREGNANCY AND OFFSPRING ADHD.

Bang MK, Lund L, Hohw++ L.

Objectives: Research efforts during the past decades have provided intriguing evidence suggesting that stressful experiences during pregnancy exert long-term consequences on the mental wellbeing of the offspring. As cessation of cohabitation constitutes a significant stress factor, the aim of our study was to examine the association between cohabitation status during pregnancy and offspring ADHD diagnosis. Secondly, we examined whether social support during pregnancy and socioeconomic status moderated this association.

Methods: Participants were part of the Danish National Birth Cohort. We included mothers who gave birth between 1996 and 2003 to live born singletons and completed all questions regarding cohabitation status in gestational week 12 and the postpartum interview at child age 6 months (N = 66,806). All children were followed in the Danish National Health registries from birth until a diagnosis of ADHD, ADHD medication prescription, death, emigration or 2013, whichever came first. Cohabitation status was categorized into; living with partner, cessation of cohabitation and no partner during pregnancy. Hazard ratios (HRs) were calculated using Cox proportional hazards models and moderation of socioeconomic status and social support during pregnancy was tested by including an interaction term.

Results: In all, 878 (1.3%) mothers experienced cessation of cohabitation, while 1174 (1.8%) did not have a partner during pregnancy. During follow-up, 1992 (2.9%) children received an ADHD diagnosis. Analyses showed no interaction effect of social support or socioeconomic status during pregnancy. After adjusting for maternal history of mental disorders, sex, social support and socioeconomic status, we found more than

twice the odds of offspring ADHD after cessation of cohabitation (HRadj: 2.39, 95% CI 1.88; 3.06) and similar results were found when the mother had no partner (HRadj: 2.20, 95% CI 1.74; 2.78).
Conclusions: The consideration of prenatal stress effects on mental health trajectories is critical for improving strategies that support healthy development

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ADHD Atten Deficit Hyperact Disord. 2019;11:S87.

IMPLICATIONS OF BRIEF ADHD TRAINING SESSIONS FOR INCREASING EDUCATORS' KNOWLEDGE AND UNDERSTANDING OF ADHD.

Brock S, Carragher L, O'Connor C.

Objectives: This study evaluates the efficacy of brief ADHD Professional Information and Awareness Sessions based on Incredible Years' principles, by measuring early years (EY) educators' and primary school teachers' knowledge and understanding of ADHD.
Methods: EY educators and primary school teachers from 18 Irish schools and early years services participated in the study. A mixedmethods approach is employed for phase one, involving a descriptive, quantitative design utilising a profile survey and KADDS measure, followed up with focus groups. EY educators' and primary school teachers' knowledge and perceptions were measured pre and post provision of ADHD information and awareness training. Descriptive and inferential statistical analysis is utilised with qualitative survey and focus group data analysed via thematic analysis.
Results: Participant profile findings revealed 69% have worked with children diagnosed with ADHD despite 81% having no ADHDspecific training. Groups differed significantly at pre-training (T1) with higher mean scores for primary school teachers and EY educators scoring substantially lower. No significant difference presented between groups at post-training (T2). Total mean scores among both groups increased between T1 and T2 with overall total mean scores almost doubled at T2. With regard to self-rated confidence levels of working with children with ADHD, primary school teachers rated themselves significantly higher at T1 than EY educators, however no significant difference presented between groups at T2.
Conclusions: Findings demonstrate that brief ADHD training programmes can increase primary school teachers and early years educators' knowledge of ADHD. Results from this study strengthen the limited research regarding the impact of brief ADHD training programmes on educators. The findings suggest brief professional development training across both disciplines can greatly increase educator's ADHD knowledge and better equip them with evidencebased strategies to support ADHD in the classroom, thus providing an effective and efficient solution in addressing the well-evidenced gap in educator's ADHD knowledge and training

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ADHD Atten Deficit Hyperact Disord. 2019;11:S46.

A QUALITATIVE ANALYSIS OF PARENT' ADAPTIVE TASKS AND COPING SKILLS DURING THE SHARED DECISION-MAKING STIMULANT TITRATION IN ADHD CARE.

Fletcher E, Samson A, Robaey P.

Objectives: This study aimed to understand how parents' experience of titration contributes to the adaptive tasks and coping skills associated with their child's ADHD diagnoses. The adaptive tasks and coping skills were examined during the parent's participation in a stimulant titration trials using shared decision making. We adapted the individualized randomized placebo-controlled trials in the NIMHfunded Multimodal Treatment of Attention Deficit Hyperactivity Disorder (MTA) study to determine the best dose. We replaced the expert approach of the MTA titration by a shared decision model, using the blinding not only as a way to control bias in assessing the effects of medication, but also as a way to transform the asymmetric relationship between a helpless family and a specialist with power and into a partnership between equals, which enables shared decision making.

Methods: The participants included 4 parents who have undergone 4-6 years before the titration and the shared decision process as a part of the ADHD treatment for their child, as well as 2 parents just after the titration process. We also completed an interview with the lead physician. The analysis was conducted via an adapted grounded theory approach.
Results: 12 themes related to the core emergent theme of titration. Themes that were representative of the titration experience were related to the participant's source of stress, cognitive appraisal of the ADHD diagnosis, adaptive tasks, coping skills, outcomes, and suggested improvements.
Conclusions: The results emphasize how titration has promoted adaptive tasks and coping skills which assisted participants to feel more in control and create a new sense of normalcy regarding their child's ADHD diagnosis. The results have important implications for improving the titration process. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S46.

TWO-YEAR FOLLOW-UP FROM BASELINE OF THE AIMAC RANDOMISED CONTROLLED TRIAL: DOES TREATMENT OF MOTHERS IN MULTIGENERATIONAL ADHD ALSO HELP CHILDREN WITH ADHD IN THE LONG TERM?

Geissler J, Vloet T, Jaite C, et al.

Objectives: ADHD often affects multiple generations in one family. Studies suggest that children of parents who also have a diagnosis of ADHD benefit less from treatment, since parental ADHD symptoms can interfere with the implementation of the intervention. Our twogroup randomised controlled trial examined whether targeting maternal ADHD improves the efficacy of parent-child training (PCT) for symptoms of ADHD and oppositional defiant disorder (ODD) in the child. We report on follow-up data 2 years from baseline.
Methods: We examined mothers of 144 mother-child dyads at five university hospitals for eligibility (T1) and randomized them to either 12 weeks of intensive multimodal treatment (TG, n = 77) or clinical management (CG, n = 67) for Step 1. For Step 2, all dyads participated in 12 weekly PCT sessions. In Step 3, participants received maintenance treatments for 6 months. At 24 months after baseline (T5), we performed follow-up assessments. The primary endpoint was an observer blind rating child ADHD/ODD score. We evaluated outcomes at T5 using ANCOVA.
Results: Data from 101 children (TG n = 58, CG n = 43) and 95 mothers were available at T5. Adjusted means (m) of ADHD/ODD symptoms (range 0 - 26) in children did not differ between the TG and CG (mean difference = 1.0; 95% CI - 1.2 to - 3.1). The advantage of TG over CG in terms of maternal ADHD symptoms on the CAARS-O:L ADHD index (range 0-36) at T3/T4 were no longer observed at T5 (mean difference = 0.2; 95% CI he advantage of TG over CG in terms of maternal ADHD symptoms on the CAARS-O:L ADHD index 2.3 to - 2.6). Sensitivity analyses controlling for medication and significant predictors of follow-up attendance revealed unchanged outcomes. Within-group outcomes remained improved from baseline.
Conclusions: TG and CG converged at the 24-month follow-up and the superiority of intensive treatment regarding maternal ADHD symptoms disappeared. In the long term, cross-generational treatment including maternal ADHD treatment seems to be effective (BMBF grant 01GV0605; registration ISRCTN73911400)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S62.

EVALUATION OF THE RESPONSE OF LISDEXAMFETAMINE IN CHILDREN AND ADOLESCENTS WITH ADHD: QUASIEXPERIMENTAL STUDY.

Barragan-Perez E, Garcia Beristain JC.

Objectives: To evaluate the Lisdexanfetamine response in Mexican pediatric patients with ADHD.
Methods: We designed a quasi-experimental, uncontrolled before and after study to evaluate the LDX response in patients with severe ADHD. We established a diagnosis of ADHD according to DSM-5 criteria. We formed three groups: without previous treatment (group A), in treatment with stimulant drugs (group B) or in treatment with non-stimulant drugs (group C). Prior to the start of the study, letters of consent and

informed consent were signed. We evaluated the effect of LDX based on the difference between ADHD-RS scores at the beginning and after 6 months.
Results: We recruited a total of 144 patients (group A: 48 patients, group B: 57 patients, group C: 39 patients). All the groups showed a significant decrease in the mean score of ADHD-RS (Attention Deficit Hyperactivity Disorder Rating Scale) at 6 months (group A 37.57 vs. 22.34, p<.01), (group B 36.72 vs. 24.45; p<.01), (group C 38.54 vs. 24.3, p<.01). Fewer than 30% of the subjects showed a significant adverse reaction, the most frequent ones being: sleep disturbance (primary insomnia) 24% and decreased appetite in 20%.
Conclusions: Treatment with LDX is an effective, well-tolerated pharmacological option for Mexican pediatric patients with ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S35-S36.

FAMILY-BASED ASSOCIATION STUDY ON FUNCTIONAL ALPHASYNUCLEIN POLYMORPHISMS IN ADHD.

Renner T, Sharma M, Romanos M, et al.

Objectives: There is strong evidence for a disturbed regulation of dopaminergic neurotransmission in ADHD and Parkinson's Disease. Furthermore, a genetic and phenotypic overlap between both disorders has been discussed. A well-studied risk gene for PD is the gene coding for alpha-synuclein (SNCA). This protein is located primarily in presynaptic vesicles and has been suggested to play a role in the modulation of dopamine transporter (DAT) function. DAT is the target of psychostimulants and plays a key role in regulating the dopamine concentrations in the synaptic cleft. In our sample consisting of German families with children affected by ADHD we tested for association of allelic variants of two functionally relevant polymorphisms of SNCA (NACP-Rep1, rs356219).
Methods: Participants were recruited in children and parents, and phenotypically characterized by a team of experienced child and adolescent psychiatrists in the outpatient unit of the Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, University of W++rzburg (NACP-Rep1: 156 families, 232 children; rs356219: 195 families, 284 children). Genotyping were performed using the ABI PRISM SNaPshot Multiplex kit, followed by capillary electrophoresis on an ABI 3100 Genetic Analyzer.
Results: Transmission disequilibrium test analysis revealed no overtransmission for NACP-Rep1 (OR 1, pnom = 1 padj = 1) and rs356219 (OR 1.28; pnom = 0.288) in affected siblings. A sub-analysis on trios with index children showed a nominal association of rs356219 with ADHD (OR 1.43, pnom = 0.020), which survived Bonferroni correction (padj = 0.039) while again no association for NACP-Rep1 (OR 0.8, p = 0.317, padj = 0.634) was detected.
Conclusions: In conclusion, we found in our pilot study a trend for an association of the rs356219 genotype in SCNA that may affect alphasynuclein function and contribute to the aetiology of ADHD. Despite the small sample size our findings underline an interesting potential link in dopamine related neurobiology between PD and ADHD. Future studies on SNCA in large ADHD samples should focus on specified symptoms and traits e.g. attentional capacities or emotional dysregulation

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ADHD Atten Deficit Hyperact Disord. 2019;11:S82.

ADHD SYMPTOM FLUCTUATIONS AND EXPERIENCE OF NATURE IN CHILDREN'S DAILY LIFE.

Reuter M, Schwarz U, K++hnhausen J, et al .

Objectives: ADHD is a disorder frequently diagnosed in children and adolescents showing symptoms of inattention, impulsivity and hyperactivity according to the dimensional approach of ADHD also children without an ADHD diagnosis frequently show ADHD symptoms (Coghill and Sonuga-Barke 2012). ADHD symptoms fluctuate within children from day to day (Schmid et al. 2016). Therefore, ADHD symptoms can be seen as context dependent. Whether nature as context can reduce inattention in children with ADHD was assessed by Faber Taylor and Kuo (2009). The authors found out that the children were able to concentrate

better after walking in a green area compared to walking in a city. In our study, we assessed with ambulatory assessment whether there is a covariation of daily fluctuations of inattention and the experience of nature in children with ADHD symptoms.
Methods: Students from German comprehensive and middle schools (N = 55; age in years: AM = 10;9, SD = 0;6), rated their daily ADHD symptoms (Lidzba et al. 2013) as well as their daily natural experience, over eighteen consecutive days. Items from the original questionnaires were adapted to daily measurement and assessed via smartphones once or three times a day. In addition, attention was objectively assessed via a working memory task on the smartphone.
Results: The children's ratings revealed an intra-individual standard deviation (MISD) of inattention of 0.70 (SD = 0.47), and for natural experience an MISD of 1.02 (SD = 0.62). Mixed model analyses for the covariation of inattention and the daily experience of nature will be discussed on the poster.
Conclusions: Children showed daily inattention fluctuations as well as fluctuations of their daily experience of nature. Further analyzes and implications of the study will be discussed on the poster

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ADHD Atten Deficit Hyperact Disord. 2019;11:S82-S83.

MANAGING CHILDREN WITH CHALLENGING BEHAVIOUR. PARENTS' MEANING-MAKING PROCESSES IN RELATION TO THEIR CHILDREN'S ADHD DIAGNOSES.

Ringer N, Scheja M, Gustavsson A, et al.

Objectives: This study investigates parents' lived experiences of having a child diagnosed with ADHD. The particular aim was to explore parents' meaning -making processes in relation to their children's ADHD with a focus on understanding the potential impact that receiving a diagnosis had on the parents' perceptions of, and ways of managing, their children's challenging behaviours.
Methods: Drawing on data collected through semi-structured interviews with 12 parents recruited to the study by school psychologists in Sweden, we carried out a content analysis of the parents' accounts, producing a range of categories describing different aspects of the parents' meaning-making processes in relation to their child receiving an ADHD diagnosis.
Results: Five conceptual categories were identified, describing components of a process of adaptation through which the parents - using the diagnosis as a tool -were able to transform feelings of distress over their difficulties in managing their child's challenging behaviours into feelings of being able to cope with these challenges of integrating the ADHD diagnosis into everyday family life.
Conclusions: This research suggests that understanding the long-term processes involved in parents' meaning -making of an ADHD diagnosis is important and can open up a pathway to developing initiatives to support parents in dealing with their child's challenging behaviours in everyday life

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ADHD Atten Deficit Hyperact Disord. 2019;11:S83.

ADHD IN URBAN CHINA: IMPLEMENTING ADHD PATHWAYS IN A PEDIATRIC AND IN A MENTAL HEALTH CARE SYSTEM.

Robaey P, Fei L, Li Y.

Objectives: In the context of modern China, children experience a tremendous pressure to perform academically at high levels. This stressful environment is associated with depressive symptoms, suicidal ideation and attempts in adolescence. Children with a diagnosis of ADHD are at high risk in such a stressful environment, despite a generally normal intellectual potential. ADHD treatments are very effective but dependent on the quality of care and on the coordination of different interventions, planned according to individual needs. We aim at developing, implementing and evaluating a model of care based on the Canadian experience while adapting it to the Chinese urban context.
Methods: Based on a review of the literature and group discussions, we designed interviews that were conducted with primary care providers to identify the main barriers to care, the existing resources and the relevance of the shared care model developed in Canada for the Chinese context. The primary care providers

were either working in the pediatric or the mental health care systems. The analysis was done via an adapted grounded theory approach.
Results: The main common barriers are the shortage of qualified clinicians, the lack of training, and the lack of referral system. The main difference was a much more pronounced stigma for seeking help in the mental health system.
Conclusions: In response, we will train the different practitioner focusing on their specific needs, implement shared care pathways between general and specialized practitioners in two target districts, within a stepped care in which the patient is treated at the most appropriate level of care, depending on complexity or outcome

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ADHD Atten Deficit Hyperact Disord. 2019;11:S86.
GETTING PSYCHOTIC WHILE LOOKING FOR TRANQUILLITY: TWO SIDES OF COCAINE CINSUMPTION IN ADULT ADHD - A CASE REPORT.
Ribeiro N, Franco AM, Fonseca I, et al.
Objectives: Case report of adult ADHD comorbid with cocaine abuse (in search for symptom treatment). Dichotomic effect of cocaine with both ADHD symptom relief and toxic psychosis. Revision of literature.
Methods: Clinical history and literature revision using Pubmed with Attention deficit hyperactivity disorder; Cocaine; Psychosis.
Results: We present the case of a 38-year-old man without prior history of psychiatric illness, with regular consumption of cocaine (which he described as a means to calm down). He was admitted to our Psychiatric Ward with a diagnosis of Toxic Psychosis (cocaine related), was medicated with olanzapine 10 mg and showed symptom relief within 3 days. Further investigation revealed prior history of difficulties concentrating and restlessness since childhood. The probable diagnosis of ADHD was supported by the immediate and positive response to rapid acting Methylphenidate. He was discharged after 5 days with olanzapine 10 mg and modified release Methylphenidate 20 mg.
Conclusions: ADHD is composed by the triad of inattentiveness, hyperactivity and impulsivity. In adults, it has significant comorbidity with other mental disorders, mainly Substance Use Disorders (SUDs): approximately a quarter of SUDs are associated with ADHD, and those are the most severe and precocious cases. Treatment of ADHD with methylphenidate at an early age appears to reduce the risk of SUDs. Cocaine is an illicit stimulant with an action similar to methylphenidate; its addiction is one of the most common dependencies seen in patients with ADHD: it is believed that some ADHD patients may choose cocaine to self-medicate their symptoms. The effects of cocaine include transient psychotic episodes. This case emphasizes the need for a timely treatment of ADHD at an early age, while simultaneously serving as a reminder that ADHD, although an uncommon diagnosis in adult Psychiatry, must be considered as a comorbidity in patients with SUDs

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ADHD Atten Deficit Hyperact Disord. 2019;11:S21.
THE INFLUENCE OF SLUGGISH COGNITIVE TEMPO ON CHILD SELFREPORT MEASURES IN CHILDREN WITH ADHD.
Saez BV, Servera M, Trias C.
Objectives: Clinical behavioral measures are the most common way to analyze the symptoms in children with ADHD compared to other groups. However, most of these measures have focused on parent, teacher or clinicians, being the use of self-reports much less common. The aim of the current study was to analyze the self-perceived differences in a group of children diagnosed with ADHD compared to their peers in a community-based sample and, to observe the influence of a measure of Sluggish Cognitive Tempo (SCT).
Methods: The study involved 1655 children (ages 8-13 years). The 4.6% (n = 76) of the sample had an official diagnosis of ADHD. Children completed measures of SCT, anxiety, depression, loneliness, preference for solitude and sleep problems. A multivariate analysis was applied to compare the ADHD group with the control group on all measures.

Results: The most remarkable results to emerge from the data was that the ADHD group showed significant higher scores on SCT, depression, sleep problems and loneliness, while not differing in anxiety and preference for solitude. Then, the same analysis was performed although using the SCT measure as a covariate. In this case, the results showed that the differences between two groups were not significant on all measures, with the exception of loneliness.
Conclusions: The main conclusion is that, in general, children diagnosed with ADHD self-perceive more clinical problems in most measures. Besides, the score on SCT might mediate this self-perception since it clearly affects depression and sleep problems, and to a lesser degree anxiety

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ADHD Atten Deficit Hyperact Disord. 2019;11:S58.

EVALUATION OF TEACHER RATINGS REGARDING EMOTIONAL INTELLIGENCE IN PRIMARY SCHOOL CHILDREN WITH ADHD.

Rodopman AA, Buyukdeniz A.

Objectives: Primary school children with Attention Deficit Hyperactivity Disorder (ADHD) may show deficiencies in social skills in school settings. Students who have low emotional intelligence (EI) were reported by their teachers as having more behavioral problems. This study aims to evaluate EI and teachers' behavioral ratings in a group of children between 7 and 13 years who referred to child psychiatry outpatient clinic with ADHD complaints compared with controls having similar age and sex.
Methods: Clinical psychiatric diagnoses were established by using the Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime Version. Teachers filled out Conner's Teacher and DSM-IV ADHD Checklists. EI was rated by using Bar-On EI Quotient Inventory Youth Version. Intelligence Quotient (IQ) assessments were made by using Wechsler Intelligence Scale for Children-Revised. Student's t- test is used for further comparative analysis, whereas regression analysis was used for predictive factors (SPSS 20.0 descriptive statistics).
Results: The treatment-na+»ve ADHD group consisted 65 children (mean age: 10.34 -¦ 1.86; 48 male, 17 female) and 61 healthy controls (mean age: 10.16 -¦ 1.69; 21 male, 40 female). The ADHD severity was determined as moderate according to Clinical Global Impairment Scale and the diagnosis age was 8.6 -¦ 2.11. EI domains ($p<0.001$) in children with ADHD were significantly lower than the control group. Hyperactivity subscale scores of Conners' ratings revealed significance inversely in relation to EI scores ($p<0.05$). Verbal IQ scores were positively related to higher EI levels in ADHD group ($p<0.05$). Moreover, absence of an ADHD diagnosis was a predictive factor of the level of EI in children.
Conclusions: The identification of possible deficits of EI in ADHD subgroups might enhance the possibility of early intervention that could lead to better academic fulfillment in school settings. Teachers may play an important role in directing families about psychosocial issues related to ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S50.

AUDITORY NOISE TREATS COGNITIVE SYMPTOMS IN ADHD MORE EFFICIENTLY THAN STIMULANT MEDICATION: IS THE SMARTNOISE APPLICATION A NEW POSSIBLE TREATMENT OF INATTENTION IN SCHOOL CHILDREN?

Soderlund GBW, Gustafsson P.

Objectives: Auditory noise is typically perceived as detrimental for cognitive performance; particularly in people with attention deficits and ADHD, that is associated with vulnerability to distraction. Counter to this, we have experimentally shown that sensory noise improves neural function under certain conditions, in particular among subjects where function is impaired to start with. The theoretical underpinning of noise benefit is described in the framework of the Moderate Brain Arousal model.
Methods: In a recent study we compared the effect of 80 dB auditory noise with the one of stimulant medication on two cognitive tasks (episodic- and visuo-spatial working memory). Twenty children with an ADHD diagnosis and twenty typically developing children were tested at two different occasions.

Results: Results showed a significant noise benefit in both tasks for the ADHD group. In the visuo-spatial task the noise benefit was even larger than the one of medication. The effect of medication was marginal in both tasks.
Conclusions: We conclude that this opens up a possibility to use auditory noise as an alternative non-pharmacological treatment of inattention in school children. Based on these findings we have developed an iPhone/iPad application, Smartnoise, that utilize the benefits of noise exposure during demanding cognitive tasks like school work. The Smartnoise tool is portable and easy to use in the classroom and at home during homework. A randomized control trial study to evaluate the Smartnoise application in a school setting is planned to take place during the Spring 2018 conducted by the Vestfold Hospital in Norway

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ADHD Atten Deficit Hyperact Disord. 2019;11:S86.

CIGARETTE SMOKING SEVERITY AMONG ADULTS IN SUBSTANCE USE DISORDER TREATMENT BY ADHD STATUS: RESULTS FROM ICASA STUDIES.

Sanchez-Garcia NC, Velez-Pastrana M, Gonz+ílez R.

Objectives: To examine cigarette smoking severity among adults in Substance Use Disorder (SUD) treatment with and without ADHD. Cigarette smoking is associated to adverse health outcomes and increased mortality. Given the high prevalence of cigarette smoking among people with ADHD and among people with SUD, we examine the severity of cigarette smoking comparing adults in SUD treatment with and without ADHD.
Methods: We examine data from the International ADHD in Substance Use Disorders Prevalence Study Phase 2 (IASP-2), a crosssectional multinational study. Participants are 402 adults in SUD treatment from Puerto Rico, Hungary and Australia (18-65 years, M 36.91 (11.87); 79.6% male). Data on ADHD, SUD, comorbid disorders and cigarette smoking behaviors was collected using the CAADID, ASRS, MINI Plus, SCID-II, Fagerstrom Test of Nicotine Dependence (FTND) and K-SADS.
Results: Among adults in treatment for SUD, people with ADHD have significantly more severe cigarette smoking behaviors. People with ADHD smoke more cigarettes per day, report smoking more cigarettes at their most intense period of smoking, started smoking at an earlier age, and have higher scores on the Fagerstrom Test of Nicotine Dependence. These differences were all significant (all p's<.05). People with ADHD also report having smoked more cigarettes for a greater number of years, although non-significant. Childhood ADHD significantly predicts current cigarette smoking and is associated to earlier age of onset of cigarette smoking.
Conclusions: Adults who have a SUD, and particularly those who also have ADHD, are at significantly increased risk for more severe cigarette smoking. These findings underscore the importance of screening for ADHD among this population. In both SUD treatment and smoking cessation interventions attention should be paid to participants' ADHD symptoms, as these are associated with more severe use of these substances and may complicate treatment. Prevention efforts targeting youth should also consider the impact of ADHD on smoking initiation

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ADHD Atten Deficit Hyperact Disord. 2019;11:S82.

LIVING WITH ADHD: A META-SYNTHESIS REVIEW OF QUALITATIVE RESEARCH ON CHILDREN'S AND ADOLESCENTS' EXPERIENCES AND UNDERSTANDING OF THEIR ADHD.

Ringer N.

Objectives: The aim of the following study was to systematically search for and review qualitative research on children's and adolescents' everyday experiences and understanding of their ADHD, and to suggest an integrative synthesis of the results.
Methods: The method that was used as a guide for the synthesis of the qualitative studies is the one suggested by Sandelowski and Barroso (2007). This broadly used method in the context of healthcare

research (Saini and Shlonsky 2012) aims to systematically review and integrate the findings from various qualitative research reports and to suggest an understanding of the phenomenon in a manner entailing more than merely the sum of all the studies' results (Sandelowski and Barroso 2007). The method consists of three stages: firstly, a systematic search for and retrieval of qualitative research reports; secondly, a critical appraisal of the identified reports according to inclusion criteria; and thirdly, an interpretative integration of the findings of those studies regarded as eligible by creating a categorisation of these findings.
Results: In total, 16 published and unpublished qualitative studies on the subject were identified. The analysis identified four categories: (1) experiences related to one's body and psychological abilities: lack of control, having difficulties, and the biological determination of these experiences; (2) ambivalent experiences related to one's own psychological needs: a need to adjust oneself and a need to be accepted as 'who I am'; (3) ambivalent experience related to social others: demands and expectations are a problem, experiencing lack of belonging and stigma, but also receiving help from close social others; and (4) experiences related to the formation of personal identity.
Conclusions: Knowledge regarding children's and adolescents' everyday experiences of ADHD and their understanding of these experiences is valuable for the further development of interventions

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ADHD Atten Deficit Hyperact Disord. 2019;11:S59.
INHIBITION IN THE ANTISACCADE TASK: AN ENDOPHENOTYPE FOR ADHD.
Siqueiros SM, Falck-Ytter T, Kennedy D, et al.
Objectives: A deficit in response inhibition has been documented in individuals with ADHD (Munoz, Armstrong, Hampton, and Moore 2003) and hypothesized to underpin the characteristic behavioral manifestations of the disorder (Barkley 1997). In this study we aim to (1) assess if higher levels of inhibition errors (deficit) differentially predict higher levels of ADHD traits in late childhood and, (2) assess the heritability of both these measures, using a classic twin design.
Methods: We embedded a response inhibition eye tracking task (the antisaccade task) within a twin study of children from the general (twin) population. The final sample consisted of 298 pairs between the ages of 9-12 years (50% Monozygotic) from the Child and Adolescent Twin Study in Sweden (CATSS). We use linear regression (accounting for intra-pair relatedness) to predict response inhibition deficits (commission errors and anticipatory eye movements in the antisaccade task) from inattention and hyperactivity behaviors (Conners-3P), while controlling for IQ, age, sex, and autistic-like traits. We estimate genetic and environmental effects comparing intra-class Pearson correlations of monozygotic (MZ) and dizygotic (DZ) twin pairs.
Results: There was a unique significant relation between the percentage of anticipatory eye movements and inattention ($p = .042$), but not with Hyperactivity. This, relation held after accounting for sex, age, and IQ. Intra-class correlation comparisons confirmed the expected genetic effect on ADHD traits (MZ: $r = .715$, $p<.001$; DZ: $r = .153$, $p = .031$) and percentage of anticipatory eye movements (MZ: $r = .526$, $p<.001$; DZ: $r = .137$, $p = .044$). We found no relation between ADHD traits and the % of commission errors.
Conclusions: The relationship between percentage of anticipatory eye movements and inattention traits, combined with the strong genetic effects for both measures suggested by the intra-class correlations of MZ and DZ twins, suggests potential for this measure as an endophenotype for inattention. Future analyses will use multivariate twin modeling to directly assess the nature of the observed association

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ADHD Atten Deficit Hyperact Disord. 2019;11:S59.

UNDERSTANDING THE NEUROPSYCHOLOGICAL MECHANISM OF A SELF-MONITORING INTERVENTION IN THE CLASSROOM FOR SYMPSTOMS OF ADHD: A PILOT STUDY.

Sluiter MN, Groen Y, de JP, et al.

Objectives: Self-monitoring interventions can be applied in the classroom to reduce off-task behavior of students. The objective of this study was to replicate previously found behavioral effects of a self-monitoring intervention in children with symptoms of ADHD, and to explore effects on executive functions. It was hypothesized that off-task behavior would reduce and that the intervention might improve inhibition, working memory and/or attention.

Methods: Seven boys in primary special needs education participated in an intervention using an interval timer during math classes to remind them to monitor whether they were still on task. Behavioral effects were assessed by means of observations and teacher ratings before, during and after three intervention weeks (ABA-design), and tested using a GLM repeated measures analysis. Effects on executive functions were assessed pre- and post intervention by means of neuropsychological tests for inhibition, working memory and attention, and analyzed using t-tests.

Results: The classroom observations showed a decline in off-task behavior in the intervention period compared to baseline and these effects lasted in the week after cessation of the intervention (post intervention) ($p<.001$), and both results were confirmed by teacher ratings ($p<.001$). The effects of the intervention on executive functioning were less consistent than the effect on behavior, and only significant improvements in inhibition were found ($p<.001$ and $p = .047$). The teachers as well as students evaluated the intervention mainly as positive.

Conclusions: Some students with ADHD-symptoms clearly benefit from a self-monitoring intervention, with an average to large effect on observed classroom behavior. The effect on cognition seems pertained to inhibition. Further research with a control group is necessary to control for a potential testing effect and confounding factors. The evaluations with teachers and students support the promising conclusions and social validity of the intervention

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ADHD Atten Deficit Hyperact Disord. 2019;11:S13.

SLUGGISH COGNITIVE TEMPO BUT NOT ADHD SYMPTOMS PREDICT CHILD BODY MASS INDEX: EXAMINATION IN A SAMPLE OF CLINICALLY REFERRED YOUTH.

Sarver D, Cox A, Cash A.

Objectives: ADHD symptoms, particularly inattention, have overlap with sluggish cognitive tempo symptoms, a cluster of symptoms indexing slowed behavior/thinking, reduced alertness, and getting lost in one's thoughts. Both symptom constellations predict a wide array of outcomes, and to some extent have divergent associations. While some studies show possible associations between childhood ADHD and excessive body mass index, no study to date has examined whether ADHD and/or SCT predict body mass index in children.

Methods: A retrospective chart review study of 89 children aged 6-15 years referred for learning, attention and memory problems to a developmental-behavioral pediatrics clinic were assessed (65% diagnosed with ADHD based on K-SADS and multi-informant ratings). Caregivers completed the Child and Adolescent Behavior Inventory (CABI) to measure SCT symptoms and the Vanderbilt ADHD rating scale as part of the assessment. Body mass index was calculated at the time of assessment. SCT was evaluated both overall and following a principal components analysis given evidence of commonly observed SCT subdimensions.

Results: Children in the sample had excessive BMI for age and gender (one-tailed t test $p<.001$; Mean BMI z-score = 0.73). The factor analysis revealed a 3-factor solution for SCT mirroring previously published SCT dimensions (slowed thinking, hypoarousal, and daydreamy). Results of linear regressions revealed that ADHD symptoms overall, and ADHD inattention and hyperactivity/impulsivity symptoms did not predict children's BMI scores (all $p>.65$). Total SCT symptoms also did not predict child BMI scores ($p = .86$). However, this was qualified by examination of the SCT subdimensions that revealed that greater SCT low arousal/alertness scores predicted greater BMI ($B = 0.23$; $p = .02$). SCT dimensions of slowed thinking and excessive daydreaming, however, did not predict child BMI (both $p>.14$). When ADHD inattention symptoms were added to the model, SCT low arousal/alertness continued to predict child BMI scores.

Conclusions: Results suggest that child sluggish cognitive tempo rather than ADHD symptoms may contribute to child BMI, indicating it as a novel risk factor for a deleterious health condition. Specifically, children who show low arousal and alertness are more at risk in particular, and that this risk is independent from child ADHD symptoms, despite SCT and ADHD showing strong correlations. Future studies with larger samples followed longitudinally are needed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S49.

DAY-TO-DAY EFFECTS OF A SELF-REGUATION INTERVENTION ON THE ADHD SYMPTOMS OF SCHOOL CHILDREN.

Schwarz U, Reuter M, K++hnhausen J, et al.

Objectives: Children with an ADHD are less able than peers to regulate their behavior (Gawrilow 2012). These self-regulation deficits are linked to various challenges in children's everyday lives, in particular their academic behaviour (Wirth, Reinelt, Gawrilow, and Rauch 2015). Mental contrasting with implementation intentions (also known as WOOP), improves self-regulation in schoolchildren and helps individuals to reach their self-set goals (Gawrilow, Morgenroth, Schultz, Oettingen, and Gollwitzer 2013). Whether this intervention has the potential to support children's self-regulation especially on a day-to-day-level and thereby decreasing their ADHD-symptoms is still unknown. We expect an effect of a day-to-day-level self-regulation intervention on ADHD-symptoms.

Methods: The current study tries to answer the research question with ambulatory assessment via smartphones: for a duration of 18 days children took part in three daily assessments, as well as a pre and post measurement for children and parents. The sample consists of 49 school-aged-children (M = 11.2 years, SD = 8.4 months). ADHDsymptoms were measured with the Conners 3 scale (Lidzba, Christiansen, and Drechsler 2013) and self-regulation with the german adaptation of the Brief self-control scale (Bertrams, and Dickh+ñuser 2009). Participants were randomly assigned to two conditions: Condition 1 went through the mentioned WOOP intervention, whilst thinking about their wishes, outcomes and obstacles on this path and in the end formulated an if-then-plan; Condition 2 thought about wishes, outcomes and further positive feelings on this path, but did not think about obstacles and accordingly did not formulate if-thenplans to overcome these.

Results: Preliminary results suggest that all children do indeed benefit from the intervention, with a stronger decrease of ADHD-symptoms in the WOOP condition as compared to the second condition.

Conclusions: Further results and conclusions will be discussed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S5.

PARENT-OFFSPRING RECURRENCE OF ADHD.

Solberg BS, Hegvik T-A, Zayats T, et al.

Objectives: There is a strong recurrence risk of ADHD from parent to offspring, but patterns of recurrence from mothers and fathers to sons and daughters are not studied. We aimed at evaluating whether gender-specific patterns differed between parents and further examine whether reproduction in men and women influenced the recurrence risk.

Methods: The nationwide Medical Birth Registry of Norway (MBRN) was used to identify individuals born 1967-2011, and those born 1967-1996 were linked to their own children to study reproduction. ADHD-cases in both generations were individuals being dispensed any ADHD-drugs as registered in the Norwegian Prescription Database, 2004-2015, or with an ADHD-diagnosis in the Norwegian Patient Registry, 2008-2015. We used Poisson regression to calculate the relative risk (RR) for ADHD in offspring by ADHD in mother only (n = 20,032; 0.8%), father only (n = 16,952; 0.7%) or both (n = 1545; 0.06%). The remaining adult population served as controls (n = 2,447,559). Reproduction, defined as the proportion with own children registered in the MBRN, was calculated for men and women with and without ADHD.

Results: Maternal ADHD showed stronger associations with ADHD in offspring compared to paternal ADHD (RR = 8.4; 95% confidence interval (CI) 8.2-8.6 vs. RR = 6.2; 95% CI 6.0-6.4)), and highest when both parents had ADHD (RR = 11.7; 95% CI 11.0-12.5). Both mother-offspring and father-offspring recurrence risk were higher in daughters than sons, although paternal associations were lower than maternal (mother-daughters: RR = 10.4; 95% CI 10.0-10.8; mothersons RR = 7.4; 95% CI 7.2-7.6; father-daughters: RR = 6.7; 95% CI 6.4-7.1; father-sons: 5.8; 95% CI 5.7-6.1). Men with ADHD had reduced reproduction compared to women with ADHD (75.2% vs. 90.4%, respectively); however, looking only at individuals who reproduced, the differences in maternal- and paternal-offspring recurrence risks remained.
Conclusions: The mother-offspring ADHD recurrence risk was stronger than the father-offspring risk regardless of offspring gender, with the strongest estimates found for mother-daughters. Reduced reproduction rates in men with ADHD did not explain the differences

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ADHD Atten Deficit Hyperact Disord. 2019;11:S50.

MINDFULNESS FOR CHILDREN WITH ADHD AND MINDFUL PARENTING (MINDCHAMP): A QUALITATIVE STUDY ON FACILITATORS, BARRIERS AND EFFECTS.

Siebelink N, Van HF, Van Rosmalen-Kaijadoe S, et al.

Objectives: The MindChamp study (ClinicalTrials.gov Identifier: NCT03220308) examines the effectiveness of a mindfulness-based intervention for youth with ADHD and their parents, using both quantitative and qualitative designs. Here we describe the first qualitative study which provides a rich systematic exploration of experienced facilitators and barriers to participating in the mindfulness training (i.e. feasibility), and of effects on child, parent and childparent interactions.
Methods: Children with ADHD (N = 17, ages 8-15 years) and their parents (N = 6 fathers, N = 14 mothers) participated in the 8-week protocolised MYmind mindfulness training. After the mindfulness training, individual semi-structured interviews were conducted with children and parents, selected using purposive sampling, and with the mindfulness teachers (N = 3). Interviews were transcribed verbatim, and analysed using Grounded Theory (Atlas.ti). Consolidated Criteria for Reporting Qualitative Research were followed. We report preliminary results.
Results: The following themes emerged for feasibility, most could act as facilitator or barrier: contextual factors (family, medication, time/place of training, time investment), training characteristics (homework, training content, mindfulness teachers, other participants), participant characteristics (ADHD-/comorbidity-related, personal characteristics, view on mindfulness, age of child). Effects concerned the themes of: awareness/insight, acceptance, autonomy/ confidence, cognition, emotion regulation/reactivity, calmness/ relaxation, relational changes and generalisation. Themes included mindfulness-specific (e.g. increased compassion, changed view of self/child) and more general ones (e.g. being in a group similar experiences). There was much heterogeneity in facilitators, barriers, and effects.
Conclusions: The MYmind mindfulness training is feasible, and can lead to diverse positive effects other than or beyond ADHD symptoms alone. Results inform clinical practice and research to improve mindfulness programmes, to personalise intervention, and to select relevant outcome domains for assessing intervention effects in quantitative designs. Relational changes are not captured thoroughly in the assessment battery of the MindChamp quantitative study, but should be emphasised more based on qualitative results. Heterogeneity indicates effects may be hard to identify in quantitative research using mean-based approaches

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ADHD Atten Deficit Hyperact Disord. 2019;11:S28.

USE OF ADHD MEDICATIONS IN SWEDEN: A NATIONWIDE STUDY.

Salmi P, Ginsberg Y.

Objectives: To describe trends in incidence and prevalence rates of adhd medication use in children and adults in Sweden. In addition, to describe medication persistence and comorbidity.
Methods: Data on dispensations of adhd medications and psychiatric diagnoses since 2006 were obtained from Swedish national registers held by the National Board of Health and Welfare in Sweden.
Results: Since 2006 there has been an increase in both incidence and prevalence of adhd medication use. The highest relative increase has been among adults, especially women. The prevalence however is highest among children 10-17 years. Among boys, 5.6% had at least one dispensation of an adhd-drug 2017. The corresponding number among girls was 2.5%. The majority, about 70-90% depending on age group, continued treatment during a follow-up period of 5 years. One out of 3 patients had a break from treatment during the follow-up. Comorbidity was high, especially anxiety and depressive disorders, as well as substance use disorders among adults. Among children, other neurodevelop-mental disorders, such as autism, were common.
Conclusions: The increase in adhd medication use in Sweden will likely continue as incidence is still increasing and patients often continue treatment for longer periods. Comorbidity among patients is high and represents a special challenge in addition to adhd diagnosis

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ADHD Atten Deficit Hyperact Disord. 2019;11:S58-S59.

EXAMINING THE NEUROPSYCHOLOGICAL FUNCTIONS AND PSYCHOSOCIAL PROBLEMS IN PRESCHOOL ADHD: FROM THE SITUATIONAL PERSPECTIVE.

Shoou LHG.

Objectives: Although in DSM-5, the criteria symptoms of ADHD, inattention, hyperactivity, and impulsivity have to present different cross situations (e.g., home, and school). However, studies found some children with ADHD symptoms were not concordance between parents' and teachers' report, and their ADHD symptoms are present in only one setting, either at home or at school. The current study aimed to examine the situational ADHD might have different problems behavioral pattern, neuropsychological functions, and family characteristics compared to children with pervasive ADHD (ADHD symptoms presented in most settings, including at home and school).
Methods: The current study enrolled 37 pervasive ADHD, 29 schoolonly ADHD, 29 home only ADHD, and 110 typically developing (TD) preschoolers. The neuropsychological function measured by the Conners' Kiddie Continuous Performance Test, flanker task, and day night stroop, ADHD symptoms, external and internal problem behavior, and parental stress were assessed.
Results: The pervasive ADHD had impairment in neuropsychological function. Their parents also had higher parental stress than TD. The school-only ADHD had similar impairment in neuropsychological function. However, their parents had equal parenting stress compared to the TD group. Also, the family-only ADHD had higher parental stress than TD; they did not show deficits in neuropsychological function.
Conclusions: The current study supported that the parental reports of ADHD symptoms are sensitive to parenting stress rather than neurocognitive functions, whereas teacher reports tend to be more strongly associated with neurocognitive functions. However, the ecological relevance of different informant ratings should be clarified in future studies

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ADHD Atten Deficit Hyperact Disord. 2019;11:S50.

METACOGNITIVE EXECUTIVE FUNCTION TRAINING FOR PRESCHOOL CHILDREN WITH ADHD: A RANDOMIZED CONTROLLED STUDY.

Shuai L, Zhang J, Li W, et al.

Objectives: This randomized controlled study explore the efficacy, feasibility, and acceptability of Metacognitive Executive Function Training for Preschool children (MEFP) with attention deficit hyperactivity disorder (ADHD). We conducted a randomized parallel group, single-blinded trial.

Methods: In total, 72 children aged 4-5 years old were randomized after an ADHD diagnose and informed consent. In the MEFP group, 35 out of 36 participants completed the 8-week program, compared with 30 out of 36 in the waiting group. The outcomes were ADHD symptoms and the executive function (EF) evaluated by both neuropsychological tests from NEPSY and Behavior Rating Inventory of Executive Function (BRIEF). The assessments were administered and scored by examiners who were blind to the diagnostic and treatment status of the participants. All of the participants were not on medication. Participants attended once-weekly 90-min sessions (60-min for children, 30-min for parents) for 8 weeks. The MEFP are designed to help the preschool children with ADHD to improve their EF through activities, plays, tasks and practices.

Results: The MEFP is feasible to administer and acceptable to participants with 97.9% attendance rate. In terms of the parent's opinion of MEFP, none of them found it difficult to understand and carry out. 95% of the parents felt usually or always satisfied with the program. Results show that after intervention, the oppositional defiant symptoms (p = 0.017) and visual-motor perception (p = 0.034) are improved significantly, the improvement tendency of working memory (p = 0.093). The rest differences of symptoms of ADHD and EF evaluations have not been found significant change through MEFP.

Conclusions: The MEFP is an feasible, acceptable, and potential effectiveness on symptoms and EF for preschool children with ADHD. Next step is to extend the program to longer time and more frequent practices during real life, aiming to get more obvious effectiveness

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ADHD Atten Deficit Hyperact Disord. 2019;11:S43.

MEDITERRANEAN DIET AND ADHD: A CROSS SECTIONAL STUDY.

Blumenfeld Olivares JA, San MM, I.

Objectives: There are several studies that relate ADHD to environmental factors, one of the most important environmental factors is nutrition. The Mediterranean diet is possibly one of the diets with the most beneficial effects. Our intention is to study the relationship between ADHD and the Mediterranean diet.

Methods: A total of 89 children and adolescents (41 with diagnosed ADHD and 48 controls) were studied in an observation case-control study. Anthropometry, nutritional status, adherence to a Mediterranean diet with the Mediterranean Diet Quality Test for Children and Adolescents (KIDMED Index).

Results: There were statistically significant differences between individuals in case group and control group when analysing KidMed's final score (P = 0.004), and when analysing those cases that obtained a higher than 7 score (indicative of a healthy diet) (P = 0.046). When itemizing the analysis of the KidMed questionnaire, statistically significant differences were observed in fish (P = 0.001), cereal (P = 0.002), no breakfast (P = 0.007), and commercially baked goods (P = 0.01) consumption.

Conclusions: We found a positive relationship between a lower adherence to the Mediterranean diet and ADHD diagnoses. The current findings suggest that certain dietary habits may play a role in ADHD development, even though further work is required to investigate causality and to determine if dietary manipulation could reverse the symptoms of ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S88.

ADHD AND SUCCESS IN MILITARY SERVICE IN MALES IN THE NORTHERN FINLAND BIRTH COHORT 1986.

Halt A-H, Koskela J, Uusitalo J, et al.

Objectives: ADHD relates to various difficulties in the transition into adulthood. Military service is an important element in this transition in countries where it is obligatory for men. We studied ADHD and success in military service in a longitudinal population-based study sample.

Methods: The original study sample consisted of the Northern Finland Birth Cohort 1986 (NFBC1986, N = 9432, 99% of all births between July 1st 1985 and June 30th 1986 in the two northernmost provinces in Finland). In the follow-up study at 16-18 years 74 of the males were diagnosed adolescent AHDH after comprehensive assessment while 38 were diagnosed only childhood ADHD which had remitted. In a military call-up at 18 years they were classified either fit for service or not fit for service (permanent rejection, temporary rejection). They were compared to NFBC1986 men without ADHD in respect to fitness and progress in military service.

Results: Those with adolescent or only childhood ADHD considered themselves as healthy and fit for service as those without ADHD, although smoking and alcohol use were more prevalent among them. However, those with current ADHD were more often classified not fit for the service. Among those entering military service, those with adolescent ADHD were more often pre-term exempted, had more visits to military health care, had at least one offence in service, and received lower marks for leadership skills than those without ADHD. Males with remitted childhood ADHD did not differ from controls in terms of military fitness and success in military service. However, they did receive lower marks for team leadership skills than those without ADHD.

Conclusions: Current ADHD associated with poorer military fitness and success in military service among Finnish men, while remitted ADHD did not. When evaluating military fitness of individuals with ADHD current symptoms and impairments need to be addressed

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ADHD Atten Deficit Hyperact Disord. 2019.

COMPARISONS BETWEEN SLUGGISH COGNITIVE TEMPO AND ADHD-RESTRICTIVE INATTENTIVE PRESENTATION PHENOTYPES IN A CLINICAL ADHD SAMPLE.

Ünsel-Bolat G., Ercan ES, Bolat H, et al.

There is a debate how different ADHD cases with a comorbid sluggish cognitive tempo (SCT) phenotype are from subjects with a pure inattentive ADHD presentation (ADHD-restrictive inattentive presentation). In this study, 214 patients aged 8ΓÇô15-áyears from an ADHD outpatient clinic were assessed, and 100 typically developing controls (TD) were recruited as comparisons. No psychiatric comorbidities except for oppositional defiant disorder were allowed. We compared 29 cases with ADHD + SCT with 34 ADHD-RI cases and 92 TD subjects on sociodemographic profiles, CBCL subscales scores and neurocognitive findings. Regarding sociodemographic profiles (age, gender and parental education) and CBCL subscales, ADHD + SCT and ADHD-RI cases did not differ in any score (all $p > 0.05$). Comparing with SCT cases, ADHD-RI cases presented slower psychomotor speed and worse neurocognitive index ($p < 0.001$). We found that only SCT was independently associated with a lower performance in total memory score. ADHD-RI was independently associated with longer reaction time. Our findings suggest that although SCT might be expected to present longer reaction time, we found that slower psychomotor speed and longer reaction time scores were related to inattention. Overall, SCT and ADHD-RI groups were distinguished by differential associations with measures of memory and reaction time

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ADHD Atten Deficit Hyperact Disord. 2019;11:S52-S53.

THE AWARENESS PROJECT. DIFFERENCES BETWEEN CHILDREN DIAGNOSED WITH ADHD AND HEALTHY CONTROL CHILDREN AS TO SLEEP DIFFICULTIES AND SOME BEHAVIOURAL ASPECTS.

Al-Otaibi K, Al-Otaibi S, Al-Dughaishem H, et al.

Objectives: The research aimed at determining differences between children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) and healthy control children aged between 5 and 12 years old as to sleep and some behavioural aspects. The importance of the theoretical study lies in the scarcity of Arabian researches and studies, and Saudi ones in particular, which have studied the differences between the two groups of the study (within the knowledge of the researchers).
Methods: The study sample consisted of two groups: children diagnosed with ADHD and a group of healthy control children. The measurements for the children diagnosed with ADHD were complete and available from the Good Night Project: Behavioural sleep interventions for children with ADHD: A randomised controlled trial, in the Kingdom of Saudi Arabia (ALAmmar 2018). The measurements of healthy control children were collected in this research. They were selected randomly by the researchers in the current study. Each group included 32 children of both sexes and their ages varied between 5 and 12 years. The researchers used the comparative method to determine the differences in sleep and some behavioural aspects between the two study groups. The study used the following tools: 1. Primary Information Form prepared by the researchers. 2. Children sleep habits questionnaire prepared by Owens, Spirito, and McGuinn (2000); translated by Abu-Khadhrah (2012). 3. Children Behavior Rating Scale by Conners Parents Rating 48; translated by Dr. Abdulraqib Ahmed Al-Buhairy. The researchers used repetitions, percentages and the T test for independent samples to analyse the results of the study. The obtained results were discussed in the light of the previous studies, and conclusions with suggestions and recommendations were presented.
Results: The results of the study showed: There are differences with statistical significance between the score of children diagnosed with ADHD and healthy control children on the scale of sleep habits of children. The value of T = 2.33, which is statistically significant at the 0.05 significance level. There are differences with statistical significance between the score of children diagnosed with ADHD and healthy control children on the Children Behavior Rating Scale by Conners Parents Rating 48; the value of T = 3.63, which is statistically significant at the 0.05 significance level.
Conclusions: The researchers recommend benefitting from the application of the Good Night Project: Behavioural sleep interventions for children with ADHD: A randomised controlled trial, taking into consideration the important recommendations referred to in the project (ALAmmar 2018)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S73.

ADHD AND LEARNING DISABILITIES IN SCHOOL AGED CHILDREN: AN EXAMPLE OF MULTIMODAL INTERVENTION.

Alves D, Pinto B, Moreira M, et al.

Objectives: ADHD is one of the most common childhood mental health disorders. Twenty to thirty percent of ADHD children have associated learning disabilities (LD) in reading, writing and arithmetic.
Methods: Ant+¦nio was a boy with ADHD, who displayed weaknesses in academic achievement, namely in reading fluency and written expression. His 4th grade teacher was concerned about his academic progress. Antonio was continually frustrated because he seemed unable to sustain the attention level required for learning. Parent and teacher rating scales confirmed that elevated levels of inattention, hyperactivity and impulsivity were associated with lower grades and poor peer relationships. A multimodal intervention combined medication and a psychosocial and behavioral approach was implemented from 4th grade to the end of 5th grade. The intervention focused on three areas: parenting practices (e.g., empathy, consistency), selfregulation skills (e.g., self monitoring) and academic skills (e.g., written expression and reading fluency). The intervention was based on four modalities: (1) psychopharmacological treatment (e.g., methylphenidate); (2) individual counseling with the student, (3) psychoeducation with the parents and (4) school consultation.
Results: Parent and teacher rating scales after intervention showed reduced levels of inattention, hyperactivity and impulsivity associated with greater social adjustment. Ant+¦nio showed greater autonomy and effectiveness in the performance of school tasks. He adapted well to the academic and social requirements of 5th grade and finished the 5th grade with positive results in all subjects.

Conclusions: This brief case study illustrates how multimodal intervention, in conjunction with interventions targeting parenting practices, self-regulation skills and academic skills, can be used to promote academic success in students with ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S65.

ADAPT - ADHD MEDICATION AND PREDICTORS OF TREATMENT OUTCOME.

Halldner HL, Lundberg L, Malmberg K, et al.

Objectives: In clinical RCT studies, the response rate to ADHD medication in children is high (70-90%). However, there is little data on the response rates in the ordinary clinical practice context. We sought to study the outcome of pharmacological ADHD treatment within the ordinary child and adolescent psychiatry services in Stockholm and Gotland County. Eventually we also aim at investigating any possible predictors of the individual treatment outcome.

Methods: In a prospective observational study, approximately 500 children between 6 and 17 years have been included so far. ADHD symptoms are measured using parent SNAP-IV ratings at start, 1 month, 3 months, 6 months, and 12 months. The follow-ups also include measures of weight, length, pulse, and blood pressure, as well as side-effects (P-SEC), anxiety (SCAS-P) and autism symptoms (ASSQ) ratings. Saliva is collected for future DNA analyses.

Results: Preliminary data suggest that about 1/3 of the included children had a good response to the medication (ΓëÑ 40% reduction in ADHD symptoms), about 1/3 had a partial response to the medication (ΓëÑ 20% but <40% reduction in symptoms), whereas about 1/3 had poor or no response (<20% symptom reduction) to medication at the 3 month follow-up. Interestingly, some children with no or poor response at the 12 month follow-up were still using ADHD medication.

Conclusions: Response rate to ADHD medication seems to be poorer in ordinary clinical praxis, than in clinical RCTs. Data collection is still ongoing. Future analyses will aim at identifying any predictors of treatment outcome in the ordinary clinical praxis setting

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ADHD Atten Deficit Hyperact Disord. 2019;11:S42.

ORGANIZATIONAL SKILLS TRAINING OR NEURO-FEEDBACK, COMBINED WITH PHARMACOTHERAPY IN THE TREATMENT OF SCHOOL-AGED CHILDREN WITH ADHD.

Azouz H, Abdel-Latif F, Omar T, et al.

Objectives: To assess the efficacy of use of either behavioral therapy (organization skills training, OST) or cognitive neuro-feedback training, (NFT) as interventional modality combined with medication for improving the core symptoms of ADHD and its co-morbid conduct problem among school aged children with ADHD.

Methods: Participants were 45 school aged children (age range from 6 to 10 years) with diagnosis of ADHD according to DSM-5. Children were recruited from Alexandria University Children Hospital Behavioral Clinic, Egypt and they were randomly allocated into 3 groups; group1: OST and MED (n = 15). OST was in the form of Clinic-based sessions individually applied including modeling, rehearsal, and point systems or token economies; group 2: NFT and MED (n = 15).Children were subjected to a standard protocol of inhibiting +© amplitude (4-8 Hz), muscle movement (43-59 Hz), and rewarding +¦ 1 (15-21 Hz) plus +©/+¦ ratio training either on CZ or C3. Pre and post assessment after 3-month duration of intervention using Arabic form of Conners' Parent Rating Scale short form (CPRS-48). All children received 24 sessions either once or twice per week; group 3: MED only (n = 15) served as control group. All studied children were receiving atomoxetine (ATX).

Results: The three groups were not significantly different their demographic characteristics. Combined OST and MED showed significant decrease of hyperactivity/impulsivity (p = 0.011) and item hyperactivity index (p = 0.041) and co-morbid conduct problem (p = 0.030) scores. However, no similar significant difference was found in inattention scores on post interventional assessment. No statistical significant difference was found

among the group 2 (NFT and MED) and group 3 (MED only), either on ADHD core symptoms or its co-morbid conduct problem.
Conclusions: The combination of OST and MED is significantly effective intervention in improving impulsivity and hyperactivity, and comorbid conduct problems among school-aged children with ADHD compared to combination of NFT with ATX, or ATX only

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ADHD Atten Deficit Hyperact Disord. 2019;11:S75.
THINKING OUTSIDE THE TEXT: UTILIZING VIDEO TO ENGAGE LATINO FAMILIES IN GLOBAL ADHD RESEARCH AND SERVICE UTILIZATION.
Haack L, Araujo E, Meza J, et al.
Objectives: We utilized the Behavioral Impairment Video (BIV: 9-min, silent video depicting a child with ADHD) to conduct a needs assessment and recruit for a school-based treatment pilot (Collaborative Life Skills program in Mexico: CLS-FUERTE) in a Mexican public elementary school district.
Methods: We invite all families and school personnel to an introductory gathering in participating CLS-FUERTE schools. After a greeting, we present the BIV as context for needs assessment questionnaires and treatment referrals. To-date, N = 313 participants from 8 schools consented to the needs assessment and we reached our desired sample size of 6-8 families/school for the treatment pilot (N = 46).
Results: Most participants (78%) identified ΓÇ£ADHD/ADDΓÇØ as the disorder in the BIV and biopsychosocial factors as the etiology (89%), with the most common causes identified being the family (56%) and biology/genetics (41%). Almost all (90%) reported they would be pretty or very likely motivated to seek help for the child in the BIV and only 13% reported that the behaviors are pretty or very likely to resolve without help. The most common help sources identified as appropriate for the child in the BIV were school personnel (78%), mental health professionals (74%), friends/family (45%), pediatricians/doctors (36%) and parent groups (33%). Regarding their own children, 15% endorsed a clinically-significant number of ADHD symptoms and 10% identified ΓÇ£ADHD/ADD;ΓÇØ only 5% reported ADHD service utilization (all medication).
Conclusions: Results imply unmet ADHD treatment need in Mexico, with 10-15% of our participants identifying ADHD in their own children versus 5% reporting service utilization. It is encouraging that most who viewed the BIV identified ADHD, endorsed biopsychosocial etiology, and reported help-seeking motivation. Our informational gathering presenting the BIV helped yield adequate power for our needs assessment -and- treatment pilot. Using novel methods (such as the BIV) may encourage recruitment and retention of under-reached communities in global ADHD research and treatment

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ADHD Atten Deficit Hyperact Disord. 2019;11:S5-S6.
HYPOTHALAMIC-PITUITARY-ADRENAL AXIS' ACTIVITY IN ADHD PATIENTS.
Alvim-Soares A, Pereira P, Souza-Costa D, et al.
Objectives: Evaluate the salivary concentration of cortisol as a physiological index of stress and to verify the circadian rhythm pattern in the salivary cortisol concentration analysis.
Methods: 32 patients selected from the ADHD's Clinics at the Federal University of Minas Gerais (N+ìTIDA) and 15 controls from Belo Horizonte's public schools were selected. Participants were submitted to the Trier Social Stress Test, a standardized psychosocial stress protocol (TSSTc). Saliva samples were collected at the start of the test and at 30 min intervals, for 90 min after their completion. Salivary cortisol levels were measured by the electrochemiluminescence immunoassay (ECLIA).
Results: In the psychosocial stress test, the cortisol levels evaluated by the Area Under the Curve were smaller in the patients group compared to the controls.

Conclusions: These results suggest that children with ADHD present less stress reactivity when compared to children without ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S73.

TELL ME WITH WHOM YOU WALK, AND I WILL TELL YOU WHO YOU ARE: A SOCIAL NETWORK ANALYSIS OF ADOLESCENTS WITH ADHD.

Arruda M, Arruda R, Andrade Ribeiro AC.

Objectives: Peer rejection and poor mutual friendship are among the possible causes of an impaired social functioning in children and adolescents with ADHD. Very few studies have explored this field with modern tools of Social Psychology. The objectives of the present study are: (1) To study the impact of ADHD on the process of social selection of best friends using social network analysis (SNA) techniques in a network of adolescents attending a public school. (2) To investigate the occurrence of homophily (the extent to which individuals form ties with similar vs. dissimilar others) in adolescents with ADHD.

Methods: Sample consists of 108 sixth and seventh-graders (10-16 years) recruited at a public school of a low-density Brazilian city. Parents and teachers were interviewed using standardized and validated questionnaires. ADHD was ascertained as per the DSM-5. A rank of the top three friends was requested from the adolescents. SNA techniques were applied as Exponential Random Graphs Model (ERGM) to verify the impact of ADHD on the selection of friendships, relational configurations and attributes of the actors in the selection of best friends. Homophily was evaluated according to Pearson's correlation coefficient (C Constraint).

Results: Of 108 adolescents 7 (6.5%) met DSM-5 criteria for ADHD. Those with ADHD tended to occupy the periphery of the social network and to develop a relational pattern that expressed less autonomy (C Constraint = 0.249, $p<0.01$), whereas students without ADHD were more likely to be selected as best friends. The homophily mechanism was not observed based on the diagnosis of ADHD.

Conclusions: The present study adds to the literature original findings to better understand the impact of ADHD on social functioning, helping clinicians to a more comprehensive approach and more effective therapeutic intervention

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ADHD Atten Deficit Hyperact Disord. 2019;11:S72-S73.

THE AWARENESS PROJECT.DIFFERENCES BETWEEN MOTHERS OF CHILDREN DIAGNOSED WITH ADHD AND MOTHERS OF HEALTHY CONTROL CHILDREN AS TO SLEEP DISORDERS AND SYMPTOMS OF ANXIETY, DEPRESSION AND STRESS.

Al-Menea A, Al-Ammar H, Al-Eissa A, et al.

Objectives: The research aimed at determining differences between mothers of healthy control children and mothers of children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) as to sleep disorders, anxiety, depression and stress.

Methods: The study sample was composed of multiple regions in the Kingdom of Saudi Arabia; 32 mothers of healthy control children whose measurements were collected in this research and 32 mothers of children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) with the help of samples from a previous study whose measurements were complete and provided by the Good Night Project: Behavioural sleep interventions for children with ADHD: A randomised controlled trial, in the Kingdom of Saudi Arabia (ALAmmar 2018) which measured 32 mothers of children diagnosed with ADHD. The comparative descriptive method was used.

Results: The results showed: First: There are differences with statistical significance for each of anxiety, depression and stress; they were higher for mothers of children diagnosed with ADHD. Second: There are no differences with statistical significance on the scale of sleep disorders.

Conclusions: Recommendations 1. Provide care and support for mothers of children with ADHD to improve psychological health via counselling programmes and periodical meetings for exchange of experience among

mothers. 2. Train mothers on skills of time management and co-ordination between her and her child diagnosed with the disorder and her other life responsibilities

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ADHD Atten Deficit Hyperact Disord. 2019;11:S73-S74.

HOW'S THE PRACTICE OF GENERAL PSYCHIATRISTS FOR ADHD IN ADULTS?

Bahn G-H, Hong M, Lee S-Y, et al.

Objectives: Even though there is a growing body of research on the persistence of childhood ADHD through adolescence to adulthood, professional and public awareness of adult ADHD has to be improved. Child and adolescent psychiatrists are familiar with the trajectory of ADHD, because they have completed four-year residency in general psychiatry and after then, two-year fellowship in child psychiatry. General psychiatrists have less chance to be exposed to symptoms and signs of ADHD. As a primary step to establish a practice parameter for adult ADHD, we surveyed the expert consensus of general psychiatrists how they diagnose and choose medication for adult ADHD in Korea.
Methods: The survey was conducted with Korean psychiatrists in 2018. The questionnaire contains; clinical experience of adult ADHD in practice, chief complaints at initial visit of the outpatient clinic, comorbid psychiatric diagnosis, steps to diagnosis and differential diagnosis, preferred treatment options, preference of anti-ADHD drugs, and average and optimal treatment duration. Descriptive analysis was performed.
Results: Among 139 respondents, 42.5% of respondents met 10-50 patients with adult ADHD. 38.7% of respondents answered 6 month to 1 year as average treatment duration, and over 3 years as optimal treatment duration. The most important step for differential diagnosis was clinical psychiatric interview (71%). The preferred treatment option was pharmacotherapy (71%), and the optional second step were psychoeducation, and cognitive behavioral therapy (CBT). The most preferred medication was Concerta-«.
Conclusions: Although ADHD is life-long condition, public and even experts still aware the ADHD as childhood disorder or self-limited. Continuous medical education for the experts and collection of data with long-term prognosis in adults are needed

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Atten Deficit Hyperact Disord. 2019;11:S6.

IDENTIFYING EXECUTIVE FUNCTIONING PROFILES OF PRESCHOOLERS WITH ADHD: A MULTIMETHOD APPROACH.

Graziano P, Landis T, Garcia A.

Objectives: There is significant heterogeneity in executive functioning (EF) among individuals with Attention-Deficit/Hyperactivity Disorder (ADHD). The current study sought to identify such EF heterogeneity within the preschool period and determine how various EF profiles relate to ADHD symptomology, and associated impairments in emotion regulation and academic functioning.
Methods: Participants included 288 children (Mage = 4.93, 74% male, 83% Hispanic) diagnosed or at risk for ADHD. Children's EF was measured via standardized tasks, and parent/teacher report. ADHD symptoms and emotion regulation were reported by both parents/teachers while children's academic performance was measured via a standardized test. A latent profile analysis (LPA) was conducted to identify EF profiles.
Results: The LPA resulted in four profiles: (1) Consistent high EF (22% of the sample), (2) Inconsistent high EF (17%), (3) Consistent low EF (44%), and (4) Inconsistent low EF (17%). Children classified in the consistent and inconsistent high EF groups had significantly lower levels of ADHD symptoms compared to children in both the consistent and inconsistent low EF groups (ps<.001). Only children in the consistent high EF group had significantly better emotion regulation compared to the inconsistent and consistent low EF groups (p<.001). Lastly, children in the consistent high EF group had significantly higher academic achievement scores compared to children in the Inconsistent High EF group as well as those in the consistent and inconsistent low EF groups (p<.001).
Conclusions: As early as the preschool period, significant heterogeneity in children with ADHD's EF can be found as only 61% of our sample showed some type of EF impairment. Additionally, only children in the

consistently high EF group had better emotion regulation and academic functioning compared to the low EF groups, highlighting the importance of a multimethod approach towards measuring EF

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ADHD Atten Deficit Hyperact Disord. 2019;11:S61.

EXAMINATION OF DIFFERENT RESPONDER CRITERIA APPLIED POST HOC TO SELECT SHORT-TERM, RANDOMIZED, CONTROLLED TRIALS OF LISDEXAMFETAMINE DIMESYLATE IN CHILDREN AND ADOLESCENTS WITH ADHD.

Banaschewski T, Newcorn JH, Coghill DR, et al.

Objectives: Lack of consensus regarding how best to define treatment response hinders translation from trials to the clinic. These post hoc analyses examine three commonly used response criteria in four latephase trials of lisdexamfetamine dimesylate (LDX) in children and adolescents with ADHD.

Methods: Data were analysed from four short-term, randomized, clinical trials of LDX (30 mg to 70 mg) that included placebo and/or active comparators. Response was defined post hoc as Clinical Global Impressions-Improvement (CGI-I) score of 1 (very much improved) or 2 (much improved) plus a reduction in ADHD-RS-IV total score of C 30% or CGI-I scores of 1 or 2 plus a reduction in ADHD-RS-IV total score of C 50% or an ADHD-RS-IV total score B 18.

Results: At endpoint, LDX response rates varied between studies but were generally higher for the least stringent criterion of a CGI-I score of 1 or 2 plus a reduction in ADHD-RS-IV total score of C 30% (range 69.6%-82.6%) than for the stricter and roughly equivalent criteria of a CGI-I score of 1 or 2 plus a reduction in ADHD-RS-IV total score of C 50% (range 59.8%-74.8%) or an ADHD-RS-IV total score B 18 (range and 56.7%-79.9%).

Conclusions: These post hoc analyses demonstrated that response rates were similar for an ADHD-RS-IV total score of B 18 and at least a 50% reduction in ADHD-RS-IV total score plus CGI-I score of 1 or 2. The least stringent criterion of a C 30% reduction in ADHDRS- IV total score plus a CGI-I score of 1 or 2 resulted in higher response rates and may be considered a partial response. Some variability in response rates across different trial designs was observed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S16.

THE POSSIBILITY OF VIRTUAL REALITY AS AN ADHD SCREENING TOOL.

Bae S-M, Lee S-K, Lee S, et al.

Objectives: ADHD is a disease that has a great negative impact on children, families, and schools. Although exact diagnosis and appropriate treatment are most important for ADHD children, it is very difficult to differentiate from other psychiatric conditions because at these ages, normal children can also show some distraction and hyperactivity. Existing screening tests for ADHD has a limitation that the test results are very different depending on the subjectivity of the questioner. In addition, it has been found that specialized tests, such as the Continuous Performance Test is relatively expensive, and it is difficult to apply it widely and quickly because of the need of expert evaluation. Therefore, both problems of non-treatment due to the missed diagnosis period and problems caused by wrong diagnosis of non-specialists have been socially interested. Recently, with the rapid growth of Virtual Reality (VR) technology, the possibility of screening and treatment tool for mental disorders is being studied. Also, VR is an attractive technology to children with familiarity and accessibility. Therefore, this study was designed to introduce the development process of VR game program and examines the possibility of this program as ADHD screening tool.

Methods: The development of the game began with a weekly meeting of child-adolescent psychiatrists, clinical psychologists, and special education specialists. We compared and analyzed the currently developed screening tests and the close-up tests first, and selected those that can be implemented as VR game. In the following 6 months, the game scenarios were revised considering the suitability to the subject, conformity to applicable inspection area, and difficulty level control. The completed scenario was checked twice by an

advisory council composed of the child psychiatrists who are the members of ADHD expert committee in South Korea.
Results: We tried to implement the game as a design to evaluate the three core items of the symptoms of ADHD in various ways, such as hyperactivity, impulsiveness, and attention difficulty required for basic ADHD diagnosis. First, all games were designed for elementary school students which have the highest diagnostic rate among the all ages, and were divided into lower grade and upper grade. Each game has difficulty levels from step 1 to step 3. Each level was divided into 10 sessions, 20 sessions, 40 sessions, and 60 sessions to comparison analyze of the inattention of the subjects from the increasion of mistakes as the session increased. Second, we have programmed to analyze the response time of the subjects in the game, so that the deviation between the degree of hyperactivity and the response time can be calculated. In addition, we tried to determine the inattention of concentration by presenting irritation of the irrespective stimulus and the ambient noise as the disturbance stimulation during game.
Conclusions: A new testing tool that overcomes the limitations of the current ADHD screening tool which depends on just questionnaire only, or a thorough examination which is costly and inaccessible, is necessary. This abstract describes the process of developing a game program to help diagnose ADHD by utilizing VR technology. As a result, we have made a VR program that can evaluate all of the content in paper-based ADHD assessment tools. This VR program will be compared with those of children who were and were not diagnosed with ADHD and the data will be analyzed in the next study. Through more studies in the future, we expect that this game program can be considered as one of the efficient and convenient screening tools for ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S46-S47.
EVALUATION OF A GROUP-BASED PARENTING INTERVENTION FOR PARENTS OF YOUNG PEOPLE DIAGNOSED WITH ADHD IN A COMMUNITY NHS CHILD ADOLESCENT MENTAL HEALTH SERVICE (CAMHS).
Gonzalez R, Afelumo M, Stephens S, et al.
Objectives: To examine the effect of a Group-Based parenting intervention (PI) for young people diagnosed with ADHD in a community CAMHS service. We hypothesized that the perceived overall parents' experience and satisfaction of the ADHD Group-Based PI will be positive with an improvement of young people's behavioural symptoms.
Methods: The ADHD Group-Based PI at CAMHS-Newham (East London) is a 6-week group programme for parents of young people with ADHD. Its run by two senior systemic family psychotherapists. Session content includes: psychoeducation, impact of ADHD on young people/family, positive relationships within family and parental self-care. This is a mixed methods evaluation using qualitative and quantitative data. The qualitative data was derived from in-depth interviews with 8 parents using purposive sampling. Findings from Thematic Analysis will be integrated with quantitative results. Quantitative analyses included: change in ADHD symptoms (hyperactivity) and conduct problems (CD and ODD symptoms). The Strengths and Difficulties Questionnaires was collected from 30 families pre-and-post ADHD Group-Based PI. Data indicating change in hyperactivity, CP and parental efficacy was analyzed using independent and paired samples t-tests, to examine between and within group differences.
Results: Males comprised 82% of the sample, and about half were on ADHD medication. There were significant decreases on CP scores, and an increase in parental efficacy scores post-treatment (all $p<0.001$). So far qualitative findings indicate a positive experience with increased parental confidence, specifically in improving the selfesteem of their children diagnosed with ADHD-and confidence in mention of parenting strategies like praise, reward and firm boundaries.
Conclusions: Given that the ADHD Group-Based PI is the first-line treatment for young people as per NICE guidance, the present service evaluation will improve the quality of this intervention to young people and their families with deprived socio-economic backgrounds and inner-city young people with comorbid CP

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ADHD Atten Deficit Hyperact Disord. 2019;11:S34.

DESCRIBING THE GENETIC ARCHITECTURE OF ADHD USING LINKED-READ SEQUENCING: A CASE-CONTROL STUDY FROM THE ISOLATED POPULATION OF THE FAROE ISLANDS.

Gregersen NO, Zachariasen JF.

Objectives: ADHD is a mental disorder characterised by an ongoing pattern of inattention and/or hyperactivity-impulsivity. ADHD is highly heritable and genetic studies show substantia contribution of common variants to disorder susceptibility. Moreover, a reason metaanalysis show genome-wide significance of 12 independent loci comprising evolutionarily constrained genomic regions and loss-offunction intolerant genes. In this study the potential enrichment of ADHD risk variants will be explored based on whole-exome data from linked-read sequencing of individuals from the isolated population of the Faroe Islands. The demographic history of the Faroese population may have induced enrichment of variants rarely seen in outbred European populations, including enrichment of risk variants for ADHD.

Methods: Cases in this study comprises 56 patients with ADHD, recruited to the ADHD outpatient clinic at the Department of Psychiatry, General Hospital in T+¦rshavn, Faroe Islands. Diagnosis have been verified by a psychiatrist/child and youth psychiatrist, a psychologist and a ADHD specialized nurse. Further, the diagnostics were verified with the diagnostic tools: ADHD-RS (Attention Deficit/ Hyperactive Disorder-Rating Scale), TOVA (Test Vaiabels of Attention), BRIEF (Behavioural Rating Inventory of Eexecutive Function) and in some cases DIVA (Diagnostic Interview for ADHD in adults) and QbTest (Quantified Behaviour Test Plus). Cases have been reviewed by experienced psychiatrists and the diagnostic most solid/robust cases have been selected for genetic analyses. Healthy controls in this study comprises 200 individuals voluntarily recruited to the FarGen infrastructure, at the Genetic Biobank of the Faroe Islands. Self-reported healthy status was confirmed by the diagnostic registry at the National Hospital of the Faroe Islands. High-molecular weight (HMW) DNA extracted from peripheral blood was barcoded by a gel-bead emulsion (GEM) process in the ChromiumTM controller. The 256 exomes were captured using the SureSelectXT Human All Exon kit and sequenced on the NextSeq 500. The linkedreads were aligned to the reference genome (GRGh37/hg19) and variants were called using GATK.

Results: The exomes were sequenced with an average coverage of 56, >98% of the reads were aligned to the reference genome. Due to the barcodes introduced to the DNA fragments in the GEM process we were able to perform molecular phasing, which assign >85% of the genes under 100 kb to a haplotype and phased >75% of the SNPs. Moreover, we will present results from single variant and genebased association analyses, as well as possible structural variants will be presented.

Conclusions: To our knowledge this is the first study to use linkedread sequencing to identify susceptibility variants/genes for ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S25-S26.

STAGNATED PREVALENCE OF DIAGNOSIS AND MEDICATION FOR ADHD IN KOREAN YOUTH.

Bahn G-H, Lee S-Y, Hong M-H.

Objectives: Authors examined the recent changes of the prevalence of diagnosis and anti-ADHD medications for general population under 19 years old.

Methods: 0-18 year old subjects who visited psychiatric department and diagnosed with psychiatric disorders including ADHD, based on National Health Insurance Claims Data for consecutive 6 years, were analyzed. In order to investigate the trends in diagnosis, the year-byyear changes of the diagnoses were analyzed from 2010 as a reference year to 2015, and compared prevalence with other psychiatric disorders. For the prescription trends, anti-ADHD medications were classified into psychostimulants and non-stimulants.

Results: From 2010 to 2015, there was no statistically significant change in diagnosis prevalence (Average Annual Percent Change, AAPC = - 0.17, p value - 0.34). In 2010 as a reference year, ADHD was the commonest among psychiatric disorders in both genders (weighted % of population; Total = 7.65). In males, ADHD showed the highest diagnosis prevalence, but ADHD was followed by depressive disorders in female (weighted % of population; Male = 11.46, Female = 3.46). By age distribution, the diagnosis prevalence showed rapid increase in the age range of 7-9 years, and then decreased with aging in both genders. For anti-ADHD medication prevalence, psychostimulants did not change significantly for 6 years, and non-

stimulants showed a significant increase over the years (AAPC; 0.15, p value, 0.012). In 2010 as a reference year, psychostimulants were prescribed at 17.50% in male, and 6.78% in female. Non-stimulants were prescribed 3.76% in male and 1.08% in female.
Conclusions: While the diagnosis prevalence of ADHD and the prescription with psychostimulants were stable over the recent several years, non-stimulants were medicated more year by year. As the prevalence of diagnosis and medication for ADHD in youth were still much lower than the estimated prevalence, it is necessary to analyze the reason the rates were stagnated

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ADHD Atten Deficit Hyperact Disord. 2019;11:S34-S35.

FAMILY AND CASE-CONTROL ASSOCIATION STUDY OF THE FKBP5 STRESS RELATED GENE WITH ADHD FOLLOWING BY META-ANALYSIS.

Grunblatt E, Werling AM, Walitza S.

Objectives: ADHD is one of the most common psychiatric disorders in children and adolescents with over 5% of the population affected worldwide, often persists into adulthood. Although ADHD was found to be heritable with around 80% genetic predisposition, environmental factors, in particularly stress, might play a role in this equation. FKBP5 gene variants (e.g. rs1360780 and rs3800373) have been linked with various stress related disorders, such as major depression, PTSD and recently described to associate with childhood ADHD, however no confirmatory study has been conducted to date.
Methods: We performed a case-control association study (220 children with ADHD, 152 healthy controls) and a family-based association analysis (n = 202 nuclear families total 724 individuals) investigating two SNPs on the FKBP5 gene (rs3800373 and rs1360780). Following, a meta-analysis has been conducted including the current findings and the findings published by Isaksson et al. (2014).
Results: Both SNPs did not deviate for Hardy-Weinberg equilibrium (p value>0.05). We found a significant association with rs3800373 C-allele and childhood ADHD in the case-control sample (OR 1.486; 95% CI 1.062-2.078; p = 0.0239), while no association with rs1360780 T-allele (OR 1.329; 95% CI 0.955-1.850; p = 0.0971). We could not detect a significant transmission for both SNPs in the family study (OR 0.765 95% CI 0.554-1.056; OR 0.761 95% CI 0.558-1.038, respectively). We could conduct a meta-analysis only for the rs1360780, since this SNP was assessed by Isaksson et al. 2014. Significant heterogeneity between studies was found (I2 = 77.3% p = 0.0122). The random effect meta-analysis resulted in non-significant association between rs1360780 and ADHD (total n = 1243, OR 0.8668 95% CI 0.547-1.372, p = 0.542). In the recent ADHD-PGC GWAS (Demontis et al. 2019) rs3800373 resulted in a trend toward association (OR 0.9719 SE = 0.015, p = 0.0577 uncorrected to genome-wide study), while rs1360780 was found not to associated with European ADHD (childhood and adults; OR 1.020 SE = 0.0147, p = 0.175).
Conclusions: For the rs1360780 we could not confirm association with ADHD, however rs3800373 might confer as a risk SNP for ADHD, since a similar trend was observed in the ADHD-PGC GWAS. Moreover, interactions between these SNPs and aggression and impulsivity was reported in prisoners (Bevilacqua et al. 2012), while in healthy volunteers these SNPs showed association with impulsivity (Kawamura et al. 2013). Therefore, replication studies are needed to assess these findings as well as dimensional traits analysis might help in endophenotyping this gene

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ADHD Atten Deficit Hyperact Disord. 2019;11:S16-S17.

MULTICENTER APPLICATION OF DIVA-5, KOREAN VERSION, FOR ADULTS WITH ADHD.

Bahn G-H, Lee S-Y, Hong M-H, et al.

Objectives: Diagnostic interview for ADHD in adults-5 (DIVA-5) was developed by the DIVA foundation in 2016, revised from DIVA 2.0. Authors translated DIVA-5 into Korean and applied to prove the utility of the tool for adult with ADHD in Korea. Authors aimed to confirm the concordance of DIVA-5 as a diagnostic tool

for ADHD by analyzing the agreement between ADHD diagnosed by two child psychiatrists and results of DIVA-5 interview.
Methods: This study was conducted at eight university hospitals and one private clinic. 284 participants (male; 177, female; 107), mean age 27.5 years (male: 26.3; female: 29.5), enrolled in the study. Two child psychiatrists interviewed participants based on the criteria of Diagnostic and statistical manual of mental disorders-5 (DSM-5) and Adult ADHD Self-Report Scale (ASRS) screener which have proven reliability and validity, and classified them into ADHD group (male: 96, female; 46) and healthy controls (male: 81, female; 61). Adults with ADHD were diagnosed first time in adulthood and drug na+»ve. The ASRS screener score between groups was analyzed to verify the group classification by two child psychiatrists. We analyzed the concordance of diagnosis by two child psychiatrists and DIVA-5 results.
Results: There was a significant difference in the total score of the ASRS screener items in the ADHD group classified by the DSM-5 and the healthy control group (t = 12.670, p = .000). According to the DSM-5, 142 (50%) were classified as ADHD group by two child psychiatrists, and 139 (48.9%) were suggested as ADHD by DIVA-5 result. Of the ADHD group, 130 (91.5%) were suggested as ADHD according to DIVA-5. Among ADHD group, false negative rate applied with DIVA-5 was 8.5%. Among healthy controls, false positive rate with DIVA-5 was 6.3%.
Conclusions: Diagnosis by two child psychiatrists and DIVA-5 results showed high concordance. DIVA-5 would be efficient tool to diagnose ADHD in adults

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ADHD Atten Deficit Hyperact Disord. 2019;11:S10.

A RETROSPECTIVE HOSPITAL CENTER STUDY - ADHD IN CHILDHOOD AND BIPOLAR AFFECTIVE DISORDER: IS THERE A RELATIONSHIP?

Costa A, Samico A, Melo S, et al.

Objectives: Comorbidity between Attention-Deficit/Hyperactivity Disorder (ADHD) and Bipolar Affective Disorder (BAD) is relatively common and a diagnostic and therapeutic challenge, being associated with more severe symptoms, course and a worse prognosis. To our knowledge, there are no data regarding the comorbidity or evolution of the diagnosis from ADHD in childhood to a PAB in adulthood in our population. We intend to analyze data on the comorbidity presence of both pathologies and the diagnosis evolution.
Methods: We performed a retrospective survey of patients followed at a Psychiatry hospital center with one or comorbid diagnosis, whose current age varies between 18 and 38 years. We identified those that were followed in childhood and examined clinical processes in order to evaluate the previous complaints and psychoactive drug used.
Results: We obtained a total of 34 patients with PAB. No patient had a comorbid diagnosis of ADHD, although two patients appeared to have characteristics suggestive of ADHD, both of whom had substance use since adolescence. Only 6 were followed in childhood: three with diagnosis of BAD, two with diagnosis of Depressive Disorder and one with indefined diagnosis.
Conclusions: Studies suggest that there is a presence of comorbidity between BAD and ADHD. Also the previous diagnosis of ADHD is a strong predictive indicator of BAD. Symptomatology suggestive of ADHD in adult patients is not usually part of the previously history routine. Our hospital center receives a population of 300,000 habitants, justifying the small clinical sample of patients with BAD and even smaller with a concomitant presence of follow-up in Childhood Psiquiatry. A cross-sectional study following patients with ADHD in childhood to BAD adulthood should be done to analyze the comorbidity and diagnostic evolution

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ADHD Atten Deficit Hyperact Disord. 2019;11:S44-S45.

INCREASED LEFT INFERIOR FRONTO-STRIATAL ACTIVATION DURING ERROR MONITORING AFTER FMRI NEUROFEEDBACK OF RIGHT INFERIOR FRONTAL CORTEX IN ADHD.

Criaud M, Wulff M, Alegria A, et al.

Objectives: ADHD is associated with poor self-control, underpinned by inferior fronto-striatal deficits including poor self-monitoring skills typically associated with reduced activation in error monitoring networks of left inferior frontal cortex (IFC), insula, cingulate and striato-thalamic regions. We showed previously that 11 runs of 8.5 min of real-time functional magnetic resonance imaging neurofeedback (fMRI-NF) of right IFC in 18 ADHD adolescents resulted in increased activation in rIFC as well as of entire fronto-cingulo-striatal networks, which were associated with clinical symptom improvement. Furthermore, rIFC-NF also increased activation in rIFC and parietal areas during successful Stop task performance. In this study, we investigated whether fMRI-NF would also improve the neural correlates of error monitoring during failed stop trials.
Methods: Twenty-seven boys with ADHD underwent fMRI-NF; 16 in the active group received fMRI-NF of the rIFC and 11 in the control group received fMRI-NF of the left parahippocampal gyrus. They performed a tracking fMRI Stop task before and after fMRI-NF. An ANOVA time (pre- vs. post-fMRI NF) x group (active vs. control) was applied to brain activation and performance to failed stop trials. We furthermore tested for correlations between brain changes and performance and clinical changes.
Results: The active relative to the control group showed increased activation in left IFC, insula and putamen during the failed stop trials, after relative to before fMRI-NF. This activation change was furthermore correlated with decreased post-error reaction times, indicating more efficient error monitoring, and trend-wise with decreased clinical symptoms.
Conclusions: fMRI-NF of rIFC improved performance and activation of left-hemispheric IFC-insular-striatal regions during error monitoring in association with clinical symptom improvement. The findings show that rIFC-NF of rIFC has more widespread upregulation effects-not limited to right IFC-that extend to contralateral fronto-insular-striatal areas of error monitoring, which have previously been shown to be upregulated with stimulant medication. Change in error monitoring related activity after fMRI neurofeedback in ADHD. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S87.

SEARCHING FOR NEW WAYS TO DEFINE AND EVALUATE ATTENTION.

Fehr E, Schweizer H-J, Kane J, et al.

Objectives: Current attention tests primarily attach importance to speed and precision of rule-bound tasks. Thus, they neglect creative aspects of attention frequently relevant to solve everyday problems. To address creativity and to broaden the scope of current attention tests, a Tapping Test (TaTe) was designed to determine the degree of redundancy while attempting to create random patterns. Major goals of the study were (1) to discover new aspects of attention by means of the newly developed TaTe and (2) to extend and/or modify the concept of attention.
Methods: The TaTe was developed in cooperation with Helgi-J+¦n Schweizer and evaluated in preliminary pilot studies. The present study involved 34 pupils from an elementary school in Austria (aged 8.9-12.2 years). Based on assessments by parents, teachers and the pupils themselves, we divided all pupils into a group with (A) and a group without (B) attention problems (A: N = 15, age 10.4 -¦ 1.1 years, and B: N = 19, age 10.1 -¦ 0.8 years, respectively). Group A represented significantly more boys than group B. To validate the results of the TaTe, subjects were also submitted to established attention tests, the Number Connection Test and a Reaction Time Test. Following these tests, pupils underwent the TaTe. In addition to standard statistics, we calculated Shannon entropy and time factors for the tapping sequences.
Results: Results obtained with the TaTe significantly correlated with the distinction of the groups A and B. TaTe supported a high degree of validity. Reliability remains still to be confirmed.

Conclusions: We suggest that the TaTe could be a valuable diagnostic instrument in the field of ADHD and dementia research. Further, being creative while attempting to produce random patterns seems to depend on intact attention processes

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ADHD Atten Deficit Hyperact Disord. 2019;11:S52.

FMRI NEUROFEEDBACK OF RIGHT INFERIOR FRONTAL CORTEX LEADS TO INCREASED FUNCTIONAL CONNECTIVITY IN A FRONTOCINGULO-STRIATAL COGNITIVE CONTROL NETWORK IN ADOLESCENTS WITH ADHD.

Criaud M, Wulff M, Alegria A, et al.

Objectives: ADHD is associated with poor self-control, underpinned by inferior fronto-striatal deficits. We showed previously that 11 runs of 8.5 min of real-time functional magnetic resonance neurofeedback (fMRI-NF) of the right inferior frontal cortex (rIFC) in 18 ADHD adolescents resulted in progressively increased activation in 2 regions of the rIFC which furthermore was associated with clinical symptoms improvements. In this study, we used functional connectivity (FC) analyses to investigate whether fMRI-NF of rIFC resulted in dynamic FC changes in underlying neural networks.

Methods: Whole-brain seed-based FC analyses were applied using as seed regions the two clusters that showed progressively increased activation in rIFC to test for changes in positive and negative FC before and after 11 runs of fMRI-NF. Furthermore, we tested whether the resulting positive and negative FC changes were associated with improvements in clinical symptoms.

Results: rIFC showed increased positive FC after relative to before fMRI-NF with dorsal caudate and anterior cingulate and increased negative FC with posterior regions of the default mode network (DMN), including posterior cingulate, precuneus, striato-thalamic and occipital areas. Furthermore, both the increased FC between rIFC and cingulo-striatal regions and the increased negative FC between rIFC and DMN regions were associated with clinical symptom improvements.

Conclusions: The findings show for the first time that fMRI-NF of a typical dysfunctional frontal region in ADHD adolescents such as rIFC leads to a strengthening within entire ventral fronto-cingulostriatal networks of self-control and to a weakening of FC with posterior DMN regions, presumably decreasing mind-wandering, and that this may be underlying clinical symptom improvement. The fMRI-NF effects of improving the FC of inferior fronto-cingulostriatal self-control networks and of improving the anticorrelation between a self-control region and the DMN reflect a more mature network pattern and are furthermore similar to the effects of psychostimulants. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S26-S27.

ADHD AND COMORBID EATING DISORDERS IN A SPANISH SAMPLE OF FEMALE ADOLESCENTS.

Diez-Suarez A., Mart+¡nez G, I, Vallejo M, et al.

Objectives: To describe the frequency and characteristics of ED behaviors, ED and obesity or overweight in a Spanish sample of female adolescents with ADHD.

Methods: In this longitudinal observational study all the medical records of women between 12 and 18 years with a main diagnosis of ADHD (DSM-IV), between 2001 and 2017, were reviewed. We searched for suggestive symptoms of ED, and T1: first consultation and T2: last follow-up. Anthropometrical measures (Weight, height, BMI) were expressed as Z-scores. Age at diagnosis, and type of treatment were also analyzed.

Results: Patients are 12.3 (2.8) years at ADHD diagnosis, with 3.48 (3.02) years follow-up period (rank: 0.1-13.2). 98 (49.5%) patients have at least one ED, concern for the figure was the most frequent (17.2%). One (0.5%) patient has Bulimia Nervosa and one (0.5%) Binge Eating Disorder. 29 (14.7%) patients have overweight and 14 (7%) obesity. 92.9% of them are on medication, 85% of them methylphenidate. Overweight and obesity decreased to 4% after 3.48 years.

Conclusions: In this sample, half (49.5%) of the patients present at least one ED symptom, only 2 (1%) patients have a diagnosis of ED. The most frequent symptom is concern for the figure. 21.7% of patients are overweight or obese, 4% at follow-up. Lack of a control group, sample size, and the absence of standardized tools for the interview are the main limitations

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ADHD Atten Deficit Hyperact Disord. 2019;11:S34.

ADHD POLYGENIC RISK AND MIGRAINE.

Debost M, Agerbo E, Mortensen PB, et al.

Objectives: Migraine and ADHD have been associated in epidemiological studies. A recent large-scale genetic study further identified a significant genetic correlation between ADHD and migraine based on genome-wide data. Notably, this was one of very few significant genetic correlations across neurological and psychiatric disorders, warranting further investigation of the genetic link between migraine and ADHD. The objective of this study was to investigate whether ADHD genetic liability, summed into a polygenic risk score (PRS), is associated with migraine in a population-based sample.
Methods: We used data on 13,801 ADHD-cases and 19,980 non- ADHD controls born 1981-2001 from the Danish iPSYCH study, a unique case-cohort sample combining genetic and nationwide register data. Standardised ADHD-PRS (mean = 0, standard deviation [SD] = 1) were derived in iPSYCH based on summary statistics from the largest available meta-analysis of genome-wide association studies of ADHD. Migraine cases were identified via the National Patient Register and migraine drug dispensations in the Prescribed Drug Register. The association between ADHD-PRS and migraine was estimated as odds ratios (ORs) by logistic regression, in ADHDcases and non-ADHD controls separately.
Results: There was no association between ADHD-PRS and migraine in ADHD-cases (OR 0.97, 95% Confidence intervals [CI] = 0.90-1.05, p value = 0.43). In contrast, we found a significant association in non-ADHD controls (OR 1.08, 95% CI 1.02-1.15, p value <0.001), reflecting an 8% increased risk of migraine for every 1 SD increase in ADHD-PRS. Controls with ADHD-PRS in the highest quintile had a 32% higher risk of migraine, compared to those in the lowest quintile (OR 1.32, 95% CI 1.09-1.60, p value <0.001).
Conclusions: In this population-based sample of typically developing children, ADHD genetic liability was associated with an increased risk of migraine, suggesting possible shared genetic mechanisms between ADHD-traits and migraine. The lack of association in ADHD-cases may reflect reduced PRS variance in ADHD-cases. In future studies interactions between ADHD-PRS, family history and other potential mediators could be investigated

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ADHD Atten Deficit Hyperact Disord. 2019;11:S44.

DIETARY INTERVENTION AS ADDITIVE OPTION IN ADHD THERAPY.

Clement C, Doelp A, Overdick L, et al.

Objectives: The influence of food intake on the behavior in children with ADHD has already been described in the early 20th century. Referring to the INCA study of Pelsser (2011), changing diet according to individual food intolerances lead to significant improvement of ADHD symptoms in more than 2/3 of the patients. The objective of our study was, to evaluate whether a standardized oligoantigenic diet can be established as diagnostic tool to identify individual food intolerances in the context of ADHD symptoms in a blinded rating context.
Methods: Twentyfour children (18 m/6f; age 7-14 years) diagnosed with ADHD according to the ICD-10 were tested before and after 4 weeks of oligoantigenic diet. The children's behavior was accessed by ADHD-Rating-Scale (ARS) parent report. Results under blinded and none blinded conditions were compared.
Results: Children showed a high compliance to the dietary intervention: 22 of 24 participants completed the 4 weeks of ambulant oligoantigenic diet. After diet, the ARS dropped significantly to about 60%. Blinded rating was not different to non-blinded condition. Significant reductions of the symptoms were found in

subscales for inattention and for hyperactivity/impulsivity as confirmed to parent's ratings. Patients who responded to the diet (60%), reported an improvement in quality of life.
Conclusions: Restricted elimination diet reduces symptoms in food sensitive children suffering from ADHD evaluated under blinded conditions. It can be used as diagnostic tool to identify individual foodintolerances in the context of ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S22-S23.
A DEEP LEARNING BASED APPROACH FOR MISSING DATA IMPUTATION IN ADHD.
Cheng C-Y, Gau S-F.
Objectives: This study aimed to use deep learning method to conduct missing data imputation to maximize the whole size of datasets for future analysis to distinguish ADHD from non-ADHD.
Methods: The total sample consists of 1220 children including 799 clinical cases with ADHD and 421 typically developing (TD) controls from the same school districts. There were 5 kinds of assessment tools: (1) the Conners' Continuous Performance Test; (2) the Chinese version of Conners' parent rating scale-revised: short form; (3) the Chinese version of Conners' teacher rating scale-revised: short form; (4) the Chinese version of the Swanson, Nolan, and Pelham, version IV scale-parent report; (5) the Chinese version of the Swanson, Nolan, and Pelham, version IV scale-teacher report. We used deep learning to decide imputation order, and process effectiveness evaluation by support vector machine (SVM) after imputation.
Results: By using SVM to classify the ADHD and TD groups, around 91% accuracy for original sample with complete 5 datasets and 90% accuracy for imputation dataset shown in every different parameter. Most oppositional behavioral items occupied the high priority group to distinguish ADHD from non-ADHD; most inattention issues gathered in the low priority group.
Conclusions: Our results indicate that our architecture turns out a deep learning solution for data imputation without any damage to the group feature, and we can use the reconstructed data for future analysis

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ADHD Atten Deficit Hyperact Disord. 2019;11:S74.
YOUNG PEOPLE WITH ADHD: A QUALITATIVE INVESTIGATION OF FACTORS FOR A SUCCESSFUL PERSONAL RECOVERY.
Edwards SJ, Chen W, Toner M.
Objectives: Personal recovery has become a standard of mental health care. A recovery-oriented framework comprises: Connectedness, Hope and optimism, Identity, Meaning and purpose, and Empowerment-CHIME. Extending on the findings from a related parent/carer inquiry that sought to understand factors promoting their child living a satisfying, hopeful and contributing life, the present study investigated factors adolescents and young adults perceived as promoting them living a satisfying, hopeful and contributing life while exposed to the challenges of ADHD.
Methods: Guided by a phenomenological theoretical framework, a data-driven thematic content analysis approach for collecting, organising, analysing and interpreting qualitative data received with purposive sampling was adopted. Approval was granted by the Human Research Ethics Committee at the University of Western Australia. The sample consisted of N = 24 individuals (N = 9) aged 14-19 years old and (N = 15) aged 20-34 years old. Data were gathered through open-ended interviews. Interviews were audiotaped. The text transcriptions were entered into NVivo 11software. Transcripts were analysed using a constant comparative method. Credibility of the data was further established by member checking.
Results: Multiple themes relevant to living a satisfying, hopeful and contributing life while exposed to the impacts and challenges of ADHD were identified and combined into nine (9) primary themes: Time investment, Having a plan, Routine and structure, Identity, Valued social supports, Educating and collaborating, Self-awareness, Self-acceptance, and Symptom control-THRIVESSS. Parents and young people placed differing emphasis on specific aspects of THRIVESSS. An overarching goal for parents using

THRIVESSS was establishing their child's positive identity. Young adults found transition (taking over THRIVESSS from parent) challenging and emotional dysregulation in personal relationships a primary concern.
Conclusions: The CHIME adult recovery-oriented framework holds some common elements with a young person's journey living and thriving with ADHD. The term 'personal recovery' is problematic given its inference for absence of the condition. Developing a specific child and adolescent personal recovery lexicon is indicated

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ADHD Atten Deficit Hyperact Disord. 2019;11:S53.
COMPARISON OF VOLUNTARY AND AUTOMATIC ORIENTING OF ATTENTION IN DIFFERENT AGE CHILDREN WITH ADHD.
Carreiro LR, Martins De Castro MM, Rocha RL, V, et al.
Objectives: Voluntary and automatic orienting of attention enable proper processing of environmental information. Few studies have assessed how this process varies during development in children with ADHD. This study analyzed the voluntary and automatic orienting of attention in in different age children with ADHD.
Methods: Experiments 1 and 2 were designed to assess the differences regarding the voluntary and automatic attentional orientation, respectively. Both experiments used the manual RT to visual targets as a measure of attention manipulation in 30 children with ADHD (Experimental group-EG) and 30 age-matched controls (Control group-CG). In Experiment 1 (Voluntary orienting) the participants had to fixate on central point, directing their attention to the position indicated and responding pressing a key. In Experiment 2, the participants had to fixate on central point, ignore the first stimulus, and respond to the target. The RT medians calculated for each condition and participant were analyzed using the General Linear Model.
Results: Children with ADHD exhibited higher RTs than the CG group even for Experiment 1 and 2. For Experiment 1 we observed a significant interactions involving group and cue validity (F[1,56] = 5,6627, P = .02076), demonstrating an increase of RT for the EG in the invalid condition. The second two factors interaction, between group and cue-target interval (F[1, 56] = 15,773, P = .00021), demonstrating a significant increase of RT for CG (P<.001) for the short interval. For experiment 2 A significant effect of group was found (F[1, 56] = 3,9641, P = .05), whereby EG were globally slower than CG. We also observed a significant difference (F[1, 56] = 9,7897, P = .00279) in relation to Age (Half- Younger 9 Half-Older). Younger (RT = 575) were slower compared with Older children (RT = 475). A significant interaction of this factor with cue-target spatial correlation (F[1, 56] = 4,7154, P = .03415) demonstrated that the Half-Younger children were slower in the contralateral condition than in the ipsilateral, but not the Half-Older children.
Conclusions: Children with ADHD have higher RT in comparison with healthy controls. They also have prejudices in the reorienting process as observed during the invalid condition in Experiment 1 (voluntary orienting) and in directing their attention for shorter intervals (SOA of 300 ms). In Experiment 2 (automatic orienting), there was no interaction involving the group factor. This fact may be dependent on ADHD diagnosis and the age of the children

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ADHD Atten Deficit Hyperact Disord. 2019;11:S27.
ATTENTION DEFICIT HYPERACTIVITY SYMPTOMS AND SLEEP HABITS AMONG PRESCHOOLERS: IS THERE A RELATIONSHIP?
Gomes R, Sousa B, Gonzaga D, et al.
Objectives: To investigate the prevalence of attention-deficit/hyperactivity disorder (ADHD) symptoms and study its association with sleep habits among preschoolers aged 3-6 years-old in Porto, Portugal.
Methods: A cross-sectional study was conducted, through the application of a questionnaire to the caregivers of children attending a random sample of kindergartens at Porto. ADHD symptoms and sleep habits were assessed by the Portuguese versions of the Conners' Parents Rating Scale Revised and the Children's Sleep Habits Questionnaire (CSHQ-PT), respectively. Data on socio-demographic characteristics, TV viewing

duration and outdoor activities was also collected. Statistical analysis was performed using SPSS Statistics, version 25 through both Pearson's Chi-square and logistic regression models; a p value <0.05 was considered significant.
Results: The final sample included 381 preschoolers (50.9% boys). High levels of ADHD symptoms were found in 13.1%, being girls more affected than boys (14.4% vs. 11.85%). Concerning sleep, 45.7% had a mean total score at CSQH-PT >48, the cut-off point considered for the screening of sleep disturbances in the Portuguese population. There was a significant association between high levels of ADHD symptoms and a lower maternal education level, a lower sleep duration and higher scores at parasomnias and sleep disordered breathing CHQH-PT subscales.
Conclusions: Both ADHD symptoms and sleep problems are prevalent in preschoolers at Porto, Portugal and this study contributes to suggest some clinical correlations between them. Since these interactions are complex and far from being elucidated, further studies will be paramount to provide guidance for earlier prevention and managing strategies in younger children at risk for ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S38.

SLUGGISH COGNITIVE TEMPO SYMPTOMS IN ADHD MAY BE ASSOCIATED WITH OCCIPITAL COMPANSATUAR MECHANISMS.

Ercan ES, Kardar B, +£nsel BG, et al.

Objectives: The construct of Sluggish Cognitive Tempo (SCT) is characterized by daydreaming, mental confusion, staring blankly and hypoactivity. There is a lack of studies examining biological factors in relation to SCT.
Methods: The main goal of the current study was to compare functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI) findings between Sluggish Cognitive Tempo (SCT) cases comorbid with ADHD and typically developing controls (TD). In this study, 576 patients were screened from the outpatient clinic of the child and adolescent psychiatry department. Finally, 18 SCT cases comorbid with ADHD-combine presentation (ADHD-C), 24 SCT cases comorbid with ADHD-Inattentive presentation (ADHD-IA) and 24 TD were included. We applied tract-based spatial statistics to the DTI measures for obtaining fractional anisotropy (FA), axial, radial and mean diffusivity (AD, RD, MD) to explore white matter differences for the whole brain.
Results: Significant hyperactivity was detected during the Go task in the SCT and ADHD-C group when compared with the TD group in terms of fMRI findings. However, there was no significant difference in the SCT and ADHD-IA group compared to the TD group. Using tract-based spatial statistics to the DTI measures, we detected increased FA in the bilateral anterior and posterior limb of internal capsule, bilateral cerebral peduncle and the fornix comparing SCT and ADHD-IA with TD. Comparing SCT and ADHD-Combine presentation with TD, we did not find any differences for all DTI measures.
Conclusions: In our study, it was found that the posterior brain regions were more active when a task requiring attention was given to SCT and ADHD-C group. This activation in the posterior region is considered a compensatory mechanism for lifelong attention deficit symptoms. On the other hand, SCT and ADHD-IA group differed from TD group in terms of white matter structure. ADHD is a heterogeneous disorder with various clinic presentations, impairment domains, and biological traits. And, heterogenous findings support that we need more homogenous groups to understand ADHD well. And, taking into account symptoms of SCT may help deep phenotyping

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ADHD Atten Deficit Hyperact Disord. 2019;11:S64-S65.

PHARMACOLOGICAL INTERVENTIONS FOR ADHD IN PRESCHOOL CHILDREN: A SYSTEMATIC REVIEW.

Gurgel W, Aoyama R, Polanczyk G.

Objectives: ADHD is estimated to affect between 1.5 and 5.7% of preschool-age children. Despite there are good scientific evidence of preschool-onset ADHD diagnostic validity and stability, this subpopulation is far less studied than school age-onset ADHD children. Specifically, there are several unanswered questions regarding the treatment. Here we report the preliminary results of the first review of pharmacological treatments (stimulant and non-stimulant) of preschool children with ADHD.

Methods: We conducted a systematic and comprehensive search for papers, published and unpublished RCTs meeting the inclusion criteria until July 2018 in Medline, EMBASE, WHO -ICTRP, and ClinicalTrials.gov. Studies were included if they met the following criteria: 1. Included at least some children younger than 6 years of age that had a diagnosis of ADHD, or exhibited behavior problems that are part of the ADHD diagnostic criteria; 2. Involved pharmacological intervention aimed at ADHD symptoms, and included an outcome measure to monitor ADHD symptoms. We used common MeSH terms for participants (all variants of ADHD), young children, preschool children (the terms child or preschool were used to capture research on children in the target age group, and the terms were not restricted to titles or keywords), and medications. Risk of bias was also assessed for each included study using the Cochrane risk of bias tool for randomized controlled trials.

Results: Only 4 studies evaluated non-stimulants (atomoxetine, risperidone). For stimulants, 8 RCTs were found. Using the Cochrane risk of bias tool, among the 12 RCTs only one study presented a fair overall quality.

Conclusions: Based on the existing literature, stimulants, particularly methylphenidate, should be the preferred medication for treatment of preschoolers with ADHD. There is scarce literature on the efficacy of nonstimulants for this population. More studies are needed, especially with more rigorous methodologies

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ADHD Atten Deficit Hyperact Disord. 2019;11:S17-S18.

DISCRIMINATING ADHD FROM HEALTHY CONTROLS USING FUNCTIONAL CONNECTIVITIES: THE CROSS-SECTIONAL CLASSIFICATION AND THE LONGITUDINAL PREDICTION.

Guo X, Yao D, Cao Q, et al.

Objectives: ADHD is lack of objective diagnosis biomarkers despite substantial evidences for neurofunctional deficits. Therefore, we aim to classify ADHD from healthy controls (HCs) with functional connectivities (FCs) to provide an objective discriminant method.

Methods: We proposed a novel feature selection method based on relative importance and ensemble learning, aiming to classify ADHD from healthy controls (HCs) with FCs yielded from resting-state fMRI. Specifically, both adult ADHD from HCs (77 HCs and 112 ADHD) and child ADHD dataset (28 HCs and 34 ADHD) were classified independently. Next, longitudinal prediction-the FC features trained from child dataset were used to classify adult ADHD from HCs, and vice versa.

Results: The mean accuracies of cross-sectionally classifying adult ADHD and child ADHD from HCs were 79.86% (Figure 1A) and 84.42% (Figure 1B), respectively, which were both significantly higher than other popular classification models. The accuracies of longitudinal prediction were 70.4% to classify adult ADHD with features trained from child dataset and 75.6% to classify child ADHD with features trained from adult dataset (Figure 1C). Furthermore, the child-adult ADHD common aberrant FC connect between ventromedial prefrontal cortex (VMPFC) and cerebellum (Figure 1D), while the default network (DN) is the most ADHD-discriminative functional network.

Conclusions: There are both common and diverse impaired FCs in adult and child ADHD, particularly, VMPFC, cerebellum and DN might serve as the promising biomarkers for ADHD diagnosis and development. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019.

THE EFFECTS OF CHILDHOOD INATTENTION AND ANXIETY ON EXECUTIVE FUNCTIONING: INHIBITION, UPDATING, AND SHIFTING.

Castagna PJ, Calamia M, Roye S, et al.

Although anxiety and attention-deficit/hyperactivity disorder (ADHD) symptoms are highly comorbid, research has generally examined the executive functioning (EF) deficits associated with each of these symptoms independently. The purpose of this study was to examine the unique and interactive effects of anxiety and ADHD symptoms (first respectively, then collectively) on multiple dimensions of EF (i.e., inhibition, updating, and shifting, respectively). A sample of 142 youth from the community (age range 8ΓÇô17-áyears; Mage = 11.87 -¦ 2.94-áyears) completed the DelisΓÇôKaplan Executive Function System and dimensional measures of anxiety, inattention, and hyperactivity/impulsivity. It was hypothesized that anxiety would moderate the effect of ADHD symptomatology on EF. Multiple regression models examined anxiety and ADHD symptom domains as predictors of EF. When examining ADHD symptom domains separately, anxiety moderated the relationship between inattention and both updating and shifting; the association between hyperactivity/impulsivity and updating was also moderated by anxiety. Within the full model including both ADHD symptom domains, results indicated that anxiety moderated the relationship between inattention and shifting. Analyses of ADHD symptoms in separate and combined models demonstrated a similar pattern: Increased inattention was associated with worse EF and when anxiety was a significant moderator, and increased ADHD symptoms were associated with worse EF only for those with high levels of anxiety. These results highlight the utility of including anxiety in studies examining the relationship between ADHD and EF. EF is related to multiple aspects of daily functioning (e.g., academic achievement), and EF deficits are often targeted in interventions for ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S87.

WHAT IS KNOWN ABOUT ADHD? A STUDY IN A PORTUGUESE POPULATION.

Cardoso J, Maio I, Vaz M, I, et al.

Objectives: To evaluate the knowledge of the population about hyperactivity and ADHD and study its association with the educational level and reading habits.

Methods: We applied a questionnaire to 6th year medical students and to caregivers of patients that attended the emergency department (ER) or were admitted in the pediatric hospital ward. Persons whose children had ADHD were excluded. We collected variables such as: family relationship to the child, gender, age, educational level, number of books at home. Statistical analysis was performed using SPSS Statistics, version 25. A value of $p<0.05$ was considered statistically significant.

Results: The sample consisted of 44 students and 78 child caregivers (57 questioned at the ER and 21 at the ward). Most of them were females (73%) and young (76.2% aged <40 years-old). The level of education ranged from elementary school (22.5%) to a university degree (37.5%). 73% reported having many books at home (C 1 bookcases). Concerning ADHD knowledge, the majority of the inquired (82.8%) knew the diagnosis is based on clinical criteria (77%) and that treatment is case oriented (87.4%). 46.3% reported being informed about the drug methylphenidate, with 83.9% of these stating that it acts as a stimulant. Over half of the inquired (62.8%) have read or tried to find out information about ADHD. We found a significant association between being a medical student, having a younger age, a higher educational degree and more books at home and the knowledge about ADHD diagnosis and treatment.

Conclusions: The majority of the population in our sample had a significant knowledge about ADHD, with schooling and reading habits contributing to it

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ADHD Atten Deficit Hyperact Disord. 2019;11:S85.

PREVALENCE AND CHARACTERISTICS OF BULLYING AND CYBERBULLYING IN ADOLESCENTS WITH ADHD: A CROSSSECTIONAL STUDY IN GRANADA (SPAIN).

Fernandez RD, Herreros O, V+ízquez-Gonz+ílez AP, et al.

Objectives: Very few studies to date have investigated bullying conducts in psychiatric patients, although everything seems to indicate that they are a risk group. The main objective of this pilot study was to estimate the prevalence of bullying and cyberbullying behaviors in adolescents with ADHD and other mental health disorders, in order to develop a future bigger study.

Methods: A cross-sectional study was carried out by means of a questionnaire which was offered to patients between 11 and 17 yearsold who attended the Child and Adolescent Mental Health Unit of the Hospital Universitario Virgen de las Nieves of Granada (Spain). The sample included 90 patients with a psychiatric diagnosis.

Results: In this clinical sample, 21.1% of the patients were victims of bullying, 6.7% of cyberbullying, and only 1.1% (1 patient) are aggressors. Significant associations were detected between being a victim of bullying and studying in a public school, and between suffering cyberbullying and being a woman. Also, the prevalence of being a bullying victim was higher in the group of patients with an internalizing disorder rather than ADHD patients. No further differences were found by gender, age, or academic performance.

Conclusions: The prevalence of bullying seems higher in adolescents with mental health disorders than in the general population, especially in those with internalizing disorder. Further studies are warranted. Specific and multidisciplinary intervention protocols should be created, and they should include the participation of mental health professionals

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ADHD Atten Deficit Hyperact Disord. 2019;11:S36.

ABERRANT DEVELOPMENTAL NEUROANATOMICAL CHANGES ASSOCIATED WITH ADHD SYMPTOMS CHANGES: A LONGITUDINAL IMAGE STUDY OF YOUTHS WITH ADHD.

Chen Y-C, Fen Gau SS.

Objectives: Atypical brain morphology that disrupts the cognitive and behavioral functions have been previously investigated in individuals with ADHD. However, it is unclear whether variation in developmental brain structural changes parallels ADHD symptoms changes, and whether deviations from typical brain development trajectories are associated with differential outcomes. Hence, this work aimed to identify the neural correlates of attentional problems and determine neonatal predictors of those neural correlates and attention problems.

Methods: The sample included 50 youths with DSM-IV ADHD (21 girls, 29 boys) and 63 typically developing (TD) youths without ADHD (28 girls, 35 boys). They received MRI and ADHD symptoms (by parent reports on the SNAP-IV) assessments at two-time points: ADHD, 1st scan: 11.0 -¦ 2.1 years old, 2nd scan: 16. 8 -¦ 3.5 years, time latency: 4.5 -¦ 1.2 years; TD, 1st scan: 11.6 -¦ 3.7 years old; 2nd scan: 17.71 -¦ 3.22 years old, time latency: 4.8 -¦ 1.3 years. FreeSurfer was used to automatically process with the longitudinal stream of brain structure to extract reliable volume and cortical thickness estimates. Specifically, an unbiased within-subject template space and image were created using robust, inverse consistent registration. The linear mixed effects model was used to conduct longitudinal data analysis including gender, the first scan age, Full-IQ score, and duration time between two scans as covariates.

Results: Five developmental neuroanatomical changes that related to phenotypic variations were identified: the anterior to the medial corpus callosum, the right cerebellum cortex, the lateral orbitofrontal cortex/rostral middle frontal cortex/postcentral cortex, bilateral superior temporal cortex, and overall brain structure. For all the structural changes, ADHD youths showed significantly greater slopes of volume reduction than TD youths. Moreover, these developmental brain volume reductions were positively correlated with ADHD symptoms reduction (both inattention and hyperactivity-impulsivity symptoms) except only hyperactivity-impulsivity symptoms relating to changes of the anterior to medial corpus callosum and the bilateral superior temporal cortex. Lastly, the greater developmental overall brain reduction in ADHD was particularly demonstrated in girls with ADHD.

Conclusions: The findings of differential developmental changes of brain structures that correlate with ADHD core symptoms changes from childhood to late adolescence provide evidence of neural correlates for the developmental aspect of behavioral phenotype changes

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ADHD Atten Deficit Hyperact Disord. 2019;11:S62-S63.

A CLINICAL OBSERVATION ON CURATIVE EFFECT OF JING LING ORAL LIQUID ON 33 CHILDREN WITH ADHD.

Chen T, Shen H, Han X.

Objectives: Jing Ling oral liquid (JLOL), a kind of Chinese herbal medicine compound, which consists of Rehmannia Radix Praeparata, Moutan Cortex, Polygalae Radix, Acori Tatarinowii Rhizoma, Cortex Phellodendri etal, has been used to treat attention deficit hyperactivity disorder (ADHD), based on traditional Chinese medicine (TCM) theory for more than 20 years and obtained good therapeutic effect. In this study, we observed the curative effect of Jing Ling oral liquid on 33 children with ADHD who are of Liver-Kidney Yin deficiency, so as to evaluate the effect of Jing Ling oral liquid on ADHD and find a better way to treat ADHD.
Methods: The self-control experiment was conducted over 33 cases of children with ADHD (between the age of 6-12) who were of Liver- Kidney Yin deficiency. They were selected according to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) and guidelines for the diagnosis and treatment of common diseases in traditional Chinese pediatrics (published by China Press of TCM in 2012). These children were treated with Jing Ling oral liquid for 12 weeks and contrast was made before and after treatment. Swanson children's behavior scale (Swanson, Nolan and Pelham IV, SNAP IV) and audio-visual integrated continuous attention tester (IVACPT, made by Brain train USA) were used before and after treatment to record the changes of attention deficit, hyperactivity and impulsivity. Meanwhile, we also observed the syndrome changes according to TCM syndrome score scale.
Results: (1) SNAP-IV: Compared with those before treatment, 18 cases had a reduction rate of more than 40%. The overall curative effective rate was 54.5%. The scores of hyperactivity-impulsivity and Oppositional defiant disorder (ODD) showed a significant decrease and the difference between the before and after treatment was statistically significant (P<0.01). There was no statistically significant difference in scores of attention deficit (P>0.05). (2) IVA-CPT: The control quotient (CQ) of children with ADHD increases after the treatment. Difference between the before and after treatment was statistically significant (P<0.01). But the change of attention quotient (AQ) has no statistically significant difference (P>0.05). (3) TCM syndrome score scale: Compared with those before treatment, the main symptoms such as hyperactivity, restlessness, talkativeness, impulsiveness, petulance, irritability, and subsymptoms such as dry mouth and drinking too much, short and yellow urine, dry stool, were significantly improved (P<0.01). Meanwhile, the main symptom of attention deficit and the sub-symptom of learning difficulty were not significantly improved, and the difference was not statistically significant (P>0.05).
Conclusions: Jingling oral liquid can effectively improve the core symptoms of ADHD children-hyperactivity and impulsivity, and reduce the degree of ODD, with few adverse reactions. The results of this study showed that jingling oral liquid did not significantly improve the attention deficit and learning difficulties, which may be due to the short observation time of treatment, or the small sample size. Because education and training are also important in improving attention deficit and learning difficulties. In addition to drug treatment, only by developing a good study habit can they have a good academic achievement

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ADHD Atten Deficit Hyperact Disord. 2019;11:S55.

THE WEISS FUNCTIONAL IMPAIRMENT RATING SCALE IN A NORWEGIAN CLINICAL SAMPLE OF ADOLESCENTS WITH ADHD.

Juul HAL, Thomsen PH, Lydersen S, et al.

Objectives: Functional impairment is an essential part of ADHD and is an important measure in assessment and evaluation of treatment outcome. Weiss Functional Impairment Rating Scale (WFIRS) has shown good

psychometric properties in assessing impairment in children and adolescents with ADHD, but no studies have been published using Scandinavian populations. In this study we address three main questions; what is the relationship between ADHD symptoms and functional impairment? What is the relationship between parent report and self-report? To what extent do comorbid psychiatric disorders, gender and IQ mediate and moderate functional outcome?
Methods: Adolescents (14-18 years old) diagnosed with ADHD according to DSM-IV criteria were recruited from Child and Adolescent Psychiatric Outpatient Clinics in Mid-Norway. The adolescents and their parents filled out the WFIRS-S and WFIRS-P respectively. The ADHD Rating Scale IV was used to measure ADHD symptoms. Clinicians scored the Children Global Assessment Scale (C-GAS). We also recorded co-existing psychiatric diagnoses and included a measure of global IQ from the WISC-IV.
Results: Data collection is ongoing. Data analyses of approximately N = 80 cases, will be completed prior to the ADHD conference in Lisbon in April 2019, where results will be presented.
Conclusions: Results from this study will add to the understanding of functional impairment in adolescents with ADHD. Examining the impact of IQ and comorbid psychiatric illness will add to current knowledge on functional impairment in this patient group, and provide recommendations for further use of the WFIRS as a supplemental tool in clinical assessment and treatment in adolescents with ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S80-S81.
SLEEP PATTERNS IN AN ADHD SAMPLE: A LATENT CLASS ANALYSIS.
Palacio JD, Gomez S, Aguirre AD.
Objectives: The aim of the study was to determine sleep profiles in a outpatient population with ADHD by using latent class analysis (LCA).
Methods: Cross-sectional study in a clinical sample of 228 attention deficit and hyperactivity disorder (ADHD) patients (Mean age = 11 years old. Parents filled out the Children Sleep Habits Questionnaire- Abbreviated (CSHQ-A). LCA was used to classify each child into a class according to their demographical and clinical variables, and to sleep patterns.
Results: The model of 4 classes for the sleep profile in ADHD was selected: class 1: only children, males the majority with combine presentation, with comorbidity especially disruptive learning or language disorders, and with the higher score in the scale (M: 25.98). Class 2: mostly female adolescents, two-thirds with inattentive presentation and comorbid anxiety, they had the lower score in the scale (M: 12.78). Class 3: males with ADHD combine presentation, exclusively adolescents, with comorbid depression, and with high score in the scale (M: 24.28). Class 4: only male children with highly comorbid (especially disruptive learning or language disorders), and some sleep problems by scale (M:20.1).
Conclusions: This is an alternative analysis for and ADHD sample according to sleep. Classes 1 and 3 presented a greater number of sleep problems as indicated by the CSHQ-A score: class 1 represented by children male, and class 3 with adolescent male, both with combine presentation and comorbidity (disruptive, depressive and learning disorders). Besides, class 2 represented by adolescent women with anxiety and inattentive presentation, had few sleep problems. LCA allow to find a possible relationship between ADHD presentation, comorbidity and sleep: classes 1, 3 and 4 have the highest scores on the scale, and are those represented by ADHD combine type and highly comorbid. Through the latent classes model, ADHD groups that present more sleep problems were identified

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ADHD Atten Deficit Hyperact Disord. 2019;11:S76.
BEHAVIORS OF CHILDREN WITH ADHD THAT INCREASE THEIR RISK TO BE BULLIED IN SCHOOL.
Irimie-Ana A, Hatis M-V, Mihai SL.

Objectives: Our aim was to identify, among patients diagnosed with ADHD) those who were physically, verbally or emotionally bullied at school, also which of their behaviors upset, annoy and provoke their colleagues, prior transforming into a victim of bullying.
Methods: We compiled a questionnaire with 20 closed and open questions, applied to patients aged 10-18 years, diagnosed with ADHD, who were brought by parents for evaluation in our Clinic. The first 10 questions were aimed at identifying bullying (e.g. Have you ever been hit by a colleague of yours at school?). The following 10 questions were designed to identify the behaviors that preceded the bullying (an example of a closed question Have you insulted your colleague before he has offended you? An open one What did you do before being hit by your colleague?). The period of application was set between 1 November 2018 and 1 February 2019, the final number of patients being established at 50. We mention that patients with ADHD who were not bullied, were excluded from the study.
Results: Looking at the data collected so far, we expect the results to be consistent with other studies. The identified behaviors were: verbal and physical aggression, impatience with interruption of others, lack of response to requests. Identifying these behaviors can improve the intervention by raising awareness, understanding social needs and relationships, increasing the possibility of developing effective coping methods.
Conclusions: The final interpretation of the results and study conclusions will be available by February 28, 2019

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ADHD Atten Deficit Hyperact Disord. 2019;11:S67.

A RETROSPECTIVE STUDY TO UNDERSTAND EMERGING THEMES FROM USING LONG ACTING GUANFACINE IN 70 CHILDREN AND YOUNG PEOPLE WITH ADHD IN A SECONDARY CARE SETTING IN UK.

Jainer R, Wilkin R, Yemula C.

Objectives: As most clinicians are still not confident about using Guanfacine since its license in 2016 in UK, this study was undertaken to identify any gender differences, comorbid factors and side effects in patients which would impact on its usage.
Methods: Data was collected from clinical notes in all our patients with ADHD who have been on Guanfacine over the past 1 year. We looked at demographics, co morbidity, tolerance and dosage needed. Emerging themes were identified in addition.
Results: 70 children and young people aged 4-5 years (12 girls and 58 boys) received treatment with Guanfacine. Co-morbidity was noted in 48 patients (69%): autism spectrum disorder was commonest (16), developmental coordination disorder (13), leaning disability (10) and some had other conditions such as conduct disorder, tic disorder and dyslexia. Guanfacine was discontinued in 36 patients (51%), the commonest side effect was sedation in 20 patients (29%) and other reasons for discontinuation include headaches, aggressive behavior and ineffective control of ADHD symptoms. The success rate was 98.8% in teenage girls. The dose range was 1 mg (19) to 6 mg (1), and most patients (36) needed 2-3 mg for effective control of symptoms.
Conclusions: This is a small study and larger studies comparing the side effects and efficacy of low dose Guanfacine in teenage girls should be investigated across different regions. Following on, low dose poly-therapy regimes with stimulant medication which minimize side effects and improve overall efficacy should to be explored in UK and Europe as is proven to be effective in other countries

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ADHD Atten Deficit Hyperact Disord. 2019;11:S81.

PROGNOSTIC FACTORS RELATED WITH "UNMET NEED"IN ADOLESCENTS WITH ADHD.

Palacios-Cruz L, Arias-Caballero De MA, C+írdenas God+¡nez EM, et al.

Objectives: To determine the Unmet needs for seeking mental health care in ADHD adolescents non-referred versus their siblings also with ADHD.

Methods: Study sample was obtained from 2 outpatient centers and was composed by 83 probands (MET group) and 38 siblings both adolescents with ADHD (UNMET group). The subjects were evaluated by clinicians with at least 5 years of experience and the diagnostic determination was made by clinical consensus with at least one expert with 20 years of clinical experience. The sample was evaluated by a clinical interview based on DSM IV: For the current study, we define unmet need for ADHD care as meeting diagnostic criteria without having received ADHD treatment across the life span.
Results: Around 61% of the ADHD adolescents (n = 121) were male, average age was 15.32 (DE = 2.08). We found more than 2 times more likelihood that a female ADHD adolescent was in UNMET group (UNMET group, 52.6% vs. MET group, 35.2%; 95% CI 1.05-5.05). Even 3 times more likely when adjusting for severity of the disorder (OR 2.7; 95% CI 1.2-6.2). No differences regarding age between groups (UNMET group 15.8 DE -¦ 2.6 vs. MET group 15.1 DE -¦ 1.7, p = 0.187).
Conclusions: When we evaluate subjects with suspected ADHD, it's important to consider the role played by sex of affected subjects in the clinical presentation. It's important to consider of school information regarding to performance in different areas Utilization of these services in adolescence may be particularly salient for preventing persistence of psychopathology into adulthood. To eventually reduce the impact of ADHD in subjects and their families, health policies should be aimed at detecting high-risk populations that have not yet received attention and timely treatment

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ADHD Atten Deficit Hyperact Disord. 2019;11:S19.

DISTINCT CLASSIFICATION OF ADULT ADHD: A LATENT CLASS ANALYSIS OF ADHD SYMPTOM PROFILE.

Oh Y-H, Baek J-H.

Objectives: The objective of this study was to conduct latent class analysis (LCA) of adult ADHD symptoms to clarify the distinct subtype of adult ADHD.
Methods: The participants of this study were 72 adult patients diagnosed with adult ADHD through Mini International Neuropsychiatric Interview (MINI) among the patients who visited the psychiatric department of Samsung Medical Center, Seoul, Korea. We performed LCA with 10 adolescent childhood ADHD symptoms and 14 adult ADHD symptoms as variables.
Results: A four-class solution was found to be the best model. Of the 4 groups, (1) Class I (n = 30), inattentive dominant type in childhood, combined type in adulthood (2) Class II (n = 8), hyperactive dominant type in childhood and adulthood (3) Class III (n = 29), combined type in childhood and adulthood (4) Class IV (n = 5), no problems in childhood, inattentive dominant type in adulthood.
Conclusions: This study revealed adulthood trajectory according to childhood ADHD subtype. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S70.

SOCIADEMOGRAPHIC AND TREATMENT FEATURES OF GIRLS WITH ADHD REFERRING TO A "ADHD OUTPATIENT CLINIC" IN A UNIVERSITY HOSPITAL IN TURKEY.

Oztop D, Uytun M, Ak+ºay E.

Objectives: The aim of the present study is to evaluate demographical features, symptoms, diagnosis, comorbidity and treatment of ADHD girls who referred to ADHD outpatient clinic at Child and Adolescent Psychiatry Department of Ankara Medical School in Turkey, between January 2018 and December 2018, retrospectively.
Methods: All subjects were evaluated with Child Behavior Checklist 6-18 (CBCL), The Turgay DSM-IV Based Disruptive Behavior Disorders Child and Adolescent Rating and Screening Scale (T-DSMIV- S), Conners' Parents and Teachers Rating Scale, and CBCL.
Results: 40 ADHD girls who were between 8 and 18 years mean age was 12.87 -¦ 2.83 years. The overall mean age at first diagnosis of ADHD was 7.8 -¦ 1.97 years and the average follow-up duration was 5.25 -¦

2.88. The predominant form of ADHD suptypes was combined type (52.5%) and inattention subtype (45%). Most common complaints of the patients were inattention and school failure (50%). In the 40% of the patients both parents and teachers were the difficulties of children. According to T-DSM-IV-S and r- CPRs and rinattentiveness scores was the highest score. Most comomn comorbid disorder is Learning Disorder (57.5%). 95% of patients use Methylphenidate (50% OROS-MPH, 32.5% Extended release MPH and 12.5% immediate release MPH). In the follow-up period, OROSMPH was most changed drug (25%) due to ineffectiveness and side effects. The particular items of CBCL that related with sluggish cognitive tempo were also assessed (items 81,780,102). There were CBCL scores of 31 patients. Total scores of these 4 items were ΓëÑ 3 score of 20 patients (%72.5).
Conclusions: To know the most common subtypes of ADHD, comorbidity diagnoses, effective treatment for girls with ADHD will be useful for improving treatment effectiveness and quality of life in ADHD girls

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ADHD Atten Deficit Hyperact Disord. 2019;11:S24-S25.
DIFFERENCES IN NEUROPHYSIOLOGICAL CHARACTERISTICS ACCORDING TO THE ADHD SUBTYPES.
Park Y-J, Park J-Y, Jhung K-G.
Objectives: ADHD subtypes can be distinguished from each other on various characteristics. Developing a reliable neural marker to distinguish the illness as well as the subtypes will provide further insights underlying the heterogeneous illness and aid in making a precise diagnosis. The goal of this study was to examine the neurophysiological markers among the combined type, predominantly inattentive type, predominantly hyperactive-impulsivity type of ADHD subjects and control subjects in children and adolescents.
Methods: In 64 (53 male, age 10.09 -¦ 3.3 years) subjects (32 ADHD-Combined type, 11 ADHD-Inattentive type, 11 ADHDHyperactive- impulsive type and 10 healthy controls), resting-state EEG with eyes closed and eyes open were recorded. Relative powers were estimated for delta (1-4 Hz), theta (4-8 Hz), alpha (8-12 Hz), beta (12-25 Hz), gamma (30-40 Hz). Kruskal-Wallis Test was used for statistical analyses.
Results: There were significantly differences of qEEG among subtypes of ADHD. In eyes closed state, ADHD-combined type showed significantly higher levels of delta power in frontal regions (Fz, FP2, F3, F4, F7, F8), central regions (CZ, C3, C4), posterior regions (PZ, P4, 02, T6) compared to the ADHD-inattentive type and the controls. In the eyes open state, ADHD-combined type showed significantly higher delta power in the frontal region (FP2) and the central region (CZ) compared to the ADHD inattentive type, as well as higher delta in posterior regions (P4, O2, T6) and lower gamma and high gamma in the central region (CZ) compared to controls.
Conclusions: The findings show combined type to have different neurophysiological characteristics to the inattentive type and controls, while the QEEG of inattentive type appeared similar to controls. These findings indicate differential neurophysiological characteristics among ADHD subtypes. Heterogeneity should be fully considered for exploring neurobiological mechanisms of ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S6-S7.
PREDICTING ADHD SYMPTOMS OUTCOMES AT 5 YEARS OF AGE: FINDINGS FROM BIRTH COHORT STUDY.
Nakahara R, Nishimura T, Tsuchiya KJ.
Objectives: ADHD is a very important condition because of its high prevalence, persistence into adult life, and adverse outcomes that extend beyond the affected individuals. However, little has been reported on ADHD early neurodevelopmental pattern. Thus, this study investigated the relationship between early neurodevelopmental pattern, ADHD symptoms at 5 years of age.
Methods: Participants were derived from the Hamamatsu Birth Cohort Study for Mothers and Children (HBC-Study) and the final sample comprised 879 children. We assessed the early neurodevelopment by the Mullen Scales of Early Learning (MSEL: 5 domains; gross motor, visual reception, fine motor, receptive language, and expressive language) at four time points, from 18 to 42 months of age, and ADHD measured using

ADHD Rating Scale-IV (ADHD-RS; 3 symptoms: inattention, hyperactivity/impulsivity, and combined) at 5 years of age. MSEL scores were classified low, middle and high by T-score (low; Γëª 1SD, middle; >- 1SD and <+ 1SD, high; <+ 1SD). We analysed the date using each neurodevelopment domain as independent variables and ADHD symptoms as the dependent variable by multinomial logistic regression.
Results: Multinomial logistic regression analysis showed that low visual reception (32 m: OR 3.61, CI 1.86-7.09; 40 m: OR 2.63, CI 1.31-5.29), low fine motor (32 m: OR 2.64, CI 1.35-5.16; 40 m: OR 3.19, CI 1.61-6.32) and low receptive language (32 m: OR 2.41, CI 1.12-5.18; 40 m: OR 2.50, CI 1.18-5.30) at 32 months and 40 months were associated with inattention at 5 years of age. Besides, low visual reception (32 m: OR 2.06, CI 1.02-4.18; 40 m: OR 2.63, CI 1.31-5.29) and low receptive language (40 m: OR 2.89, CI 1.36-6.13) at 32 months and 40 months were associated with combine at 5 years of age. Hyperactivity/Impulsivity and early neurodevelopment showed no significant association.
Conclusions: The present results suggested that several low neurodevelopmental domains of childhood are a sign of ADHD. ADHD and ASD have high comorbidity rate. However, we did not take into account comorbidity of ADHD and ASD in the present study. Future research should add ASD scales into independent variables

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ADHD Atten Deficit Hyperact Disord. 2019;11:S68-S69.
COMBINATION TREATMENT WITH GUANFACINE EXTENDED RELEASE AND BLONANSERIN FOR TOURETTE'S DISORDER COMORBID WITH ADHD: A CASE REPORT.
Kawabe K, Horiuchi F, Ueno S-I.
Objectives: Tourette's Disorder (TD) is a neurodevelopmental disorder with several tic behaviors, and frequently comorbid with Attention-Deficit/Hyperactivity Disorder (ADHD). Atypical antipsychotics are usually used in TD, however, tolerability is limited. We report a case who had severe TD with ADHD, recovered with both a selective +¦2A-adrenergic agonist, guanfacine extended release (GXR) and a dopamine-serotonin antagonist, blonanserin (BNS).
Methods: A case report.
Results: A 10-year-old boy with severe vocal and motor tics including head shaking and eye blinking was visited in our University Hospital. He was bullied because of his tic behaviors and had a school refusal since 9-year-old. He was diagnosed as TD with ADHD by DSM-5. BNS 12 mg/day was prescribed, however it was small effects for his tic symptoms. We added GXR and then 8 weeks of follow-up, his vocal tics were resolved. The final doses of GXR and BNS were 3 and 8 mg/day, respectively. He had a good adherence with medication for more than 1 year without any side effects till now. He recovered from tics, however, his ADHD-RS score had not major changed.
Conclusions: GXR is selectively on post-synaptic +¦2A-adrenergic receptors in the prefrontal cortex and may work for TD through the function of dorsolateral PFC. This case supports a pharmacological approach of GXR to treat severe tic symptoms

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ADHD Atten Deficit Hyperact Disord. 2019;11:S3.
NEUROCOGNITIVE MARKERS OF LATE-ONSET ADHD: A 6-YEAR LONGITUDINAL STUDY.
Ilbegi S, Buitelaar JK, Hoekstra P, et al.
Objectives: There is increased interest in 'late-onset' ADHD, referring to the onset of clinically significant ADHD symptoms after the age 12, i.e. in adolescence or adulthood. Biological siblings of ADHD probands who are unaffected in childhood may be at increased risk for developing late-onset of ADHD. Aim: To examine whether unaffected siblings with late-onset ADHD could be differentiated from stable unaffected siblings by their neurocognitive functioning in childhood.
Methods: We report findings from a 6-year prospective, longitudinal study of a subsample of the Dutch part of the International Multicenter ADHD Genetics (IMAGE) study, including individuals with childhood-onset

(persistent) ADHD (n = 111), late-onset ADHD (n = 34), stable unaffected siblings (n = 111), and healthy controls (n = 186). At study entry (mean age: 11.3) and follow-up (mean age: 17.01) participants were comprehensively assessed on ADHD by structured psychiatric interviews and multi-informant questionnaires. Several neurocognitive functions including time reproduction, timing variability (reaction time variability and time production variability), reaction time speed, motor control, working memory, and intelligence were assessed at baseline and after 6 years.
Results: Siblings with late-onset ADHD were similar to individuals with childhood-onset ADHD in showing longer reaction times and/or higher error rates on all neurocognitive measures at baseline and follow-up, when compared to healthy controls; they differed from stable unaffected siblings by greater reaction time variability and timing production variability at baseline. No significant group by time interaction was present for all tasks.
Conclusions: Neurocognitive dysfunction, in particular for reaction time variability and timing production variability, may serve among unaffected siblings as risk biomarkers for late-onset ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S10.

THE PREVALENCE OF PSYCHIATRIC COMORBIDITY IN CHILDREN AND ADOLESCENTS WITH ADHD IN TURKEY.

Ipci M, Inci Izmir SB, et al.

Objectives: The objective of this study was to examine comorbid disorders associated with Attention Deficit Hyperactivity Disorder (ADHD) and the subtypes of ADHD in children and adolescents with the diagnosis of ADHD. In addition, it was examined the relationship between the comorbidities, the subtypes of ADHD and sociodemographic features.
Methods: The study included 326 children and adolescents aged between 8 and 15 years who were diagnosed with ADHD for the first time as a result of an interview by using the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children Present and Lifetime version (K-SADS-PL) that based on a DSM-IV diagnostic criteria by experienced psychiatry resident, in a child adolescent psychiatry clinic in Izmir.
Results: In the study, it was found that 49.7% of the cases were diagnosed with ADHD and 50.3% of children and adolescents with ADHD had at least one comorbid disorder was obtained. The comorbidities accompanied ADHD were disruptive behavior disorder (28.8%), depressive disorder (13.2%), obsessive-compulsive disorder (9.5%) and anxiety disorder (6.1%), in respectively. When the subtypes of ADHD were assessed according to psychiatric comorbidity, oppositional defiant disorder and conduct disorder were frequently seen with ADHD combined type, whereas anxiety disorder was seen more frequent in children diagnosed with ADHD inattentive type.
Conclusions: The most important predictive factor that determines both the response to treatment and the prognosis in ADHD are comorbid diagnoses. Therefore, to determine the comorbid disorders associated with ADHD will affect the prognosis in positively

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ADHD Atten Deficit Hyperact Disord. 2019;11:S56.

SENSORY PROCESSING ISSUES AND ASSESSMENT IN CHILDREN WITH ADHD.

Keating J, Gaffney R, Bramham J, et al.

Objectives: Recent research suggests an increased recognition of and assessment for sensory processing difficulties in children with ADHD. This review aims to establish the prevalence of specific sensory processing difficulties in children with attention deficit hyperactivity disorder and to examine current measures of sensory processing for school age children with ADHD.
Methods: The review protocol was registered with PROSPERO (CRD42018091730). PRISMA guidelines were adhered to. Two databases were searched using a predetermined search string.

Results: Of 224 studies, 19 met the inclusion criteria. Sensory processing difficulties are more likely to be found when caregiver-report measures are used, relative to physiological or behavioural methods. Despite the focus to date on difficulties in auditory and tactile processing in this patient population, the reported studies show no evidence for these difficulties being more prevalent than difficulties in other sensory domains.
Conclusions: This review provides a greater understanding of the prevalence of sensory processing difficulties in children with ADHD. The best practice for assessing sensory processing difficulties, and their implications for clinical practice, are also considered

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ADHD Atten Deficit Hyperact Disord. 2019;11:S23-S24.

BETA-PHASE HIGH GAMMA-AMPLITUDE COUPLING DEFICITS IN CHILDREN WITH ADHD.

Ibanez SD, Kroupi E, Rojas A, et al.

Objectives: As pointed out by the scientific community, ADHD leads to an intrinsic risk of mis- and over-diagnosis. ADHD research is thus currently focused on the development of biomarkers that support accurate clinical diagnosis and reduce the risk of over-diagnosis. In this work we have explored coupling abnormalities between different brain rhythms in ADHD children.
Methods: In this study 51 children participated, aged between 7 and 11 years old. Participants were assigned to one of two groups: clinical diagnosed ADHD group (N = 21) or healthy controls (N = 30). Experimental recordings followed a 3-min resting state eyes closed protocol where EEG was recorded in the fronto-central region (C3, Cz, C4, F3, Fz and F4) using Enobio. PAC has gained enormous popularity in the recent years as a means to understand how the amplitude and the phase of distinct oscillations regulate dynamic communication within the brain. We have investigated coupling anomalies in brain rhythms in the 4-200 Hz range using the phase amplitude coupling (PAC) approach proposed in Canolty 2006 in 30-s trials. We have used the non-parametric statistical test based on clustering proposed by Maris et al. 2007 to automatically identify coupled frequency bands of interest.
Results: We successfully demonstrated that ADHD children present overall deficits in phase -amplitude coupling across all frequencies in the frontal cortex. These deficits have proved to be statistically significant in the beta-phase high-gamma-amplitude coupling of the frontal-left hemisphere (channel F3) ($p<0.05$).
Conclusions: Analyzing 21 ADHD children and 30 age-matched healthy controls, we found a significant deficit in the beta-gamma PAC in the frontal cortex of the ADHD population, that may be related to deficits in the maintenance and encoding of working memory contents (Bastos et al. 2018). This metric successfully discriminated between the ADHD and healthy controls, boosting its potential use as an ADHD diagnosis biomarker

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ADHD Atten Deficit Hyperact Disord. 2019;11:S6.

TRAUMATIC STRESS DURING PREGNANCY CAUSED BY A NATURAL DISASTER AND THE RISK OF ADHD IN CHILDREN: THE CASE OF AILA CYCLONE.

Hanc T, Chakraborty R, Koziel S.

Objectives: ADHD is widely recognized as neurodevelopmental disorder with predominant genetic aetiology. Nevertheless, there are numerous environmental factors that may increase the risk of ADHD in children. One of them is prenatal exposure to stress. There is a need of farther studies aimed to examine the relation between objective stressors acting during pregnancy and ADHD in offspring. It is possible in research focused on consequences of adverse, traumatic events, e.g. natural disasters. The aim of the study was to examine the level of ADHD symptoms in children of mothers exposed during pregnancy to the Aila Cyclone in West Bengal, India, May 2009.
Methods: The Aila Cyclone was a strong tropical storm which was responsible for at least 339 deaths and left about 1 million people homeless across India and Bangladesh. The level of symptoms of ADHD was

compared between the sample of 182 children, age 8 years, with prenatal exposure to the Aila Cyclone (ACExp) and the control group (CG) included 189 of their peers from the area of similar level of urbanization to the ACExp but unaffected by Aila Cyclone. The short version of the Conners' Teacher Rating Scale-Revised (CTRS-R-S) was used to assess the level of ADHD symptoms. The differences in ADHD symptoms between ACExp and CG were tested using ANOVA. GLM analysis was applied to control sex, gestational age and birth weight effects.
Results: The analysis adjusted to possible confounding factors revealed significantly increased ADHD symptoms in ACExp in comparison to CG, indicated by the total CTRS-R-S score, ADHD index and Hyperactivity, Cognitive problems/Inattention and Oppositional subscales.
Conclusions: The level of ADHD symptoms was found higher in children affected by the Aila Cyclone. This result underline the role of prenatal stress as a factor affecting the development of child's nervous system and its importance in the ADHD aetiology

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ADHD Atten Deficit Hyperact Disord. 2019;11:S68.

OPEN-LABEL DOSE-OPTIMIZATION OF AN AMPHETAMINE EXTENDED RELEASE ORAL SUSPENSION IN CHILDREN WITH ADHD.

Kando J, Cutler A, King T, et al.

Objectives: Report efficacy of open-label (OL) amphetamine extended- release oral suspension (AMPH EROS) for treatment of children with ADHD. AMPH EROS has a 1-h onset and duration of efficacy of 13 h. A significant treatment difference in change from pre-dose SKAMP-combined score was observed at the primary endpoint of 4 h ($p<0.0001$) and each post-dose timepoint (1, 2, 4, 6, 8, 10, 12, 13 h). Data are from the 5-week OL dose optimization.
Methods: Males/females aged 6-12 years with ADHD enrolled and began OL treatment with 2.5 mg or 5 mg/day of AMPH EROS titrated in 2.5-10 mg/day increments until optimal dose (maximum 20 mg/day). Doses were decreased for tolerability. Subjects took AMPH EROS for 5 weeks. ADHD-RS (ADHD-Rating Scale), CGI-S (Clinical Global Impression of Severity), CGI-I (CGI-of Improvement) and CPRS (Conners' Parent Rating Scale) and safety were also reported.
Results: Treatment with AMPH EROS (n = 99) was associated with a mean change in ADHD-RS-IV of 28.2 (-¦ 9.03) (Baseline score = 41.3 -¦ 7.95). 90.9% of subjects had change from baseline to OL week 6 of C 50% in the ADHD-RS-IV total score. The CGI-S scores decreased continuously from baseline, from 4.8 at baseline to 2.0 at OL week 6. The percentage of subjects classified as moderately ill or greater decreased from 97% at Baseline to 1% at OL week 6. CGI-I decrease was similar to decrease in CGI-S. CPRS for most categories decreased from Baseline to OL week 6. Mean change from baseline to OL week 6 on the CPRS inattention T-score subscale was - 25.3 (-¦ 14.38) and - 24.4 (-¦ 13.87). Adverse events (>5%) reported were decreased appetite, insomnia, affect lability, upper abdominal pain, mood swings and headache.
Conclusions: AMPH EROS was effective in reducing symptoms of ADHD in this OL dose optimization. The AE profile of AMPH EROS was consistent with other amphetamine products

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ADHD Atten Deficit Hyperact Disord. 2019;11:S68.

DURATION OF PHARMACOLOGICAL TREATMENT OF ADHD: A NORWEGIAN POPULATION-BASED STUDY.

Karlstad O, Furu K.

Objectives: To examine early discontinuation and duration of pharmacological treatment of ADHD in Norway among children and adults.
Methods: We used data from the Norwegian Prescription Database, which includes all prescription drugs dispensed from pharmacies in Norway. Medications approved for treatment of ADHD were included: methylphenidate, atomoxetine, amphetamine, dexamphetamine, lisdexamphetamine and guanfacine. We included new users (initiators) of ADHD medications during 2007-November 2016, defined by not having

filled prescriptions during the run-in period 2004-2006. We defined early discontinuation as not filling a second prescription within 180 days after initiation of treatment. For analysis of duration of treatment, we examined time from initiation until cessation of treatment, death or end of study period and presented as Kaplan- Meier plots. Cessation of treatment was defined when 180 days had passed without the patient filling prescriptions.
Results: 32,006 children (6-17 years) and 28,004 adults (18 + years) initiated ADHD medications during the study period (over 90% on methylphenidate). 8.5% of children and 12.4% of adults discontinued treatment early with a decreasing proportion over time. Duration of treatment was similar for males and females. Time until 50% of patients had stopped treatment (median treatment duration) was longest among patients initiating treatment as children (6-12 years old) with 3.73 years, while it was 1.28 years in 13-17 year olds. Duration was shortest among young adults (18-29 years) with 1.16 years, while it was 1.75 years for 30-44 year olds and 1.66 years for patients over 45 years. Treatment durations were higher among patients initiating treatment during latter half of study period.
Conclusions: Treatment duration was longest among children and shortest in young adults. Duration of treatment with specific medications will be further examined. Other measures of adherence as well as characteristics of the treated population will be explored by linkage with diagnostic codes in the Norwegian Patient Registry

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ADHD Atten Deficit Hyperact Disord. 2019;11:S55-S56.
IMPROVED EXECUTIVE FUNCTIONING BUT NOT ADHD SYMPTOMS IN CHILDREN WITH ADHD AT 1-YEAR FOLLOW-UP.
Hotakainen DM, O'Reilly H, Kiiski H.
Objectives: To investigate whether the executive functioning of children with ADHD (1) differ from controls at baseline, and (2) change over 1-year period.
Methods: 37 children with an ADHD diagnosis (mean age = 10.2, range = 8-16; 3 females), and 24 healthy controls (mean age = 9.7, range = 8-12; 12 females), two executive functioning tasks Visuomotor Children's Color Trails Test 2 (CCTT2) and Verbal Fluency subtest of Delis-Kaplan Executive Functioning System (DK-VF). The scores from these tasks were age- corrected. Parents of the children filled out Conners-3 Parent questionnaire (CP) measuring ADHD symptoms. Children with ADHD and their parents repeated the procedure 1 year later.
Results: Compared to the controls at baseline, children with ADHD had significantly more ADHD symptoms in all of the CP scales ($p<.001$), and worse executive function performance as measured by both CCTT2 time ($p<.05$) and DK-VF letter fluency ($p<.001$), category fluency ($p<.01$) and switching accuracy ($p<.05$) subscales. One year later the executive performance of children with ADHD in DK-VF letter and category fluency had significantly improved ($p<.05$), but there was no change in their ADHD symptoms.
Conclusions: Children with ADHD show more ADHD symptomatology and verbal and motor executive dysfunction at baseline. One year after receiving diagnosis their verbal executive functioning was improved but their ADHD symptoms reported by their parents did not reduce. Brief, cost-efficient neuropsychological tools have a potential to complement parent-report measures and support clinicians with making a more comprehensive neurodevelopmental assessment and treatment recommendations for ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S66.
PULSE RATE AND BLOOD PRESSURE OUTCOMES FROM A LONGTERM STUDY OF GUANFACINE EXTENDED RELEASE IN CHILDREN AND ADOLESCENTS WITH ADHD.
Huss M, Ramos-Quiroga A, Dirks B, et al.
Objectives: To report pulse rate and blood pressure outcomes from the first 2-year study of guanfacine extended release (GXR) B 7 mg/day in children and adolescents (aged 6-18 years) with ADHD.

Methods: SPD503-318 was a phase 3, open-label extension study for European participants of studies SPD503-315 and SPD503-316. Participants received dose-optimized GXR (maximum permitted dose: children, 4 mg/day; adolescents, 4-7 mg/day depending on weight).
Results: Of 215 enrolled participants, 214 were included in the safety population and 133 completed the study. The mean age of participants at baseline was 11.7 years and 73.8% were male. Any treatmentemergent adverse events (TEAEs) were reported in 177 patients (82.7%). Cardiovascular-related TEAEs were reported in 35 participants (16.4%), most were mild in severity and none were serious. The most frequently reported cardiovascular-related TEAEs were hypotension (n = 4 [5 events]; 1.9%), hypertension (n = 4; 1.9%) and bradycardia (n = 4; 1.9%). The incidences of these cardiovascular TEAEs by weight-adjusted dose were: hypotension, 0.05-0.08 mg/kg, n = 2; 0.09-0.12 mg/kg, n = 2; 0.13-0.16 mg/kg, n = 1; hypertension, 0.01-0.04 mg/kg, n = 1; 0.05-0.08 mg/kg, n = 3; bradycardia, 0.05-0.08 mg/kg, n = 3; 0.13-0.16 mg/kg, n = 1. One mild cardiovascular TEAE of first degree atrioventricular block led to discontinuation on day 352, and subsequently resolved. There were small changes from baseline to final assessment in mean (standard deviation) supine pulse (- 5.5 [12.98] bpm) and blood pressure (systolic, 0.6 [9.32] mmHg; diastolic, 0.2 [9.17] mmHg), which were not considered by investigators to be clinically meaningful.
Conclusions: In this 2-year trial of GXR Γëñ 7 mg/day, cardiovascular TEAEs were predominantly mild in severity, with no consistent pattern of increasing incidence with increasing dose. Modest changes in pulse rate and blood pressure were not considered by investigators to be clinically meaningful

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ADHD Atten Deficit Hyperact Disord. 2019;11:S78.

SYSTEMIC DEFICIT OF ATTENTION OF CHILD PROTECTION CHILDREN: IMPLICATIONS FOR ASSESSMENT, INTERVENTION AND DIAGNOSIS.

Lynch M.

Objectives: To demonstrate how trauma can obscure the diagnoses for children entering care, To present a method where diagnoses and interventions can be identified using the Neurosequential Model of Therapeutics (NMT) (Perry 2009, The Child Trauma Academy) and the Sensory Profile (SP2A) (Dunn 2014).
Methods: De-identified case studies will review initial diagnosis and demonstrate the utility and efficiency of the NMT and SP2A in identifying domain functioning and relational and sensory based activities that can assist the child's self -regulation and development. The NMT reviews developmental history and current functioning on sensory integration, self-regulation, relational and general cognitive functioning. The SP2A examines auditory, visual, tactile, and movement processing, along with the behavioural correlate of sensory processing.
Results: The diagnosis of PTSD arose in the cases due to the information available, To better inform ongoing care, consideration of ADHD as the most likely primary diagnosis needs to be given. The challenges to the recognition and medical management of ADHD with this population were described.
Conclusions: NMT and SP2A bring a capacity to help the child understand and self-regulate in relationship with key persons. The inter-relationship between biological predisposition, neural atypicality and environmental harm needs to be considered and responded to with appropriate interventions

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ADHD Atten Deficit Hyperact Disord. 2019;11:S11-S12.

CHILDREN WITH ADHD USING METHYLPHENIDATE: ANALYSIS OF EXECUTIVE FUNCTIONS, ATTENTION AND VERBAL FLUENCY.

Minervino C, Cruz L.

Objectives: The present study aimed to analyze the performance profile on executive functions (working memory, inhibitory control and cognitive flexibility), attention (sustained, selective, alternated) and verbal fluency (phonological and semantic) of children with ADHD using methylphenidate.

Methods: A total of 71 children aged 7-11 years old were divided into three groups: control group (n = 38), ADHD group with methylphenidate (n = 13) and ADHD group without methylphenidate (n = 20). The parents or responsible for the children signed a Free and Informed Consent Form and completed a sociodemographic questionnaire, and parents of children with ADHD also completed the SNAP-IV. The children signed the Minor Assent Term. The instruments used in order to reach the proposed objectives were Progressive Matrices of Raven, Digit Span, Corsi Block Test, Trail Making Test, Five Digit Test and Verbal Fluency Test. After tested and confirmed the homogeneity of the variance between groups ($p>0.05$), it was decided to use ANOVA one-way and correspondence analysis.
Results: The results revealed the performance of 38 (53.5%) children of the control group and of 33 children with ADHD (46.5%), carefully diagnosed. Of these children with the disorder, 27 (81.8%) were boys and 6 (18.2%) were girls. In regarding the presentation of ADHD, 19 (26.8%) children were diagnosed as ADHD with predominantly inattentive presentation, 6 (8.5%) had ADHD with predominantly hyperactive-impulsive presentation and 8 (11.3%) had ADHD with combined presentation. Through ANOVA one-way, it was observed there was a significant difference between the averages of the three groups for the abilities of working memory [$F(2, 68) = 5.28$; $p<0.05$], cognitive flexibility [$F(2, 68) = 6.71$; $p<0.05$], inhibitory control [$F(2.68) = 4.66$; $p<0.05$], sustained attention [$F (2.68) = 4.79$; $p<0.05$], selective attention [$F(2.68) = 5.81$; $p<0.05$] and alternated attention [$F(2.68) = 8.16$; $p<0.05$]. With the post hoc it was possible to verify that the difference of averages was between the control group (CG) and the ADHD with methylphenidate or between the CG and the two experimental groups, since $p<0.05$. Observing the means of the scores obtained by the groups, it was seen that these differences were better for the Control Group that obtained the highest scores. Correspondence analysis were also performed and was observed an association between the use of the medication and the achievement of an average performance on cognitive flexibility, inhibitory control and selective attention.
Conclusions: The analysis indicated that children with ADHD using methylphenidate, compared with other children with the disorder who do not use medication and with healthy children, presented a lowered profile of executive and attentional functioning regarding the abilities of inhibitory control, cognitive flexibility, working memory, sustained attention, selective attention, alternated attention, phonological verbal fluency and semantic verbal fluency

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ADHD Atten Deficit Hyperact Disord. 2019;11:S11.

THE ASSOCIATION BETWEEN INSOMNIA AND ALCOHOL CONSUMPTION IN ADULTS WITH ADHD.

Lundervold AJ, et al.

Objectives: Insomnia and alcohol consumption are both described as co-existing problems in adults with ADHD. Here we investigated the frequency of and the association between the two in a sample of adults with ADHD and a control group recruited from the population.
Methods: The sample included cross-sectional data from 270 adults with an ADHD diagnosis (41.3% males) and 201 controls (38% males). All participants completed a questionnaire to define insomnia (the Bergen Insomnia Scale) and the Alcohol Use Disorder Identification Test (AUDIT), where the sum score of the first eight items was used to define the frequency of alcohol use.
Results: Compared to the control group, the ADHD group showed a higher frequency of insomnia (67.2% and 28.8%, respectively, Chi square = 60.97, $p<.001$) and a higher frequency of alcohol consumption ($t(417)3.227$, $p<.001$). The rate of insomnia was not statistically different between males and females, but males obtained higher AUDIT scores than females, both in the ADHD ($t(233) = - 3.10$, $p = .002$), and the control group ($t(182) = - 2.76$, $p = .006$). A logistic regression analysis with insomnia as the dependent variable showed that the contribution of AUDIT severity was statistically significant even when age, gender and diagnostic status (ADHD/control) were controlled (Beta = .073, $p = .010$). The four variables, altogether, explained 22.2% of the presence of insomnia (Nagelkerke Rsquare).
Conclusions: Considering the high impact of insomnia and drug abuse on core symptoms of ADHD, a careful assessment should include information about both sleep problems and alcohol consumption before deciding on an intervention program for an adult with an ADHD diagnosis. Additional analyses of the

relationship between current and childhood ADHD symptoms, comorbid disorders, sleep, and alcohol consumption will be presented

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ADHD Atten Deficit Hyperact Disord. 2019;11:S19.

THE ATENTO PROJECT OR HOW TO ASSESS EXECUTIVE FUNCTION IN ADHD CASES DURING SCHOOL AGE.

Luque T, et al.

Objectives: To address ADHD's assessment from a neuropsychological and dimensional perspective, to better describe the deficits and their impact in the person's daily life. The understanding of the disorder from a more global perspective, focusing on affected processes instead of the compliant of diagnostic criteria is especially relevant to: (1) avoid people's stigmatization; (2) help with the identification of their strengths and weaknesses; and (3) allow an adapted and individualized intervention.

Methods: After an extensive literature review and pilot study, the ATENTO questionnaire was administered to a Spanish general population sample of over 1.200 people (average age = 11.2; SD = 4.5) and was administered too to a clinical sample of over 400 cases (average age = 8.8; SD = 4.2). Different studies were carried out to compare the executive profiles in both samples.

Results: The average of the scales' scores of the ADHD group were more than 1.5 standard deviations over the average of general population group, reflecting a lower executive functioning. This profile was found mainly in Attentional control, Working memory, Planning and organization and Temporal orientation scales. Additionally, differences between combinate and inattentive types were found in the ADHD group.

Conclusions: ADHD seems to be characterized by an executive profile of lower attentional, working memory, planning and organization and temporal orientation scores in comparison with the profile of general population. This pattern of dysfunctions may be related with the presence of adaptation problems in familiar, scholar and social contexts. So, the comprehension of the individual profile is essential in order to plan the most appropriate intervention and to improve the quality of life of these children and their families

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ADHD Atten Deficit Hyperact Disord. 2019;11:S80.

INTERVENTIONS TO IMPROVE SOCIAL COMPETENCE IN ADOLESCENTS WITH ADHD: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Morris S, Sheen J, Ling M, et al.

Objectives: ADHD is associated with social impairment in peer relationships. Interventions to improve social competence have predominantly focused on elementary-aged children, despite clear evidence that ADHD-related social difficulties persist into adolescence, with more adverse consequences. This review identifies trials of interventions targeting social competence in adolescents with ADHD, to assess the current state of evidence.

Methods: To maximize eligible studies, all studies of non-pharmacological interventions to improve social competence with peers were eligible for inclusion, with the exception of single case designs. Adolescents aged 10-18 years with a diagnosis of ADHD were the recipients of the intervention. Following PRISMA guidelines, a systematic search identified 1615 non-duplicate articles from which 11 trials reported in 13 records were included for systematic review. Four randomized, and four non-randomized trials reported results eligible for inclusion in meta-analyses. Overall, included studies evidenced a high risk of bias.

Results: A random effects meta-analysis of the randomized controlled trials found there were no statistically significant differences between treatment and control groups as measured by parents (g = - 0.08 [- 0.34, 0.19], k = 4, N = 354) or teachers (g = 0.17 [- 0.06, 0.40], k = 3, N = 301). A random effects meta-analysis of the non-randomized trials found a statistically significant improvement in social competence from pre- to post-intervention according to parents (g = 0.54 [0.13, 0.95], k = 4, N = 48), but not according to teacher report (g = 0.04 [- 0.75, 0.83], k = 2, N = 16), or self-report (g = 0.45 [- 0.05, 0.95], k = 2, N = 32).

Conclusions: The weight of evidence does not currently support the efficacy of interventions to improve the social competence of adolescents with ADHD. Tailoring interventions to address individual differences in social difficulties may improve their efficacy. Limitations in measuring change, along with the inherent difficulties in designing efficacy trials are also discussed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S79.

SCREEN TIME EXPOSURE AND SLEEP AMONG CHILDREN WITH ADHD.

Matias J, Matias M, Garrido R, et al.

Objectives: Children with ADHD are at risk of excessive screen time and sleep disorders. The aim of this study was to determine the extent of screen time use in children with ADHD and its relationship with sleep duration.

Methods: Children aged 6-10 years were recruited from the ADHD population followed in the neurodevelopment clinic of a district hospital. Cases with comorbidities such as other developmental disorders and severe behavioural problems were excluded. The parents of the selected children were asked to answer an electronic questionnaire about sleeping habits and screen time use. Univariate statistical analysis (t-test and Chi-square test) were, then, performed.

Results: Parents of 24 children completed the questionnaire. Most children were male (83%) and had 10 years of age (54%). The mean daily total screen time exposure was 5h09 min (SD 184 min). Nine hours and fiftyeight minutes (SD 38 min) was the mean amount of sleep per weekday. In children with greater screen exposure (4 h per day), sleep time was reduced, on average, by 23 min (9 h45 min vs. 10 h08 min). Bedtime electronics use was also associated with less sleep (9 h47 min vs. 10 h15 min). Older children tended to sleep less and to have more screen time.

Conclusions: Among children with ADHD, greater daily screen time and bedtime use of technology seems to be associated with lower sleep duration. It is highly recommended that clinicians routinely ask about screen time exposure, especially in older children, to provide appropriate guidance and prevent sleep disorders

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ADHD Atten Deficit Hyperact Disord. 2019;11:S69-S70.

HERB-DRUG INTERACTION CAUSALITY ASSESSMENT IN PEDIATRIC ADVERSE EVENT REPORTS ASSOCIATED WITH ADHD MEDICATION.

Mazhar H, Robaey P, Harris C, et al.

Objectives: Natural Health Products (NHPs) are generally considered to be safe when they are used properly. However, they are complex in nature and can interact with other substances being used concurrently, with potential for adverse reactions. The objective of this study is to: i) identify adverse event reports (AERs) involving commonly used NHPs and ADHD (Attention Deficit Hyperactivity Disorder) prescription medicines; ii) to evaluate the quality of collected AERs; and iii) to assess whether herb-drug interactions can be causally linked to reported adverse events.

Methods: We systematically searched the FDAble database for NHPs commonly used by patients (4-18 years old) who were also taking ADHD drugs from 1997 to 2015. We assessed the completeness of the AERs and used three causality assessment tools modified for NHPs (Naranjo, HORN Drug Interaction Probability Scale and World Health Organization Uppsala Monitoring Centre Scale).

Results: Of the 23 identified AERs involving both a NHP and an ADHD drug, most involved multiple (>3) substances with inadequate detail to assess multiple potential interactions. Following data extraction and evaluation of completeness, five AERs involving only one NHP and one ADHD drug were evaluated for causality. A herbdrug interaction was assessed to be probable in one case and to be possible in another. Both these reports involved a methylphenidate formulation and St. John's Wort.

Conclusions: St. John's Wort has been known to inhibit numerous drug-metabolizing enzymes and transporters but the effects of St. John's Wort on methylphenidate metabolism and carboxylesterase 1 (responsible for the metabolism of methylphenidate) have yet to be studied

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ADHD Atten Deficit Hyperact Disord. 2019;11:S4-S5.

PERSISTENCE AND NEURAL CORRELATES OF DISRUPTIVE MOOD DYSREGULATION DISORDER IN 10-YEAR-OLD CHILDREN WITH ADHD.

Mulraney M, Silk T, Efron D, et al.

Objectives: This study aimed to determine the proportion of children with ADHD with persistent comorbid disruptive mood dysregulation disorder (DMDD) from age 7 to 10, and the proportion with new onset DMDD at age 10. In addition, this study explored whether there were differences in cortical thickness and gray matter volume (GMV) between children with ADHD + DMDD and ADHD-DMDD at age 10.

Methods: The sample consisted of children (n = 135) participating in a cohort study with data available at age 7 and age 10. Children with ADHD were recruited through 43 schools, using a two-stage screening (parent and teacher Conners-3 ADHD index) and case confirmation (Diagnostic Interview Schedule for Children, Version IV; [DISC-IV]) procedure. DMDD status was ascertained using proxy items from the DISC-IV. Magnetic Resonance Imaging data were collected in a subset (n = 77) of participants at age 10. Extracted using Freesurfer, cortical thickness and GMV were compared between children with ADHD + DMDD and ADHD-DMDD using t-tests.

Results: At age 7, 29 (21.5%) children had comorbid DMDD; this decreased to 16 (11.9%) at age 10. Of those with DMDD at age 7, eight (27.6%) had DMDD that persisted at age 10. Eight children had new onset DMDD at age 10. Compared to ADHD-DMDD, those with ADHD + DMDD at either time point had lower thickness in the right anterior (d = 0.6, p = .03) and posterior cingulate (d = 0.7, p = .02), right medial orbitofrontal (d = 0.6, p = .02), and both the left (d = 0.6, p = .04) and right insula (d = 0.6, p = .04) cortices. Children with ADHD + DMDD also had reduced GMV in the posterior cingulate (d = 0.6, p = .04).

Conclusions: In the first study investigating the longitudinal course of DMDD in ADHD, one in four children with ADHD + DMDD at age 7 had persistent DMDD 3 years later. Several neural correlates of DMDD were found indicating that, although DMDD can be transient, it is associated with structural differences on neuroimaging

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ADHD Atten Deficit Hyperact Disord. 2019;11:S27.

ADHD IN ACUTE CARE CHILD AND ADOLESCENT PSYCHIATRIC INPATIENTS.

Martin GL, Lull CJ, Lineros LR, et al.

Objectives: ADHD is a neurodevelopmental disorder defined by impairing symptoms of inattention, hyperactivity and impulsivity according to the latest version of the Diagnostic and Statistical Manual of Mental Diseases (DSM-V). ADHD has a worldwide combined prevalence of 5.29% in childhood (Polanczyk et al. 2007) with an approximate overall male:female ratio of 2:1 (Bahmanyar et al. 2013). Patients with ADHD have a high incidence of comorbidity with other psychiatric disorders. To the best of our knowledge, there are currently no studies elucidating the prevalence of ADHD in child psychiatric inpatients. The purpose of this study was to understand the prevalence rates of ADHD among psychiatric acute care inpatients under eighteen years old. Other objectives include exploring ADHD treatment and comorbidities among these patients.

Methods: We conducted a retrospective, descriptive study based on medical records of child and adolescent patients who had been admitted in the acute inpatient psychiatry unit in Sant Joan de D+®u Hospital, Barcelona, throughout September 2018 to December 2018. A total of 106 cases were included.

Results: Among the 106 patients admitted to psychiatric acute care over the study period, 14 of them had a diagnosis of ADHD (13%). The most common comorbidities in ADHD patients were oppositional defiant

disorder (43%), substance use disorder (29%), autism spectrum disorder (21%) and conduct disorder (21%). Methylphenidate was the ADHD treatment most prescribed among the patients.
Conclusions: In this sample, the prevalence of ADHD is higher among acute care psychiatric inpatients than in the general child population. Other studies in adult population showed similar results (Lines et al. 2018). Further investigation is needed to define the convenience of routine ADHD screening in child and adolescent psychiatric inpatients

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ADHD Atten Deficit Hyperact Disord. 2019;11:S79.

COMPARING PARENTAL STRESS LEVELS BETWEEN FATHERS AND MOTHERS OF BOYS WITH ADHD.

Manzur S, Lim-Ashworth N, Lim S, et al .

Objectives: Many parenting stress studies of children with ADHD rely on maternal reports. Information about paternal stressors is minimal. This study investigates differences in parental stress levels between mothers and fathers of boys with ADHD. We hypothesise that mothers, typically the main caregivers, experience more parental stress.
Methods: A total of 15 fathers and 15 mothers (of children aged 6-19, diagnosed with ADHD at an outpatient psychiatric clinic) filled up the Parental Stress Scale (PSS) and Patient Health Questionnaire-9 (PHQ-9), a depression screener. Children of father respondents were matched to gender (all boys) and Clinical Global Impression-Severity (CGI-S) rating to control for parental stress attributable to gender differences and severity of functioning. Their responses were compared using an independent sample T-test.
Results: There is no significant difference in parental stress levels ($t(28) = 1.726$, $p = .095$) and depression scores ($t(28) = - 1.066$, $p = .295$) between fathers and mothers overall, although there is a trend towards fathers experiencing more stress (Mfather = 49.47, Mmother = 44.40). Fathers hold a significantly less optimistic future outlook than mothers ($t(28) = 2.646$, $p = .013$) and appear to experience more financial-related stress ($t(28) = 1.804$, $p = .082$). Fathers also tend to find their children less enjoyable ($t(28) = 1.775$, $p = .087$).
Conclusions: Mothers and fathers of boys with ADHD experience similar parental stress levels and mood overall. However, fathers report significantly less optimism for the future and show a propensity for higher stress than mothers in several areas. A larger sample size would possibly yield more significant results. Recommendations include appropriating clinical services for this population

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ADHD Atten Deficit Hyperact Disord. 2019;11:S25.

ELECTRODERMAL RESPONSES TO THE UNFAMILIAR SITUATION IN CHILDREN WITH ADHD AND CONDUCT PROBLEMS SYMPTOMS.

Ratajczak J, Hanl T.

Objectives: ADHD and conduct disorder are related to deficits in autonomic nervous system reaction in uncommon and factitious experimental conditions. Little is known about an autonomic reactivity of this group under everyday life conditions. The aim of the study was to examine the association between electrodermal activity (EDA) and symptoms of ADHD and Conduct Problems (CP) in response to an unfamiliar situation.
Methods: Children aged 5-7 years with slightly elevated to a very high level of symptoms measured with hyperactivity/inattention and conduct problems scales of 'Strength and Difficulties Questionnaire' (SDQ) were included to the ADHD/CP group (n = 64) and compared with healthy controls (CG, n = 74). The EDA was measured twice at three-month intervals (M1 and M2), using a Shimmer GSR + unit during a meeting with a previously unknown person who performed basic anthropometric measurements (the unfamiliar situation with potentially uncomfortable stimuli). For both measurements, the differences in skin resistance (SR) between the sample and CG were tested using the U Mann-Whitney test. The Sign test was applied to estimate the differences in SR between M1 and M2 in the sample and CG separately.

Results: ADHD/CP had lower SR in M1 (average value from the time of the first examination) than CG (131.75 vs. 153.78 kX). The differences between M1 and M2 were statistically significant in both groups but the direction of change was opposite. SR decreased in ADHD/CP (65.58 kX) but increased in CG (164.02 kX).
Conclusions: The results suggest an increased autonomic reactivity to the unfamiliar situation in children with ADHD and Conduct Problems in comparison to healthy peers. What is more, comorbidity between ADHD and conduct problems may be a predictor of a sensitization resulting in increase of arousal in repeated exposition to the same uncomfortable stimuli

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ADHD Atten Deficit Hyperact Disord. 2019;11:S12.
CHILDHOOD PSYCHOLOGICAL TRAUMATIZATION IS ASSOCIATED WITH PREVALENT COMORBID PSYCHIATRIC DISORDERS AND CURRENT PTSD IN ADULT PATIENTS WITH ADHD.
Peleikis DE, Fredriksen M.
Objectives: Research literature indicate a bidirectional association between ADHD and PTSD, suggesting childhood exposure to psychological traumatic events is associated with worsening of childhood ADHD and comorbid psychiatric disorders. This study examines whether adult ADHD-patients with a history of childhood trauma (CT) have more prevalent comorbid psychiatric disorders in adulthood than ADHD-patients without CT, and whether CT is associated with current PTSD.
Methods: Medication na+»ve adults with ADHD (n = 250) referred to a specialist outpatient clinic diagnosed by board-certified psychiatrists according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, using the Diagnostic Interview for ADHD in Adults, second edition (DIVA 2.0). The structured interview MINI International Neuropsychiatric Interview Plus (M.I.N.I.-Plus) for DSM-IV Axis I disorders was applied to assess DSM-IV qualifying trauma in childhood (CT) and other comorbid mental disorders. For analyses the ADHD-patients were divided into those with CT reported before 15 years of age and those with no CT. Categorical variables were analyzed using the Chi-square test.
Results: Prevalence of CT was 44% (n = 109), more women (n = 64) than men (n = 45) (p = 0.048). More patients with CT had current PTSD (16% vs. 2%, p<0.001), life time panic disorder (36% vs. 16%, p<0.001) or agoraphobia (28% vs. 17%, p = 0.031) than the no-CT patients, and a larger proportion the CT patients had two or more comorbid disorders (57% vs. 39%, p = 0.030).
Conclusions: For adult ADHD patients, a history of childhood traumatization was related to more prevalent psychiatric comorbidities and PTSD. Studies on whether severity of symptoms and impairment also correlate with these findings are warranted

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ADHD Atten Deficit Hyperact Disord. 2019;11:S20-S21.
A NOVEL APPROACH TO MEASURING ATTENTION IN YOUTH WITH ADHD.
Pylypow J, Balbuena L, Quinn D.
Objectives: We previously developed a novel auditory continuous performance test (CPT) to objectively measure attention in ADHD. We aim to analyze this data, looking at variability in attention, which was not previously calculated due the short interval between stimulus. Variability in attention is key in assessing attention deficits in ADHD. Current measures of attention calculate variability using the standard deviation in reaction times between blocks of time. Alternatively, variability in response accuracy over time could be calculated using Mean Square Successive Differences (MSSD). This technique of calculating variability is commonly used in measurement of heart rate variability, and signal variability on fMRI which was associated with symptom severity in children with ADHD. We aim to improve our CPT by using MSSD to calculate variation in response accuracy over time.
Methods: We reviewed data from 60 subjects ages 12-16 with a clinical diagnosis of ADHD in an outpatient child psychiatry practice in Saskatoon, Canada. These youths completed two baseline CPTs 1 week apart,

then another CPT 90 min following a one-time trial dose of a short acting stimulant medication. Variability in attention was measured by looking at errors of omission and commission in response to an auditory stimulus presented every second over 15 min. Variability between response accuracy was measured over time using MSSD.
Results: In youth with ADHD, variability in attention calculated using MSSD was higher on baseline testing than after treatment with a stimulant medication.
Conclusions: We present a novel approach to measuring attention in youth with ADHD on a continuous performance test using MSSD to calculate variability between response accuracy over time. This allowed for detection of response to stimulant medication in youth with ADHD. Our novel CPT with measurement of variability using MSSD could be useful clinically in diagnosis of ADHD and assessment of treatment response

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ADHD Atten Deficit Hyperact Disord. 2019;11:S82.
JUST BEING A KID, OR AN ADHD KID: A QUALITATIVE STUDY OF ON HOW YOUNG PEOPLE EXPERIENCE RECEIVING AND LIVING WITH A DIAGNOSIS OF ADHD.
Rasmussen IL, Undheim AM, Aldridge-Waddon L, et al.
Objectives: The objective of this study was to examine how young people experience receiving and living with a diagnosis of ADHD over an 8-year period. We aimed to develop our understanding of such an experience, and to fill the gap in the literature concerning the relationship between living with a diagnosis of ADHD and selfesteem.
Methods: The study has a qualitative retrospective design. The participants were selected from Helse-Nord Tr+©ndelag, Child and Adolescent Psychiatric services, Hospital of Nord Tr+©ndelag. Eight adolescents and young adults diagnosed with ADHD in 2007-2008, were interviewed using a semi-structured interview during 2015 and 2016. The data were analyzed using Systematic Text Condensation.
Results: Self-esteem, normalization and maturation emerged as themes from the analysis. These young people had strong self-esteem, they shared the importance of being a unique person regardless of the diagnosis, and their self-esteem was stronger than suggested by previous literature. They wanted to be treated equally without special interventions in school as this made them feel different from others. They wanted to succeed in life despite their diagnosis.
Conclusions: Receiving a diagnosis of ADHD and being treated with medication in childhood may offer a protective effect on self-esteem. They express themselves as individual persons independent of their diagnosis and the diagnosis motivated them to show that they could manage to achieve as much as their peers. Nevertheless, these young people perceived that they were stigmatized by the diagnosis which they felt marked them out to be different to others

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ADHD Atten Deficit Hyperact Disord. 2019;11:S20.
PREDICTORS AND OUTCOMES OF ADHD IN (PRE)SCHOLAR CHILD.
Pereira AM, Lopes AF, Falc+úo M, et al.
Objectives: ADHD is a pervasive neurodevelopmental disorder characterized by developmentally inappropriate levels of inattention and hyperactivity/impulsivity that emerge early in childhood and is associated with a range of negative outcomes during childhood and adulthood. The severe negative impact of ADHD underscores the importance of identifying early markers of this disorder. This review aims to identify and clarify the predictors and outcomes of ADHD at pre-school age.
Methods: Literature review of pre-scholar ADHD published at pubmed.
Results: The developmental processes that determine adult mental health have their roots in early childhood and are present in the preschool years. The studies consistently show that more than half of 3-6 year old children who meet criteria for ADHD continue to meet criteria 18 months, 3 years and 7 years later. It has been suggested that a relationship between pragmatic language impairment, activity levels and externalizing

behaviors may be a potential early marker of underlying ADHD and/or autism. Delay aversion and/or inhibitory control in prescholar have also been significantly related to ADHD symptoms in early school age. Moreover, preschool emotional functioning deficits were strongly related to ADHD symptoms in late adolescence. Preschool hyperactivity in children aged 3 years predicted a diagnosis of oppositional defiant disorder at age 6 years and has also been associated with later emotional problems, poor social skills and academic underachievement. Comorbid conduct disorder and ADHD severity in childhood are the most important predictors of adverse outcomes in adulthood and those from families with lower family incomes had relatively poorer outcomes.
Conclusions: Evidence of a correlation between preschool hyperactivity and adult mental health problems highlights the potential value of targeting early identification and intervention strategies. Early screening for hyperactivity in the preschool period may facilitate the cost-effective targeting of early intervention efforts to reduce longterm burden for mental health problems

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ADHD Atten Deficit Hyperact Disord. 2019;11:S39.
EARLY SEXUAL DIMORPHISM IN BRAIN DEVELOPMENT TRAJECTORY AMONG PRESCHOOLERS WITH ADHD.
Mahone M, Kalb L, Crocetti D, et al.
Objectives: Neuroimaging studies of ADHD suggest a pattern of sexual dimorphism, including sex-specific regional cortical differences. Despite emergence of most ADHD symptoms during the preschool years, little is known about the trajectory of brain development among young children with ADHD, including whether the sex differences observed in older individuals are evident at this age.
Methods: Participants included 112 children-65 with ADHD (40 male) and 47 typically developing (TD, 24 male), ages 48-71 months at baseline visit. Subsequent visits were scheduled annually for 3 years-1 visit (n = 109), 2 visits (n = 83), 3 visits (n = 68), 4 visits (n = 1). ADHD was diagnosed using modified DSM-IV criteria; all participants were screened for language and mood disorders. Scans were obtained on a 3.0T Philips GyroscanNT; MPRAGE images were used for volumetric assessment within Freesurfer. A series of multilevel (mixed) linear regression models were used to examine changes in total cerebral volume (TCV) over time (age in months) between groups, using linear and quadratic terms, as well as interactions between the quadratic term and diagnostic group. All models included SES, race, and medication use (stimulants: 6%, non-stimulants: 5%) as covariates.
Results: Older age and male sex were associated with greater TCV, while lower SES and ADHD were associated with lower TCV (all $p<.05$). The (quadratic) age-by-diagnosis interaction on TCV was significant ($p<.05$); however, when trajectories were examined separately within sex, the significant age-by-diagnosis effect on TCV was observed only in girls ($p<.05$). No significant effects of race or medications were observed.
Conclusions: Between ages 4 and 7 years, typical cerebral growth is slowed in girls (but not boys) with ADHD. Among preschoolers with ADHD, cerebral growth trajectory may be a sensitive biomarker of anomalous brain development in earlier maturing girls. In boys, who mature later, slowing of cerebral growth as a biomarker of ADHD likely occurs after age 7

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ADHD Atten Deficit Hyperact Disord. 2019;11:S8.
COGNITIVE SWITCHING PROCESSES, SUSTAINED ATTENTION AND INTERFERENCE CONTROL IN CHILDREN WITH AND WITHOUT ADHD SYMPTOMS.
Mamrot P, Hanc T, Bryl E, et al.
Objectives: Executive function (EF) deficits have been associated with attention-deficit/hyperactivity disorder (ADHD). However, the results differ depending on the type of EF being tested and applied method. The aim of the study was to explore whether children with ADHD symptoms differ significantly from healthy peers in selected executive functions such as: switching, sustained attention and interference control.

Methods: The sample included 285 boys and 262 girls aged 6-12 years. IOWA Conners Rating Scale was applied to measure children's ADHD symptoms. Children who scored above 2 standard deviations were qualified as increased ADHD risk group and were compared with their peers without symptoms (control group, CG). Stroop Color-Word Interference Test (SCWT), The Continuous Performance Test (CPT) and The Trial Making Test A and B (TMT-AB) were applied to assess children's EF. The test results were standardized on age and sex using mean and 1SD from the sample. The research was funded by National Science Centre, Poland (2016/21/B/ NZ5/00492).
Results: Both the number of reactions and impulsive errors in CPT were significantly associated with increased ADHD risk (xADHD = .966SD, xCG = - .239SD; xADHD = .934SD, xCG = .231SD), however, children did not differ within omission mistakes. There were no differences between children in CPT and TMT response time, although children with ADHD symptoms made more mistakes in TMT-B (xADHD = .224SD, xCG = - .004SD). Children with ADHD risk had also lower response time in all parts of SCWT (xADHD = .661SD; 1.049SD; 778SD; xCG = - .016SD; - .0234SD; - .0177SD) and higher interference score associated with mistakes (xADHD = 1.311SD, xCG = - .0294SD).
Conclusions: Children with ADHD symptoms were characterized by decreased interference control and higher impulsivity, but they did not differ in sustained attention and switching processes from their peers without symptoms. The results suggest children with ADHD risk might make more mistakes due to their impulsive reactions and they might need more time to perform the EF task, associated with control

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ADHD Atten Deficit Hyperact Disord. 2019;11:S12-S13.

SUICIDE: A PRIMARY OR SECONDARY ROAD IN ADHD - CLINICAL CASE.

Pereira D, Moreno M, Vien F, et al.

Objectives: This review aims to present a clinical case of a patient with undiagnosed ADHD who developed a depressive episode with suicidal ideation.
Methods: Clinical process consultation and PubMed search were performed in December 2018 using the search keywords ADHD, suicidal behavior and suicide risk.
Results: Attention deficit/hyperactivity disorder (ADHD) is a persistent neurodevelopmental condition characterized by persisting inattention, hyperactivity and/or impulsivity with significantly impaired functioning and development. ADHD symptoms are noted during childhood, but can often persist into adulthood in 10-79% of child patients. Several authors defends that, in adulthood, ADHD increases the risk of antissocial behavior, substance abuse, aggressive behavior, social exclusion and low self-esteem. Research has shown that these psychiatric comorbidities may play an importante role in the development of suicidal behavior. Pedro, a 37-year-old male, unemployed, presented to the Hospital de S+úo Jos+® reporting suicidal ideation. He indicated that he had been depressed for several months with easy fatigability, decreased interest in pleasurable activities, low self-steem, inability to concentrate, low mood and anxiety. Pedro reports a longstanding history of poor attention. He is creative and inteligent, but he has always had a difficult time concentrating in class. His difficulties with focusing and time management have continued into adulthood, affecting his ability to effectively manage his finances and personal life. The pressure he feels towards finding mechanisms to cope with his symptoms, have ultimately resulted in increased anxiety, feelings of guilt, and loss of self-esteem. Pedro admits to having a daily dependence on marijuana.
Conclusions: Although many studies indicate an association between ADHD and suicidal behavior, it remains controversial whether there is a direct relationship or if the association depends on the increased prevalence of pre-existing comorbid conditions and individual and family dysfunctional factors

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ADHD Atten Deficit Hyperact Disord. 2019;11:S80.

SHORT-TERM EFFECTS OF A PEER CO-LED EDUCATIONAL PROGRAMME TO PARENTS WITH ADHD CHILDREN: A STUDY PROTOCOL.

Mundal I, Grawe RW, Johansen H, et al.

Objectives: Significant parts of children with ADHD display behavior problems that interfere with their relationship development and academic achievement, and may have multiple problems, which strain family dynamics and influence their child's treatment. Parent activation, described as parents' knowledge, skills and confidence in dealing with their child's health and healthcare, has been shown to be important for improved health outcomes. Research suggests that parents need edification to learn skills, which are crucial for treatment, and management of their children's healthcare, probably by promoting positive parenting techniques and reducing negative parenting factors in the families. This study aims to assess the effect of a peer co-led educational programme for parents of children with ADHD on the Parent Patient Activation Measures (P-PAM) and secondary outcomes.

Methods: Parents (n = 55) of children between 6 and 15 years newly diagnosed with ADHD referred to pediatric psychiatric outpatient clinics, will receive a peer co-led educational programme and will be compared with a control group of parents (n = 55) receiving standard. The main outcome is the P-PAM, assessed at the inclusion and 3 months follow-up. Secondary outcomes include measures of parent satisfaction, and parent reported ADHD symptoms and problems (Swanson, Nolan, and Pelham). Parents in the intervention group will receive the educational programme after confirmed diagnosis of the child. Parents in the control group will receive regular parenting involvement, referred to as 'treatment as usual', and not the peer coled intervention.

Results: This is the first RCT assessing the efficacy of a peer co-led educational programme for parents of children with ADHD, involving educators who are user representatives and parents of children with ADHD, participating and teaching in educational interventions in cooperation with healthcare professionals.

Conclusions: This study may prove to be a valuable contribution to the healthcare of families with ADHD, and target the family's needs

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ADHD Atten Deficit Hyperact Disord. 2019;11:S77-S78.

DEVELOPMENT OF SOCIAL SKILLS RATING SCALE FOR ADHD ADOLESCENTS: PRELIMINARY STUDY.

Lee M-S, Lee J-H, Lee H-J, et al.

Objectives: Adolescents with ADHD often have problems in social interactions with peers and are confronted with peer rejection and social isolation. The most common approach to social problems in adolescents is social skills training. This intervention concept represents a variable mixture of cognitive-behavioral intervention elements. We tried to make an assessment tool specifically designed for social skills in ADHD adolescents. This instrument was developed to identify the presence of social skills deficits and to find out the specific dimensions of impaired social skills.

Methods: For the purpose of constructing the questionnaire of sociability skill scale, a comprehensive study focusing on prior studies and theories in the interpersonal relations and the behavioral characteristics of ADHD adolescents were sampled. For adolescents with ADHD, their social skills characteristics were collected and summarized. We collected them and modified them in the form of questionnaires. We also gathered previously published rating scales to assess the social skills in the adolescents. Those scales include Relationship Change Scale, Rathus Assertiveness Scale, Self Efficacy Scale, Rosenberg Self Esteem Scale, Self-control rating scale, social intelligence rating scale, social perception, interpersonal stress scale, peer relationship evaluation test, and peer relationship skill scale.

Results: The development procedure of a scale was carried out in the preliminary scale development. We have developed a preliminary scale which has 4 dimensions-Self-control, Cooperation/Empathy, Assertion/Self-esteem, and interpersonal relationship. This scale is composed of 32 items. Each item is the 5-point scale that offers a range of answer options-from not at all to definitely yes. This scale also includes reverse scoring items.

Conclusions: Further validation is needed. More than 100 adolescents enrolled from the local schools in the typically developing control group and 50 adolescent ADHD patients who visit the child and adolescents

psychiatry clinic participate in the validation study. In the later data analysis stage, the descriptive statistic analysis, the internal consistency coefficient (a), the exploratory factor analysis and the confirmatory factor analysis results will be performed and presented. These information could be used to design the personalized social skills training program for ADHD adolescents. This scale also could continuously monitor changes in these skills. Social skills rating scale for ADHD adolescents. (Table presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S30.

PREDICTORS OF ADHD SYMPTOMS IN CHILDHOOD AND ADOLESCENCE OVER TIME: RESULTS OF THE LONGITUDINAL BELLA STUDY.

Wuestner A, Otto C, Schlack R, et al.

Objectives: ADHD is a common and impairing mental disorder in childhood and adolescence. So far, longitudinal studies on risk and protective factors for the development of ADHD symptoms are scarce. Therefore, the present study investigates the cross-sectional and longitudinal influences of individual, familial and social factors on the development of ADHD symptoms in children and adolescents.
Methods: Within the population-based longitudinal BELLA study, data on n = 1384 children and adolescents aged 11-17 years were collected at three measurement points covering a period of 2 years. We examined effects of parental mental health problems (risk factor) and self-efficacy, family climate and social support (protective factors) on symptoms of ADHD at baseline as well as over time using latent growth modelling and linear regression models. Sociodemographic factors, pre- and postnatal factors, and comorbid symptoms of internalizing and externalizing mental health problems were considered as covariates. In additional regression models, we explored potential interaction effects between risk and protective factors.
Results: Parental mental health problems, stronger aggressive behavior, younger age and male gender were negatively associated with ADHD symptoms in children and adolescents at baseline. Longitudinal analyses revealed that increasing parental mental health problems, increasing aggressive behaviour, increasing symptoms of generalized anxiety, migration status and female gender were related to stronger increase of ADHD symptoms over time. However, improving family climate was associated with decreasing ADHD symptoms over time. We further detected moderating effects of social support on the relationship between parental mental health problems and ADHD symptoms.
Conclusions: The findings of the present study demonstrate detrimental effects of parental mental health problems as well as beneficial effects of family climate and social support on ADHD in children and adolescents over time. The results may be integrated in future prevention and early intervention programs that target affected children and adolescents

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ADHD Atten Deficit Hyperact Disord. 2019;11:S88-S89.

A CLINIC-BASED SURVEY OF TEENAGERS WITH AND WITHOUT ADHD TO UNDERSTAND THEIR SLEEP HABITS, IMPACT OF POOR SLEEP AND WHETHER GENDER DIFFERENCES EXIST.

Yemula C, Musgrave E, Ajmal S, et al.

Objectives: To ascertain the sleep habits of teenagers with and without ADHD, including sleep onset and duration of sleep, their use of gadgets before bedtime, the impact of poor sleep during the day and to learn if any gender differences exist.
Methods: We developed a sleep survey questionnaire for teenagers aged 13-18 years with ADHD and those without any medical conditions to anonymously report their sleep habits, including use of gadgets before bedtime, sleep onset, sleep duration and difficulties with tiredness/poor concentration during daytime.
Results: Teenagers, 52 with ADHD (40 boys and 12 girls) and 27 without any medical conditions (16 boys and 11 girls) completed the survey. 22 (42.3%) received ADHD medication and 21 (40.3%) had comorbidity including autism, anxiety or ODD. The gadget use before bedtime was more than 2 h in 21 (40.3%) with ADHD and 6 (22.2%) without ADHD. Whilst 7 (13.4%) with ADHD took more than 2 h to sleep, this was not

observed in non-ADHD group. Inadequate sleep (less than 8 h) was noted in 50% of girls and 75% of boys with ADHD and 36% of girls and 44% of boys without ADHD. Problems with poor concentration/tiredness were reported by 44 teenagers (84.6%) with ADHD (80% of boys and all girls) and 12 teenagers (44.4%) without ADHD (43% of boys and 45% of girls).
Conclusions: In our survey, a significant proportion of patients with ADHD spent more time on gadgets before bedtime, experienced major sleep onset delay and inadequate sleep compared to non-ADHD group. More boys than girls reported insufficient sleep in both the groups. Problems with poor concentration/tiredness were found in most teenagers, with girls affected more than boys. Sleep evaluation of all teenagers, especially those with ADHD should be essential in all assessments, along with tailored psychoeducation and sleep management

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ADHD Atten Deficit Hyperact Disord. 2019;11:S42.
THE RESTING-STATE BASELINE INDEX OF DEGREE CENTRALITY PREDICTS LONG-TERM THERAPEUTIC RESPONSE TO ATOMOXETINE IN CHILDREN WITH ADHD.
Zhang Q, Cao Q, Yuan J, et al.
Objectives: This study was aimed to explore the characteristics of resting-state brain functions at baseline to predict long-term (3 months) therapeutic response to atomoxetine treatment in children with ADHD.
Methods: We calculated the degree centrality (DC) on 38 ADHD children followed by atomoxetine treatment and 30 healthy controls using resting-state functional magnetic resonance imaging (fMRI) data. For all ADHD children, scores of the ADHD Rating Scale IV Parent Version (ADHD RS-IV) were reported by their parents at the baseline when take fMRI scanning and after 12 weeks atomoxetine treatment. Two sample T-test between ADHD group and healthy controls and correlation analyses between symptoms improvements and DC in ADHD group were performed. All results were corrected for multiple comparisons using Gaussian Random Field (GRF) theory (minimal Z>2.3, cluster significance: p<0.05).
Results: The DC values in the right precentral and postcentral (t = - 4.60, p<0.05) and left postcentral (t = - 4.16, p<0.05) in ADHD were lower than those in healthy controls (Figure 1a). As for the correlation analysis, there was a positive correlation between the reductions in inattention symptoms and the DC in the left angular (p<0.05), and negative correlations in right precentral and postcentral (p<0.05), left postcentral (p<0.05) and left inferior frontal gyrus (p<0.05) in ADHD (Figure 1b). Reductions in hyperactivity/ impulsivity symptoms were positively correlated with DC in bilateral medial frontal gyrus (p<0.05), left angular (p<0.05) and left cerebellum posterior lobe (p<0.05), and negatively correlated in bilateral precentral and postcentral (p<0.05), right superior temporal gyrus (p<0.05) and insula (p<0.05) (Figure 1c, d).
Conclusions: The brain functions (i.e. DC value) at baseline may be a predictor for long-term therapeutic response to atomoxetine in children with ADHD. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S41-S42.
ADHD TRAITS IN GENERAL POPULATION: WHITE MATTER ALTERATIONS AND ADHD RELATED POLYGENIC RISK.
Wu Z, Hoogman M, Bralten J, et al.
Objectives: ADHD symptoms are often viewed as a continuum in the general population. However, the underlying connection between ADHD traits in general population and the clinical ADHD diagnosis remains unclear. The current study aims to explore the relationships between ADHD traits in the general population, white matter features of the brain and polygenic risk for ADHD.
Methods: A total of 1190 healthy adolescents (all aged 14 years, 574 males and 616 females) were recruited across 8 European cities via the IMAGEN consortium1, see https://imagen-europe.com/#. For each individual, three different indicators were calculated. (1) ADHD traits were assessed with the Strength and difficulty questionnaire (SDQ) (parent rating). (2) Mean fractional anisotropy (FA, which represents the white matter integrity) was extracted in candidate regions of interest (left and right internal capsule, left and right

anterior corona radiata, genu/body/splenium of corpus callosum) using masks made from the ICBM-DTI template. (3) Individual polygenic risk scores (PRS) for ADHD risk were calculated in PRSice software using summary statistics from the psychiatric genomics consortium (PGC) (http://www.med.unc.edu/pgc/) 2.3. To study the correlation between ADHD traits, FA values of our regions of interest and PRS for ADHD risk, we performed linear regression models in R (https://www.r-project.org/), correcting for sex, scanning sites and first 4 components from MDS.
Results: We found that (1) The mean FA of the left and right Internal Capsule (IC) were significantly negatively associated with ADHD traits in the general population, which means lower FA is associated with higher ADHD scores in SDQ (p = 0.00061 and 0.0038, respectively). (2) Mean FA of the left and right IC were found nominally associated with polygenic risk of ADHD (p = 0.036 and 0.00698, respectively), but these did not survive Bonferroni correction.
Conclusions: The white matter features of the internal capsule, which has been repeatedly shown to be involved in the pathophysiology of ADHD, is related to ADHD traits in the general population. This finding further supports the hypothesis of shared underlying mechanisms of ADHD symptoms in clinically diagnosed patients and in the population

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ADHD Atten Deficit Hyperact Disord. 2019;11:S71-S72.

MONITORING ADHD IN CHILDREN TREATMENT WITH A NEW BIOLOGICAL MARKER OF ADHD.

Varela P, Ramos-Quiroga JA, Super H, et al.

Objectives: Recently we described a new method for diagnosing ADHD in children. The method consist of recording miniature eye movements (1), which are implicated in attentional processing. We showed that these eye movement are absent or weak in ADHD children (2) and can be used as an objective biological marker for ADHD (called Cognitive Vergence). In order to know whether the biological maker can be useful for monitoring treatment, we investigated the possible effect of typical pharmaceutical intervention to reduce ADHD symptoms on the level of the biological marker.
Methods: After extensive clinical diagnosis some children (N = 14; 7-14 years of age) with ADHD received pharmaceutical treatment (Methylphenidate or Lisdexamfetamine Dimesylate) while others (N = 7) did not receive pharmaceutical medication. Before treatment all ADHD children performed the BGaze test (Braingaze, Spain) to assess the probability and severity of ADHD based on the level of biological marker (Pre). Six to eight months after treatment or the initial diagnosis these children were re-tested with the BGaze test (Post). For statistics we applied Student t-tests.
Results: Preliminary results (mean -¦ std) of this pilot suggests a lowering of the severity score measured by the biological marker in the medicated group (Pre: 0.46 -¦ 0.24; Post: 0.38 -¦ 0.20; p = 0.08) and not in the non-medicated group (Pre: 0.36 -¦ 0.34; Post: 0.34 -¦ 0.14; p = 0.46). The reduction in severity score was significantly stronger (p<0.001) in the medicated group than in the non- medicated group. The probability scores the remained similar (Medicated group: Pre: 0.55 -¦ 0.08; Post: 0.56 -¦ 0.08; p = 0.38; Non-medicated group: Pre: 0.53 -¦ 0.20; Post: 0.54 -¦ 0.15; p = 0.39).
Conclusions: These findings suggest that pharmaceutical intervention lowers the severity of ADHD measured by the biological marker (Cognitive Vergence) of the BGaze test. A study (currently undertaken) with larger patient sample is needed to confirm whether Cognitive Vergence assessment can be used as a tool to monitor pharmaceutical treatment

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ADHD Atten Deficit Hyperact Disord. 2019;11:S60.

EVALUATION OF JOINT ATTENTION ABILITIES IN CHILDREN WITH ADHD: AN EYE TRACKING STUDY.

Temelturk RD, Ustun GB, Aydin O, et al.

Objectives: The aim of this study is to investigate autistic traits linked to responding joint attention (RJA) abilities using eye tracking in children with ADHD, and compare typical developing children.

Methods: Male children (6-10 years) with ADHD (n = 31) were first diagnosed and 30 typically developing children matched for age and gender were included. K-SADS was conducted and diagnosed ADHD according to DSM-5. Sociodemographic Data, CBCL/6-1Parent Form, CPRS-R/L, SRS were completed by parents. Intelligence levels of children were assessed with WISC-IV. RJA abilities were evaluated by an eye tracking system. Congruent/incongruent and male/female children videos were displayed on the computer screen without any task. Gaze to the target and face, eye,mouth regions of children were determined as area of interests (AOIs).Dwell times were measured. Statistical evaluations and analyses were performed using IBM SPSS 24.0. Eye tracking datas were recorded using SMI iView XTM systems (500 Hz).
Results: Children with ADHD had significiantly higher scores of CBCL/6-18, CPRS-R/L, SRS. In CBCL, ADHD group had significiantly positive AT profile versus controls (38.7% vs. 0%), elevated ratings of ASD traits in SRS, lower Processing Speed Index (PSI) scores. Autistic traits were positively correlated with CBCL/6-18, CPRS-R/L (anxious/shy), negatively correlated with PSI in the whole sample. Healthy children looked significiantly longer at the target ($p<0.001$) Target dwell time on incongruent conditions were significiantly longer than congruent conditions in both groups. Unless there was no significant difference in terms of dwell time on faces and eyes, dwell time on mouth is significiantly longer in ADHD group. There were significiant relationships betweeen autistis traits and dwell times for target and mouth.
Conclusions: This research showed that in children with ADHD, RJA difficulties are found to be associated with autistic traits as well as ADHD symptoms. ADHD group is more interested in the mouth region of the face. These differences during visual attention to social stimuli in this group bring about insufficiencies in social interaction and communication. Poor RJA ability has an important role in the interventions on social development focusing autistic traits in ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S40.

ATTENTIONAL LAPSES AND ADHD: AMPLITUDE VARIABILITY OVER TRIALS IN HEMODYNAMIC RESPONSES IN THE POSTERIOR DEFAULT MODE NETWORK DURING GO/-NO-GO TASK PERFORMANCE.

Sorensen L, Stevens MC.

Objectives: Attentional lapses are among the most consistently found cognitive abnormalities in ADHD. Such lapses typically are operationalized in laboratory testing as intra-individual reaction time variability (IIVRT) on speeded motor response tasks such as of inhibitory control (suppressing prepotent motor response). IIVRT has been hypothesized to stem from spontaneous brain activity of low frequency fluctuations of the intrinsic default mode network (DMN). Indeed, prior neuroimaging studies have linked high ADHD IIVRT to hemodynamic responses in the anterior DMN regions. However, the posterior regions of the DMN such as precuneus and posterior cingulate cortex were originally identified as especially important for the down-regulation of the low-frequency resting-state brain. As such, these regions represent a more likely, logical neurobiological correlate for ADHD IIVRT. This study approached the identification of IIVRT-related regions in ADHD using a different approach than prior research using fMRI data.
Methods: The sample included ADHD (n = 57) and non-ADHD adolescents (n = 56) between 12 and 19 years old who performed an attentionally-demanding Go/No-Go task. Independent Component Analysis identified canonical networks in the brain including DMN. Using component timecourses, single-trial estimates of network signal change to Go/No-Go task events were extracted and their variability quantified. Between group differences in this hemodynamic variability, in Go/No-Go task frequent 'X' Go stimuli reaction time variability, and the relationship of these two factors were examined.
Results: Six independent components represented regions within the DMN, while five of these involved the posterior DMN. The adolescents with ADHD had higher levels of hemodynamic response variability in posterior DMN regions than the healthy controls.
Conclusions: The results show that inconsistency of neural responses to individual attention-eliciting stimuli is specifically found in the posterior DMN in ADHD. This suggests that investigating trial-totrial brain function variability in ADHD provides information beyond that detectable through analyses of behavioral data

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ADHD Atten Deficit Hyperact Disord. 2019;11:S59-S60.

PREVALENCE AND IMPACT OF UNDER- OR MISDIAGNOSED ADHD IN ADULTS REFERRED FOR THE TREATMENT OF MOOD AND ANXIETY DISORDERS.

Sternat T, Fotinos K, Lokuge S, et al.

Objectives: The comorbidity between Attention-Deficit Hyperactivity Disorder (ADHD) and psychiatric disorders has been well documented. Still, many clinicians fail to screen adult patients for ADHD, despite evidence that adolescents with a history of ADHD are significantly more likely to develop anxiety and depression by adulthood. The aim of this study was to determine the percentage of patients with under- or misdiagnosed ADHD referred for the treatment of mood and anxiety disorders.
Methods: Data was collected from consecutive referrals (N = 160) to a tertiary-care mood and anxiety clinic. Diagnosis was established by the Mini International Neuropsychiatric Interview Plus (MINI) 6.0.0, ADHD module, and semi-structured interview. Chi-square analyses were performed to assess group differences and predictive factors.
Results: Adult ADHD was present in 36.9% of referrals, 29.4% had comorbid anxiety, and 20.6% had comorbid depression. Misdiagnosed ADHD occurred in 28.7% of referrals X2(4) = 44.8, p<.001, U = .529. In treatment-resistant referrals 38.2% of GAD and 34% of depression had comorbid ADHD, with 4.4% and 100% undetected respectively. The main predictive factor of misdiagnosis was number of referral diagnosis X2(9) = 39.5, p<.001, ¤å = .597.
Conclusions: ADHD is a common and treatable disorder that it is often under- or misdiagnosed in adults presenting with mood and anxiety disorders. This study signifies the importance of early and accurate diagnosis of ADHD in adults presenting with mood and anxiety disorders. Increased awareness and use of screening tools may allow for selection of targeted treatment and improved clinical outcomes

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ADHD Atten Deficit Hyperact Disord. 2019;11:S60.

THE DISTINGUISHING CHARACTERISTICS OF PURE SLUGGISH COGNITIVE TEMPO FROM ADHD WITH AND WITHOUT SLUGGISH COGNITIVE TEMPO IN AN EPIDEMIOLOGICAL SAMPLE.

Tahillioglu A, Dogan N, Bolat GU, et al.

Objectives: Sluggish Cognitive Tempo (SCT) is a distinct disorder from Attention Deficit Hyperactivity Disorder (ADHD) and has unique symptom domains such as daydreaming, thinking slowly, decreased energy and absent-mindedness. The objectives of our study are to ascertain distinguishing features of pure SCT from ADHD and ADHD comorbid SCT and determine the correlations between SCT symptom severity and several psychopathological fields.
Methods: 198 Turkish school children aged 7-11 years in 4 cities were evaluated. As parents filled out Child Behaviour Checklist (CBCL), teachers completed Teacher's Report Form (TRF). Barkley Child Attention Survey were filled out by all participants' parents and teachers. We divided the epidemiological sample into four groups: participants having no psychopathology, having pure SCT, ADHD without SCT and ADHD with comorbid SCT. These 4 groups were compared in terms of 11 domains in CBCL and TRF. Also psychiatric diagnoses were assessed using K-SADS (Schedule for Affective Disorders and Schizophrenia for School-Age Children).
Results: CBCL scores showed us the whole CBCL subscale scores except delinquency were significantly higher in SCT + ADHD group than the group without psychopathology (p<0.05). When TRF scores were reviewed, interestingly all SCT groups (pure SCT, SCT + ADHD) had greater somatization problems scores than non- SCT groups (p<0.001). Moreover we found significantly higher scores in 8 subscales in pure SCT group than in ADHD group (p<0.05). However delinquency, aggression and externalization problems scores were not significantly higher in pure SCT compared to ADHD group (p = 0.387; p = 0.646; p = 0.746). It was ascertained that there are medium-high level of positive correlations between SCT symptoms and attention problems, withdrawn and internalization problems (p<0.001, r = 0.667; r = 0.666; r = 0.601).

Conclusions: Current study corroborate SCT to be seen more likely with internalizing problems and to have a negative relationship with externalizing problems, unlike ADHD. Furthermore results suggest that somatization problems are much more relevant with SCT than ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S8-S9.

NEUROCOGNITIVE VARIABILITY IN CHILDREN WITH ADHD AND AUTISM SPECTRUM DISORDER: EXPLORING THE MOTOR COORDINATION AND PLANNING FUNCTION.

Zhang M, Huang Y.

Objectives: ADHD and Autism Spectrum Disorder are two neurodevelopmental disorders that show overlap in both the symptoms and the etiological pathways such as neurocognitive dsyfunctions. However, the two conditions have been studied previously mainly in isolation and rarely have co-morbidities been considered. Our study aimed to exploring the neurocognitive variability in children with ADHD and ASD.

Methods: Thus, the present study set out to explore the ADHD and ASD cognitive deficits in children with ADHD (N = 45), high functioning autism spectrum disorder (HFASD, N = 64) that comorbided with (ASD +, N = 22) or without (ASD -, N = 42) ADHD and typically developed children (TD, N = 32). With regard to neurocognitive variability, we used Berry Visual-Motor Integration Developmental (VMI) Test, Purdue pegboard test (PPT), as well as spatial working memory (SWM) test, Stockings of Cambridge (SOC) test, Rapid Visual Information Processing (RVP) test from CANTAB. Group comparisons among ADHD, ASD and TD were conducted and with post hoc t-tests. Furthermore, A one-way ANCOVA, with group as fixed factor (ADHD, ASD + and ASD-), was followed by post hoc t-tests to clarify the effects of co-morbidities.

Results: The between-group comparisons showed motor coordination functioning deficit in both ADHD and ASD, with ASD more severe than ADHD and most serious in ASD + group. It indicated that compared with children with ADHD, motor coordination functioning was more damaged in ASD, while ADHD comorbidity will enhance this dysfunction. The results showed that spatial working memory was nonspecific in either of these diseases. As for planning, we found significant functioning deficit only in ADHD, not in ASD - or ASD +. The results suggested that dysfunction in planning were more representative of cognitive deficits in ADHD.

Conclusions: Our results illustrated the different profile of neurocognitive deficiencies in ADHD and ASD, thus enlightened the exploration of the etiology of these two disorders. Future studies are needed to explore the neurocognitive changes after related treatment or behavioral intervention. (Table presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S72.

CHART REVIEW OF CANADIAN CHILDREN/ADOLESCENTS WITH ADHD RECEIVING GUANFACINE EXTENDED-RELEASE: PATIENT SUBGROUP ANALYSES.

Werner-Kiechle T, Gill SK, Handelman K, et al.

Objectives: Guanfacine extended release (GXR) is used to treat ADHD in children/adolescents [1,2]. These analyses provided realworld data on patients, including certain subgroups.

Methods: Data from children/adolescents (6-17 years) with ADHD prescribed GXR (monotherapy/adjunct therapy) with C 6 months' follow-up data were extracted. Changes in ADHD symptoms and functionality were classified as improvement, no change or worsening. Subgroups analysed post hoc: specific comorbidities; and initiated on GXR to reduce atypical antipsychotic (AAP) use. Treatment- emergent adverse events (TEAEs) were recorded.

Results: 330 patients with ADHD were included. After GXR initiation, 70%, 63% and 65% of patients overall had improvements in ADHD symptoms, home-life and school performance, respectively. Among those with oppositional defiant disorder (92/330), 70%, 55% and 59% had improvements in ADHD symptoms, home-life and school performance, respectively. Among those with learning disability (70/330), 74%, 69% and 73% had improvements in ADHD symptoms, home-life and school performance, respectively. Among those with anxiety (53/330), 74%, 68% and 72% had improvements in ADHD symptoms, home-life and school

performance, respectively. Among those with autism spectrum disorder (35/330), 69%, 60% and 69% had improvements in ADHD symptoms, home-life and school performance, respectively. For patients initiated on GXR to reduce AAPs (n = 44), ADHD symptoms improved for 32 (72.7%), home life improved for 25 (56.8%) and school performance improved for 24 (54.5%) patients. TEAEs were reported by 45% of patients.
Conclusions: In a Canadian population, GXR treatment improved ADHD symptoms and functioning at home/school in patients with ADHD, including those with oppositional defiant disorder, learning disabilities, anxiety, autism spectrum disorder or those initiated on GXR to reduce AAPs. Prior presentation: EUNETHYDIS 2018 (23-26 September; Edinburgh, Scotland)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S15.
SYMPTOMS OVERLAP IN ADHD AND BIPOLAR DISORDER IN PEDIATRIC POPULATION: AN OVERLOOKED ISSUE?
Wilczynski KM, Cichon L, Jelonek I, et al.
Objectives: Difficulties in differentiation between Bipolar Disorder and ADHD has been matter of much discussion lately, mainly due to the considerable symptoms overlap and high rate of co-occurence between manic episode and ADHD. Therefore, it was of interest how similar is presentation of manic episode in course of the Bipolar Disorder to clinical picture of ADHD in pediatric population.
Methods: Retrospective review of the medical records of 90 patients with first episode of the Bipolar Disorder admitted to the Department of Psychiatry and Psychotherapy of Developmental Age in 2018 was conducted. Analyzed group consisted of 75 females (83%) and 15 males (17%) and average age equaled 15.05 (95% CI 14.71-15.39) years. 38% (n = 34) patients presented with the depressive episode and therefore were excluded from further analysis. Diagnostic criteria for manic episode and ADHD were collected and divided into two groups: (1) symptoms that may suggest diagnosis of both ADHD and manic episode (n = 5); (2) symptoms distinctive for manic episode (n = 5). Ratio of number of group 1 symptoms to group 2 symptoms was calculated to evaluate similarity of clinical presentation to ADHD in each patient.
Results: The average ratio value was 1.25 (95% CI 0.95-1.54). There was statistically significant correlation between age of included patients and the average ratio value ($r = -0.321$; $p<0.05$) as well as between age of included patients and amount of group 2 symptoms ($r = 0.27$; $p<0.05$). Correlation with amount of group 1 symptoms was not significant ($r = -0.08$; $p>0.05$).
Conclusions: Obtained results point out that clinical presentation of manic episode in juvenile may bear a close resemblance to ADHD and thus may be the cause of misdiagnosis. Furthermore, with increasing age there seem to be a significant rise in group 2 symptoms rather than decrease in group 1 symptoms, what may lead to false comorbidity instead of verification of the first diagnosis

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ADHD Atten Deficit Hyperact Disord. 2019;11:S83.
THE ASSESSMENT OF MARITAL ADJUSTMENT AMONGST PARENTS OF CHILDREN DIAGNOSED WITH ADHD.
Rodopman AA, Cangut B, Aksu C, et al.
Objectives: ADHD is one of the most common neurodevelopmental disorders which may functionally have an impact on family life regarding the marital relationships. The aim of this research is to compare the marital status adjustment levels between the parents of primary school children who referred to child psychiatry university clinic diagnosed as ADHD compared to the control group of similar age and sex.
Methods: Clinical psychiatric diagnoses of ADHD were established by using the Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime Version. Parents were assessed by Marital Adjustment Scale (MAS) including 15 multiple choice questions, developed by Locke and Wallace (1959). SPSS 20.0 descriptive statistics are utilized and Chi-square is used for further comparative analysis.
Results: The treatment-naive ADHD group consisted 51 children (mean age: 10.34 -¦ 1.86; 43 male, 8 female), and 104 healthy controls (mean age: 10.16 -¦ 1.69; 124 male, 31 female). 70.83% of ADHD group was combined subtype, the rest being predominantly attention deficit subtype. The ADHD severity was

determined as moderate according to Clinical Global Impairment Scale. The ADHD group was 23% compatible in global scores in contrast to the 68.3% of the controls ($p<0.05$), when the cut-off point for Locke-Wallace MAS scale was set as 43 points. Global Happiness Scale results of MAS were 39.2% versus 78.8% for ADHD group and controls, respectively ($p<0.05$). Intimacy and Communication with Relatives subscales revealed similar results and did not differ in either groups.
Conclusions: A poor marital relationship could influence the adaptive functions and impact the satisfaction outcomes of parents having children diagnosed with ADHD. Future studies should be conducted to explore the impact of ADHD on caregivers' marital adjustment, especially in the aspects of contentment of marriage, leisure and social activities, and intimacy besides affection

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ADHD Atten Deficit Hyperact Disord. 2019;11:S27-S28.

HIGH PREVALENCE OF ADHD FOR KOREAN ADOLESCENT INMATES.

Roh H-S, Kim B-S, Lee Y-S, et al.

Objectives: ADHD is a neurodevelopmental disorder with childhood onset, defined by symptoms of hyperactivity/impulsivity and inattentiveness. According to DSM-5, about 5% of children are suffering from this disorder. (1) A recent study revealed that 3.1% of general adolescent population in Korea were diagnosed with ADHD. (2) In previous studies, the prevalence of ADHD in youth prison population was 30.1%, which is much higher than the general population. (3) In other studies conducted in Korea, the prevalence of ADHD in adolescent probationers was 10.83% and the prevalence of ADHD in male juvenile detainees was 35.3%. (4), (5) Considering previous studies, we hypothesize that in Korea, the prevalence of ADHD in the juvenile prison population will be higher than that of the general population for both males and females. The purpose of our study was to investigate the prevalence of ADHD for Korean adolescent Inmates.
Methods: Adolescents at reformative centers in Korea were included. After receiving informed consent from all participants, the interview was conducted using the MINI KID. Interviewers were psychiatric residents, two in 2nd years and two in 3rd years. Participants with IQ 80 or higher only were included.
Results: According to the inclusion criteria, One hundred adolescents were included in the study, 54 boys and 46 girls. The mean age of participants was 17.08 (SD = 1.88) years and the mean FSIQ was 91.27 (SD = 6.38). Twenty eight adolescents meet diagnostic criteria for ADHD (28%). The prevalence of ADHD was 41% (19/46) in girls and 17% (9/54) in boys respectively. ADHD patients were classified according to their type. Combined was 46% (13/28), inattentive predominant 29% (8/28), and hyperactive/impulsive predominant 25% (7/28). In females, Combined was 53% (10/19), inattentive predominant 21% (4/19), and hyperactive/impulsive predominant 26% (5/19). In males, Combined was 33% (3/9), inattentive predominant 44% (4/9), and hyperactive/impulsive predominant 22% (2/ 9).
Conclusions: Our study found that the prevalence of ADHD in juvenile prison population is 28%, which is about 9 times higher than 3.1% of the general population in Korea. In addition, the prevalence of ADHD of female was 41%, higher than males. Among girls who were diagnosed with ADHD, combined type was the most common (52.6%)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S41.

EFFECT OF ATOMOXETINE HYDROCHLORIDE ON WORKING MEMORY IN CHILDREN WITH ADHD: A FUNCTIONAL NEARINFRARED SPECTROSCOPY STUDY.

Wu X, Miao S, Gu Y, et al.

Objectives: Previous studies have found that functional near-infrared spectroscopy (fNIRS) can be used to assess activation of the prefrontal cortex (PFC) and significant deficiencies were found in children' s working memory with attention deficit hyperactivity disorder (ADHD). This study will investigate the effect of

atomoxetine hydrochloride (ATX) on activation of the PFC in children with ADHD during working memory tasks.
Methods: We recruited 8 children with ADHD who were drug-naive. Functional blood oxygen were recorded by using fNIRS during N-back task. Clinical symptoms were assessed by parent' s Swanson, Nolan, and Pelham-IV rating scales (SNAP-IV) at the same time. After 8 weeks of treatment with ATX, the children were evaluated by fNIRS and SNAP-IV again. Statistical methods were used to compare fNIRS and SNAP-IV between off- and on-ATX conditions.
Results: Based on performance data, children showed a higher accuracy, a lower omission error and commission error during N-back task after treatment with ATX. The hemodynamic changes between off-ATX and on-ATX condition suggest that high-level activations in channel 5, 36, 38 were found in children with on-ATX condition. The associated channels located in FPC and DLPFC. And enhanced trends were also found in channel 7, 10, 12, 17, 48. Rating-Scale Scores: In comparison, children with off-ATX condition showed relatively low inattention scores, hyperactivity scores, and total scores of SNAP-IV after treatment. The mean value of inattention scores, hyperactivity scores, and total scores were 23.6 -¦ 1.5, 18.7 -¦ 1.8, 56.8 -¦ 4.8 respectively, while after treatment scores were 16.8 -¦ 1.3, 15.5 -¦ 1.4, 43.8 -¦ 3.2. These values were statistically significant different.
Conclusions: ATX can improve the core symptoms and executive function of children with ADHD. fNIRS shows to be a helpful tool for identifying the effects of ATX on children

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ADHD Atten Deficit Hyperact Disord. 2019;11:S15.
CO-EXISTING PSYCHIATRIC DISORDERS ASSOCIATED WITH ADHD: NEW FINDINGS OF COMORBIDITY IN A CLINICALLY REFERRED SAMPLE OF CHILDREN AND ADOLESCENTS WITH RECENTLY DIAGNOSED ADHD.
Walitza S, Werling AM, Drechsler R.
Objectives: We analyzed co-existing disorders in referred clinical sample of children and adolescents recently diagnosed with attention deficit/hyperactivity disorder.
Methods: We included all patients referred to the outpatient units of our psychiatry from 2014 to 2018 and diagnosed with a hyperkinetic disorder (F90.0, F90.1 or F98.8) according to the ICD-10 classification. The percentage and distribution of these comorbidities were assessed according to the MAS classification.
Results: All patients (n = 232; 71.1% male) aged 6 and 17 (10.0 years, SD 2.91) had an average IQ of 102.2 (range of 75-138). About 56% of all patients were diagnosed with the combined (F90.0 or F90.1) and 44% with the inattentive type (F98.8). The majority of all ADHD patients had at least either a psychiatric or a developmental disorder (59.9%) and in 48.7% cases at least one psychiatric disorder. The most prevalent psychiatric disorders were conduct (23.9%), elimination (15.5%) and affective disorder (11.3%). Interestingly, known comorbid psychiatric disorders like oppositional defiant and anxiety disorder were only seen in a rather low rate (each 7%). Patients with F90.0 suffered more frequently from any comorbidity (Γêùstatistically significant, p<0.05). Younger children (age group 11-17 years) were more often diagnosed with F90.0 (Γêùstatistically highly significant, p<0.001) but not with more comorbidities. Developmental disorders were detected in about 23.7% of all patients.
Conclusions: Although, the prevalence of ADHD is similar to other European countries, this study showed overall lower rates of psychiatric and developmental comorbidities. This can be explained by the fact that we included only patients from an outpatient unit and those recently diagnosed by ADHD without any long course or the disorder

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ADHD Atten Deficit Hyperact Disord. 2019;11:S16.

CHARACTERISTICS OF CALLOUS-UNEMOTIONAL TRAITS IN CHINESE PRESCHOOL CHILDREN WITH ADHD.

Zhang J, Li W.

Objectives: The aim of study was to examine whether CU traits could be used to discriminate among ADHD, ASD and typically developing controls (TDC). Additional aims of study were to compare different characteristics of CU traits between ADHD and ADHD comorbid ODD and explore reciprocal associations between CU traits, ADHD symptoms, Conduct Problems (CPs) and EF among early childhood.
Methods: Parents of 206 children (68 with ADHD, 51 with ASD, and 87 TDC) with the age of 3-5 years filled out ICU, SDQ and BRIEF-P. This study measured different characteristics of CU traits in preschool children with ADHD and ASD, who are at high risk for behavioral problems. Further, we compared children with ADHD with and without comorbid ODD on CU traits, ADHD symptoms, CPs and EF.
Results: (1) ICU has a good discernment among ADHD, ASD and TDC ($F = 12.47\text{-}22.25$, $p<0.001$). Compared with ADHD, ASD has higher scores on ICU. While the score in ADHD is higher than that of TDC. (2) It is obvious that the score of callousness in ADHD + ODD is statistically higher than that of ADHD only ($F = 13.15$, $p<0.01$). However, there is no discrimination power in unemotional between ADHD only, ADHD + ODD and TDC groups. (3) ICU scales are correlated with BRIEF-P and SDQ ($r = 0.15\text{-}0.71$, $p<0.01$). (4) CU traits contributed significantly to predicting ADHD controlling for sex, ODD (predictive accuracy 8%).
Conclusions: ICU was used to discriminate ADHD and ASD; CU traits contributed significantly to predicting diagnose of ADHD controlling for sex and ODD; ICU was related to external and internal behaviors problems, executive function, and ADHD symptoms. The current research has demonstrated that the ICU is a promising scale for identifying early Callous and Uncaring traits in preschool years that may help in the identification of a sunset of preschool children who might have ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S51.

EFFECTIVENESS OF COGNITIVE TRAINING FOR SCHOOL-AGED CHILDREN AND ADOLESCENTS WITH ADHD: A SYSTEMATIC REVIEW.

Veloso A, Vicente S, Filipe M.

Objectives: As it has been proposed that cognitive training for improving executive functioning can reduce Attention Deficit/ Hyperactivity Disorder (ADHD) symptomatology (e.g., Cortese et al. 2015), our aim is to review the current literature on cognitive training interventions for executive functions (EF) in children and adolescents diagnosed with this disorder.
Methods: From 2008 to 2018, the following databases were searched: Academic Search Complete, ERIC, MEDLINE with Full Text, PsycARTICLES, PsycINFO and Psychology, and Behavioral Sciences Collection. The search keywords were: executive function OR executive functioning AND cognitive training OR intervention AND Attention Deficit Hyperactivity Disorder OR ADHD. As detailed in Figure 1, inclusion and exclusion criteria were applied.
Results: Twenty-six studies were included in this review. Of the 21 studies that reported performance-based measures of EF, 16 found improvements and four did not. Moreover, 20 studies found improvements in parent, teacher, and/or clinicians rating scales. Twenty-one studies showed positive transfer effects on ADHD symptomatology, academic improvement, reduced off-task behavior, and enhanced social skills. Of the 11 studies that performed follow-up sessions, nine concluded that the treatment effects were maintained over time.
Conclusions: Although these studies have limitations, results show that cognitive training can be an effective intervention for children and adolescents with ADHD and might be a complementary treatment option for this disorder

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ADHD Atten Deficit Hyperact Disord. 2019;11:S85.

MATERNAL ADHD SYMPTOMS AND INFANTS TEMPERAMENT PREDICT MATERNAL STRESS AND CHILDHOOD MALTREATMENT DURING THE FIRST YEAR OF LIFE.

Verano De OJ, Constantino ME, Chiesa AM, et al.

Objectives: To investigate if maternal attention deficit/hyperactivity disorder symptoms early on pregnancy predict maternal stress, attachment, and perpetration of physical abuse against their infants during the first year of life.

Methods: Eighty adolescents 14-19 years of age were included during the first trimester of pregnancy in a randomized controlled study testing the effect of a home-visiting program to improve maternal and childhood outcomes. Maternal ADHD symptoms were assessed before 16 weeks of pregnancy. Mothers-babies were assessed at 6 and 12 months of life for multiple outcomes, including PSI, BDI, PCCTS, IBQ-R. We conducted general linear model-repeated measures to test the effect of ADHD symptoms over maternal competence, attachment and childhood maltreatment controlling for the effect of the intervention, depressive symptoms, and infant temperament.

Results: Inattentive symptoms early in pregnancy predicted worse sense of competence and more childhood maltreatment during the first year of infant's life even controlling for the effects of the intervention and contemporaneous maternal depressive symptoms. The effects over childhood maltreatment were no longer significant when controlling for infant negativity, but significant when controlling for infant surgency and regulation. There were no effects on the maternal sense of attachment to the infant. Hyperactivity symptoms were not predictive of the investigated outcomes.

Conclusions: Maternal inattention contributed to higher stress and childhood maltreatment, which were partially explained by infant's temperament. Assessment and management of maternal ADHD symptoms and infant's temperament are important goals of early intervention programs

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ADHD Atten Deficit Hyperact Disord. 2019;11:S35.

PERIPHERAL MITOCHONDRIA DNA COPY NUMBERS ARE INCREASED IN KOREAN ADHD.

Kim B-N, Yang C-M, Lee J, et al.

Objectives: Several reports suggest mitochondrial dysfunction in the pathophysiology of ADHD. Mitochondrial DNA (mtDNA) copy number is a common biomarker for mitochondrial dysfunction. The purpose of this study was to compare the mtDNA copy numbers and also the methylation ratios of the PPARGC1A and D-loop region of mitochondria DNA in ADHD.

Methods: An age and gender matched sample of 70 ADHD children and adolescents (age 6-18 years) and 70 unrelated healthy controls was recruited in this study. The relative mtDNA copy numbers, the methylated/unmethylated DNA ratio for the PPARGC1A promoter and D-loop regions of mtDNA were compared between the ADHD and healthy controls groups using independent t-test s or Mann- Whitney U tests.

Results: The demographic and clinical characteristics of the participants are presented in Table 1. ADHD patients had significantly higher relative mtDNA copy numbers compared to healthy controls ($p = 0.010$). The methylated DNA/unmetDNA ratio of the PPARGC1A promoter region and also the D-loop region was significantly decreased in ADHD patients compared to healthy controls.

Conclusions: This is the first study to investigate changes in mtDNA copy numbers in ADHD subjects. We suggest that mtDNA copy numbers could be increased as a compensation mechanism for mitochondrial dysfunction. Our findings suggest that mitochondrial dysfunction and elevated mtDNA copy number may be a biological subtype of ADHD affection by epigenetic changes

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ADHD Atten Deficit Hyperact Disord. 2019;11:S69.

STIMULANT THERAPY IN A CASE OF ADHD AND MULTIPLE SCLEROSIS.

Koelle M, Senel M, Heckel K, et al.

Objectives: Attentional deficits can occur in ADHD as well as in inflammatory brain disorders (e.g. multiple sclerosis). When attentional deficits occur in a patient with an anamnesis of ADHD since childhood and inflammatory brain disorder it may be difficult to differentiate the cause of attentional deficits.

Methods: We report a case of an adult patient with a history of ADHD symptoms since childhood and the diagnosis of multiple sclerosis (MS) in adulthood. Adult ADHD was diagnosed and a stimulant therapy was started.

Results: Stimulant therapy was efficient and well tolerated. During the course of the therapy the immunosuppressive MS-prophylaxis was switched several times. There were no interactions of prophylactic agents and stimulant therapy. Finally Teriflunomid was efficient and well tolerated together with MPH.

Conclusions: The present case report shows that brain organic disease does not preclude the diagnosis of ADHD in adulthood and that, despite cerebral postinflammatory lesions, stimulant treatment may be effective. Likewise, the present case demonstrates that current immunosuppressant strategies and stimulant therapy could be prescribed without deleterious interactions or adverse effects. Therefore, in cases of ADHD and proven brain organic disease, we recommend not to rule out the diagnosis of ADHD and stimulant therapy from the outset

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ADHD Atten Deficit Hyperact Disord. 2019;11:S18-S19.

THE CPT-3 VERSUS THE QB-TEST: A TASK-ORIENTED COMPUTERIZED ASSESSMENT OF ATTENTION-RELATED PROBLEMS IN OUT-PATIENT CHILDREN: WILL DIAGNOSIS PREDICT THE ATYPICAL ATTENTION SCORES?

Kvitland LR, Jakobsen K, Achkhan H, et al.

Objectives: Un-biased measures of attention are important in the assessment and diagnosis of attention-related disorders such as ADHD. Two popular assessments of attention-related problems in Norway are CPT-3 and the QB-test. The aim of the Bup-Orkdal Pilot was to examine whether the atypical t-scores was best explained by diagnosis or by confounding variables for the different test.

Methods: Children (N = 20, females = 6) aged 8-17 with attentionrelated problems were invited to participate when admitted to the outpatient clinic. In addition to the CPT-3 and the QB test, the patients were assessed with Kiddie-SADS, ADHD-RS, parent and teacher interviews, somatic- and pedagogic examination. Patients were diagnosed by counseling psychologists or psychiatrists. 16 patients got the diagnosis of ADHD. To test for confounding variables hierarciacal step-wise block regressions was performed.

Results: Number of atypical scores was successfully predicted by diagnosis of ADHD for the CPT-3 (p = 0.042), but not for the QB-test (p = 0.275). Regardless of diagnose the QB-test indicated attentionrelated problems in all children.

Conclusions: Conclusions: The main finding was that a diagnosis of ADHD successfully explained the variance of atypical scores by the CPT-3 but not the QB-test. Because of the limited sample size type 2 errors cannot be ruled out

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ADHD Atten Deficit Hyperact Disord. 2019;11:S11.

ADHD SYMPTOMS ARE AFFECTING MATHEMATICS ACHIEVEMENT AND WELL-BEING IN STUDENTS WITH MILD INTELLECTUAL DISABILITIES.

Kiive E, Kivir+ñhk T.

Objectives: Attention is one of the most critical and complex factor affecting learning, and ADHD symptoms are increased in children and adolescents with mild intellectual disabilities (Simonoff et al. 2007). The purpose of the present study was to examine the effect of ADHD symptoms on mathematics achievement, subjective well-being and functioning in students with mild intellectual disabilities.

Methods: The study sample consisted of 76 students (44 boys, 32 girls) in the fourth grade, 10-12 years of age, diagnosed with mild intellectual disability. Hyperactive/inattentive behaviour and other emotional and behavioural problems were measured with the parent and teacher versions of Strengths and Difficulties Questionnaire, SDQ (Goodman, Meltzer and Bailey 1998). Health-related quality of life was assessed by parent version of the KINDL-R questionnaire (Ravens-Sieberer and Bullinger 1998). The students performed mathematics achievement test and their general mental abilities were assessed by using the Raven Coloured Progressive Matrices Test (Raven, Raven and Court 2003).
Results: Parent rated SDQ Hyperactivity/Inattention score was associated with lower mathematical performance and lower score of Raven Coloured Progressive Matrices Test ($r = -0.23$ and -0.25, respectively; $p<0.05$), while other emotional/behavioural problems measured by SDQ had no significant impact on mathematical achievement. The general intelligence score and math performance were significantly correlated ($r = 0.6$; $p<0.0001$). Higher hyperactivity/ inattention predicted lower emotional well-being ($p<0.005$), lower quality family relations ($p<0.005$), and lower self-esteem ($p<0.05$).
Conclusions: ADHD symptoms have significant negative impact on learning outcome and well-being of the students with mild intellectual disabilities

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ADHD Atten Deficit Hyperact Disord. 2019;11:S48-S49.

A BRAIN-COMPUTER INTERFACE BASED PROGRAMME FOR COMORBID ADHD AND AUTISM SPECTRUM DISORDER.

Lim CG, Wendy Poh XW, Jane TSH, et al.

Objectives: In this pilot study, we aim to examine the efficacy of the BCI-based intervention in treating both the inattentive symptoms of ADHD, as well as ASD symptoms, in children with co-existing ADHD and ASD.
Methods: We have previously developed an intervention programme for treating the inattentive symptoms of ADHD, which utilized the brain-computer interface technology. In this study, we added additional computer-based training activities involving skills such as facial recognition and emotion identification. We also included eye tracking technology to help guide the users' eye gaze. This intervention programme takes place over 8 weeks, involving a total of 24 sessions. We enrolled 20 children with comorbid ADHD as well as ASD and randomized them into the intervention and control group. The control group will not receive any BCI intervention. Parents completed the ADHD-Rating Scale and Social Responsiveness Scale (SRS) at weeks 0 and 8, while a blinded clinician completes the ADHD Rating Scale at weeks 0 and 8.
Results: The mean change (reduction) in the inattentive symptoms on the ADHD-Rating Scale for the intervention was significant when compared to the control group, both for parents' and clinicians' ratings. However, there was no significant difference on the parent-rated SRS between both groups, although the intervention group did improve more.
Conclusions: Children with comorbid ADHD and ASD can still benefit from the BCI intervention. Further studies on the optimal training intensity for ASD symptoms will be useful

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ADHD Atten Deficit Hyperact Disord. 2019;11:S48.

NEUROFUNCTIONAL AND BEHAVIOURAL PREDICTORS OF FMRI-NEUROFEEDBACK LEARNING IN ADHD.

Lam S-L, Criaud M, Alegria A, et al .

Objectives: FMRI neurofeedback (fMRI-NF) targeting dysfunctional regions based on fMRI research is a promising novel neurotherapy for ADHD. Our fMRI-NF study in 31 ADHD adolescents showed that NF of right inferior frontal cortex was associated with clinical improvements, which, however, were also observed in the control group who was trained to enhance left parahippocampal gyrus. However, in EEG-NF, typically only about 50% of ADHD patients learn to successfully self-regulate their brain through NF and a key question is whether we can predict those who benefit from fMRI-NF. We therefore investigate whether baseline brain function, clinical or cognitive measures differed in regulators and non-regulators and whether they can predict successful fMRI-NF learning in ADHD.

Methods: Successful brain-regulators were defined as patients who showed a positive correlation between the number of NF runs and brain activation in their respective target region. ANOVAs were conducted to test for group differences between regulators and nonregulators in baseline brain activation during the fMRI Stop task. T-tests and a logistic regression model were conducted for predictor analysis of clinical and cognitive performance measures.
Results: Forty-eight percent of ADHD adolescents successfully learned to regulate their respective brain regions. Brain regulators (N = 15) showed increased activation in left inferior fronto-cingulostriatal regions during successful and failed stop trials while nonregulators (N = 16) showed increased temporo-parietal/precuneus activation during stop trials. Baseline mean reaction time in a sustained attention task differed between groups and was a significant predictor of successful brain regulation.
Conclusions: The frontal pattern of self-regulators reflects a more mature inhibition pattern relative to the more immature posterior activation pattern in non-regulators, suggesting that developmental maturity in fronto-cingulo-striatal cognitive control regions may be related to self-regulation capacity. Cognitively, faster response to targets in a sustained attention task, presumably reflecting superior, more mature attention skills, predicted successful brain-regulation ability for fMRI-NF

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ADHD Atten Deficit Hyperact Disord. 2019;11:S57.

INHIBITION DYSFUNCTIONS AND WORKING MEMORY IN CHILDREN WITH ADHD: A PILOT STUDY.

Lee C.

Objectives: The objectives are twofolds: (1) To identify the behavioral manifestations of the inhibition dysfunctions in children with ADHD and; (2) To better understand the role of the 3 inhibition subprocesses in working memory in ADHD.
Methods: A pilot study has been done on a group of 6- to 11-year-old children with ADHD (n = 18) and a control group of age-matched children without ADHD (n = 9). Children with ADHD were recruited from Child Psychiatric Clinics and mainstream schools. All children performed tasks measuring the 3 inhibition subprocesses (i.e., interference inhibition, inhibition of prepotent responses, and inhibilition of ongoing responses) and their working memory. Dysfunction of a specific inhibition subprocess is defined as 1.5 SD below the Control mean in corresponding subprocess. The extent of inhibition dysfunctions in ADHD was presented using descriptive statistics. The predictive role of the 3 inhibition subprocesses in working memory was tested using Pearson's correlations.
Results: Our pilot data showed that about 50% children with ADHD displayed inhibition dysfunctions, 90% of them exhibited deficit in only one inhibition subprocess. In addition, the most frequently observed problem is Interference inhibition; it correlates with both verbal and visuospatial working memory significantly.
Conclusions: Inhibition dysfunctions or impulsivity are commonly observed in children with ADHD. However, our pilot study found that not all children with ADHD had difficulty inhibiting their behaviors. Among those children with inhibition dysfunction, majority of them presented only one type of inhibition problems and interference inhibition is the most common deficit that they had. In order to confirm these preliminary findings, a larger sample size is required. (Figure presented)

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ADHD Atten Deficit Hyperact Disord. 2019;11:S4.

EARLY PREDICTORS FOR LATE-ONSET ADHD SYMPTOMS.

Liu CK, Pingault J-B, Asherson P, et al.

Objectives: ADHD has been conceptualised as a childhood-onset neurodevelopmental disorder. However, a considerable number of studies have identified the emergence of ADHD symptoms beyond the childhood years. In addition, different childhood characteristics were found between late-onset of ADHD and early-onset ADHD. Despite the increasing knowledge about late-onset ADHD, whether it could be predicted in

early developmental stage remains less discussed. The current study aimed to investigate early childhood predictors for late-onset ADHD symptoms.
Methods: This study used longitudinal data from the Twins Early Development Study (TEDS), a UK population-representative sample of twins recruited from population birth records in England and Wales between 1994 and 1996. ADHD symptoms, clinical characteristics and family environment were assessed from early childhood to age 16 years. Multinomial logistic regression was performed to identify independent early childhood predictors for late-onset ADHD.
Results: Among a total of 4485 individuals, 2.7% developed significant ADHD symptoms during adolescence. 8.6% had ADHD symptoms limited in childhood and 6.4% had persistent ADHD symptoms. Multinomial logistic regression showed male sex, higher maternal depression, and lower socioeconomic status independently predicted late-onset of ADHD from non-ADHD controls.
Conclusions: Poor socioeconomic status and maternal depression predicted late emergence of ADHD independently of other childhood characteristics. The findings suggest the importance of early environmental adversity on ADHD symptom development in later stage of life. Future research investigating variables emerging and evolving across time could provide more insight on the developmental course of ADHD symptoms

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ADHD Atten Deficit Hyperact Disord. 2019;11:S57.
STRESS BIOMARKERS AND COGNITION IN ADOLESCENTS WITH ADHD.
Llorens CM, Pamias MM, Barba BM, et al.
Objectives: ADHD is a neurodevelopmental disorder with negative impact on cognitive processes and a high prevalence in childhood and adolescence. Previous studies from our research group have shown a correlation between stress-related hormones (cortisol, prolactin) and cognition in psychotic patients. The present study assesses the correlation between these hormones with cognition variables in a sample of adolescents with ADHD.
Methods: A sample of 51 adolescents diagnosed with ADHD, currently being treated at the CSPT Mental Health Center. Thirty-five subjects were male, and ages ranged from 14 to 17 years old. An early morning fasting sample of blood was drawn for cortisol and prolactin determination. Cognition variables were assessed with a complete test battery consisting of 8 subtests, using the Cambridge Cognition digital assessment system (CANTAB). Sex-stratified analyses were performed. Spearman correlation analyses were used for comparing associations between continuous variables. Significance was defined as $p<0.05$ (two-sided).
Results: Over 86.3% of patients were receiving specific pharmacological treatment for ADHD (either psychostimulants or nonpsychostimulants). No correlation was found between neither prolactin nor cortisol levels with pharmacological treatment. In males, a significant association was found between prolactin levels and stimulus rating time ($r = - 0.39$, $p = 0.025$) in an executive function task (Multitasking Test). In females a significant association was found between prolactin levels and stimulus rating time ($r = - 0.59$, $p = 0.026$) in a different executive function task (Stop Signal Task). Furthermore, a significant correlation was found between prolactin and poorer planning strategies on a spatial working memory task (Spatial Working Memory) ($r = 0.63$, $p = 0.016$). Cortisol levels were not associated with poorer cognitive performance.
Conclusions: Prolactin levels are related with cognition and executive functions in ADHD patients. Higher prolactin levels correlate with an improvement in several cognitive tasks (MTT, SST) but also with poorer planning strategies (SWM). Such association is not found for cortisol neither in males nor females. This correlations and its clinical implications will be discussed

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ADHD Atten Deficit Hyperact Disord. 2019;11:S38-S39.

METHYLPHENIDATE AND ATOMOXETINE NORMALISE FRONTOPARIETAL ACTIVATION IN ADHD DURING SUSTAINED ATTENTION.

Kowalczyk O, Cubillo A, Smith A, et al.

Objectives: Problems with sustained attention in ADHD are evident in performance scores and functional Magnetic Resonance Imaging (fMRI) correlates. Methylphenidate and atomoxetine are widely used to improve inattention symptoms and have been shown to improve attention performance. This is the first fMRI study testing the comparative neurofunctional effects of methylphenidate and atomoxetine during performance of a sustained attention task in ADHD adolescents.
Methods: Fourteen medication-naive ADHD youths (10-17 years) and 27 age-matched healthy controls performed a parametric sustained attention/vigilance task in a 3T MRI scanner. The task required to respond to a visual stimulus presented after varying long and short delays. Patients were scanned in a double-blind, placebo-controlled, randomised crossover design under a single dose of either placebo (Vitamin C, 50 mg), methylphenidate (Equasym, 0.3 mg/kg), or atomoxetine (Strattera, 1 mg/kg). Controls were scanned once, unmedicated, and compared to patients under each drug condition to test for potential normalisation effects of each drug. fMRI data were analysed using non-parametric data analysis in XBAM (www.brainmap.co.uk).
Results: ADHD patients under placebo were impaired in task performance relative to controls which was normalised with methylphenidate but not atomoxetine. ADHD patients under placebo relative to controls had reduced activation in predominantly righthemispheric dorsolateral/inferior prefrontal, posterior cingulate/precuneus, inferior parietal, and striato-thalamic areas. When patients were compared to controls under methylphenidate and atomoxetine the differences were no longer observed.
Conclusions: This study shows shared normalisation effects of methylphenidate and atomoxetine on fronto-parietal brain dysfunction in ADHD during sustained attention. The findings extend previous findings of shared normalisation effects on inferior frontal dysfunction during cognitive control and timing by showing more widespread shared normalisation effects on typical fronto-parietal and striatothalamic regions mediating sustained attention. The shared normalisation effects of methylphenidate and atomoxetine on attention network dysfunction in ADHD may underlie their clinical efficacy in improving inattention symptoms in ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S15.

CLINICAL VALIDITY FOR HOME BASED ON-LINE TESTING OF OBJECTIVE MARKERS ASSOCIATED WITH ADHD.

Ulberstad F, Chavanon M-L, Bostr+Âm H, et al.

Objectives: The objective of this ongoing international multicenter study is to evaluate the clinical utility of, a home-based online test of objective markers of inattention, impulsivity, and hyperactivity-the core symptoms of ADHD.
Methods: In total, tests from 99 healthy controls and 99 patients with a clinical diagnosis of ADHD were included. Five different objective markers (MicroEventsX, Omission Errors, Reaction Time, Reaction Time Variation and Commission Errors) reflecting different aspects of ADHD were retrieved by means of a computerized test performed on laptops with a built-in camera in the home setting. Diagnostic validity of those markers was measured using the Area Under the Curve (AUC) of the Receiver Operating Characteristic (ROC) analysis. Both healthy controls and individuals diagnosed with ADHD were included in the study.
Results: The differences in scores between the ADHD and control group were all statistically significant except for the variable Commission Errors in the adolescent/adult version. The variable with the highest diagnostic validity (ROC-curves) in the child version of the test (6-11) was Reaction Time Variability (AUC: .86). The variables Omission Errors (.77) and Reaction Time (.75) had similar validity. MicroEventsX (.69) and Commission Errors (.68) showed the lowest validity. For the adolescent/adult version of the test (12-60), the variables Reaction Time Variation (.81) and MicroEventsX (.80) showed the highest diagnostic validity. However, Omission Errors (.75), Commission Errors (.74) and Reaction Time (.73) showed only slightly lower diagnostic validity.

Conclusions: Most of the objective markers retrieved through online testing in peoples home had fair to good diagnostic validity for the prediction of clinical ADHD both in children and adolescents/adults. It is therefore suggested that home-based testing of markers for ADHD may add value during screening and treatment follow-up in ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S25.

EVENT-RELATED BRAIN OSCILLATORY AND EX-GAUSSIAN MARKERS OF ADHD REMISSION AND PERSISTENCE.

Vainieri I, Michelini G, Adamo N, et al.

Objectives: The processes underlying the different long-term clinical outcomes of ADHD (persistence vs. remission) are poorly understood. We previously found that the cognitive marker of reaction time variability (RTV) and event-related potentials of preparation-vigilance processes are markers of ADHD remission, as ADHD persisters were impaired compared to both remitters and controls, while remitters were indistinguishable from controls (Cheung et al. 2016; Michelini et al. 2016; James et al. 2017). Here, we aimed to test whether finer-grained ex-Gaussian reaction-time distribution and electroencephalographic (EEG) brain oscillatory measures also represent markers of ADHD remission.

Methods: 110 adolescents and young adults with childhood ADHD (87 persisters, 23 remitters) and 169 age-matched controls were compared on ex-Gaussian (mu, sigma, tau) indices and EEG measures of brain-oscillatory modulations of power and phase variability from a four-choice reaction-time task with slow-unrewarded baseline and fast-incentive conditions (the 'Fast task').

Results: Compared to controls, ADHD persisters showed greater mu, sigma, tau, theta phase variability and lower theta power in both task conditions (all p B 0.05; d = 0.30-0.86). Remitters showed lower mu, sigma, tau, theta phase variability than persisters in the fastincentive condition, and greater theta power in both conditions (all p B 0.05; d = 0.35-0.98), but did not differ from controls on any measure (all p>0.05).

Conclusions: These results extend our previous findings by identifying ex-Gaussian sigma and tau, theta phase variability and eventrelated theta power as novel markers of ADHD remission. These measures of cognitive variability, neural variability, and attentional processes represent promising targets for developing novel nonpharmacological interventions for ADHD

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ADHD Atten Deficit Hyperact Disord. 2019;11:S29.

TUNISIAN MILITARY CHILDREN WITH ADHD.

Soualmia I, Slama H.

Objectives: Children's mental health is affected by a number of stressors experienced by the family; and influenced by the parents' mental well-being. As ADHD is one of the most common pediatric mental health disorders and we have noticed a significant increase in the number of ADHD patients whose parents serve in the military, we decided to orient our work towards the prevalence of the disorder in offspring associated with military service.

Methods: Retrospective cohort study of children aged 1-16 years in the Military Hospital of Tunis (2017-2018) compared to the same study conducted in the University Hospital of Mahdia (2016-2017).

Results: Results have shown that 75 out of 371 children were diagnosed with ADHD in the Military Hospital (21%), whereas only 20 out of 257 children were diagnosed in the University Hospital (7%). It is essential to mention that the age demographic and gender equilibrium were unaltered in both groups. We have also discerned the military offspring as more vulnerable and negligent to their medication. This dominant behavior accentuated ADHD into a case of depression, as 10 out 75 ADHD military-associated patients were diagnosed with depression.

Conclusions: Throughout our study, we realized that children diagnosed with ADHD, whose parents are in military service, are triple the number of those whose parents aren't. This can be due to hereditary several factors seeing that ADHD is more common in the ranks of adults who are professionally-engaged in the

military, in comparison with those who are employed in the civil service. Parents who work in the military service encounter a critical number of stressors, leading to conjugal conflicts especially during pregnancy and therefore running a high risk of ADHD children. Constant separation between military parents and their children due to deployment is a direct cause of depression, and the subsequent unavailability of ADHD children to attend their scheduled appointments and improper medication complicates their ADHD case. In this respect, curative and preventive measures must be taken in order to restrict the expansion as well as the potential complications of the disorder

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ADHD Atten Deficit Hyperact Disord. 2019;11:S13-S14.

EXAMINING THE ROLE OF CHRONIC ANHEDONIA AS A TRANSDIAGNOSTIC RISK FACTOR FOR ADHD, TREATMENTRESISTANCE, AND SUICIDAL BEHAVIOR IN PATIENTS WITH GENERALIZED ANXIETY DISORDER.

Sternat T, Fotinos K, Lokuge S, et al.

Objectives: Treatment-resistance among individuals with anxiety disorders remains a significant public health concern with up to 60% of individuals experiencing residual symptoms after treatment with standard anxiolytics. Suicide is one of the leading causes of death in people aged 15-44 globally. Research has demonstrated attention deficit hyperactivity disorders (ADHD) and anxiety disorders are highly comorbid and associated with reduced quality of life and increased risk of self-harm. The aim of this study was to examine clinical features and predictive factors associated with the development of treatment-resistance and suicidal behavior in patients with generalized anxiety disorder (GAD).

Methods: Data was collected from consecutive new referrals (N = 160) to a tertiary-care mood and anxiety clinic. Diagnosis was established by administration of the Mini International Neuropsychiatric Interview Plus (MINI) 6.0.0, ADHD module, and semistructured psychiatric assessment. Treatment-resistance was defined as failure of two or more antidepressants/anxiolytics for adequate treatment dose and duration. Chi-square analyses were performed to examine clinical features and predictive factors associated with treatment-resistance and suicidal behavior. Logistic regression analyses were preformed to obtain odd rations (OR).

Results: Comorbid ADHD was present in 43.7% of patients referred for treatment-resistant GAD with 91.9% of these patients presenting with chronic anhedonia. Clinical features predictive of undiagnosed or untreated ADHD in this group included sex (65.4% males, p<.031), social phobia (p<.001, OR 6.68), OCD (p = .005, OR 3.63), alcohol (p = .010, OR 5.24) and substance dependence/abuse (p = .047, OR 3.64), and number of referral diagnosis (p<.001, OR 2.17). Whereas, number of current (p<.001, OR 1.63) and past medications at intake (p<.001, OR 2.21), SSRI failure (p<.001, OR 3.15), number of failed SSRIs (p<.001, OR 2.14), and comorbid ADHD (p = .016, OR 2.38) were significantly associated with a higher risk of treatment resistance in GAD. The most predictive factors associated with suicidal ideation were alcohol dependence/ abuse (p = .025, OR 7.85) and chronic anhedonia (p = .042, OR 2.38). Substance abuse was associated with a higher risk of suicide attempt (p = .013, OR 3.21).

Conclusions: These findings support previous studies that have demonstrated comorbid GAD and ADHD are often associated with poorer treatment outcomes. This study suggested that risky behaviors, multiple referral diagnoses, and increased numbers of failed medications may at least in part be explained by the presence of undetected or untreated ADHD. As well, chronic anhedonia may serve as a prognostic indicator of the presence of ADHD and suicidal behavior in patients with treatment-resistant GAD. This signifies the importance of screening for adult ADHD in anxious patients presenting with anhedonia the need for further studies identifying transdiagnostic markers to guide treatment and harm reduction

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ADHD Atten Deficit Hyperact Disord. 2019;11:S71.

CLINICAL, NEUROPSYCHOLOGICAL AND PHARMACOGENETIC PREDICTORS OF METHYLPHENIDATE RESPONSE IN A SAMPLE OF CHILDREN AND ADOLESCENTS WITH ADHD.

Vallejo VM, D+¡ez SA, De Castro MP, et al.

Objectives: To develop a predictive model of methylphenidate response using a longitudinal and naturalistic follow-up study in a Spanish sample of children and adolescents with ADHD.

Methods: 518 children and adolescents with ADHD treated with methylphenidate (MPH) were included. We collected ADHD-RSIV. es and CGI-S scores at baseline and at follow up, and neuropsychological testing (WISC-IV, CPT-II and Stroop). We analyzed seven SNPs in four DA-related candidate genes (COMT's rs4680 and rs6269, DAT1's rs27072 and rs2652511, MAO A's rs3027399, and MAO B's rs1799836) and BDNF's rs6265. Clinical response was defined as >30% reduction from baseline of total ADHD-RS-IV.es score and CGI-S final score of 1 or 2 maintained for the previous 3 months.

Results: Mean (SD) age of patients was 11.4 (3.3) years old (79% male, 51.7% without comorbidity); 37.6% had a complete and 35.8% had a partial response) to a mean MPH dose of 1.2 mg/kg/day. We did not find significant group differences in MPH dose between responders/no-responders (t-test, p>.1) (ANOVA, p>.1). Higher baseline ADHD-RS-IV.es scores (B = - 0.020, p = .021), presence of comorbidities (oppositional-defiant symptoms [B = - 0.054, p = .017], alcohol [B = - 0.78, p = .032] and cannabis use [B = - 1.304, p = .008]), lower total IQ (B = 0.21, p = .032) and low commission errors in CPT-II (B = - 0.13, p = .049) were significantly associated with worse MPH response (partial or noresponse). Moreover, presence of DAT1's rs2652511 was significantly higher in complete responders (p<.05).

Conclusions: This study suggests that absence of comorbidities, less impairment at some neuropsychological performance and the presence of DAT1's rs2652511 may predict a positive response to MPH. Other genetic or non-genetic factors may be involved in the variability of response to MPH, as our model only explains approximately a 5% of the response to MPH

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ADHD Atten Deficit Hyperact Disord. 2019;11:S29.

EXPOSURE TO AIR POLLUTION IN EARLY CHILDHOOD AND THE ASSOCIATION WITH ADHD.

Thygesen M, Holst GJ, Hansen B, et al.

Objectives: Exposure to air pollution early in life has been linked to cognitive deficits and adverse neurodevelopmental effects. However, studies examining associations between air pollution and ADHD have had conflicting findings. Hence, further investigation of this association is needed.

Methods: In this nationwide cohort study, all individuals born in Denmark 1992-2007 (n = 809,903) were followed for the development of ADHD, during 1997-2016. Data with daily concentrations of NOX, NO2, O3, CO, PM2.5, SO2, SO4, NO3, NH4, EC, OC and sea salt was linked to the residential addresses of each cohort member, from birth to their 5th birthday. In one-pollutant models, we estimated incidence rate ratios (IRRs) for ADHD, according to an increase in exposure, while adjusting for age, calendar year, sex, obstetric factors, parental education and income, and family history of psychiatric disorders.

Results: During the period of follow-up, 20 674 (2.6%) individuals developed ADHD. Exposure to the highest quintiles of NOX, NO2, PM2.5, CO, SO2, SO4, EC and OC during early childhood was associated with an increased risk of ADHD, when compared to exposure to the lowest quintiles of these pollutants. Estimates were robust across all geographical regions and adjustments for covariates did not influence the results. In contrast, exposure to higher concentrations of O3, NO3, NH4 and Sea salt was not associated with the risk of developing ADHD.

Conclusions: This is the first nationwide study to document, that children exposed to high levels of NOx, NO2, PM2.5, SO2, SO4, EC and OC may have an increased risk of developing ADHD. This result supports the hypothesis that, although ADHD is a highly heritable disorder, the etiology of ADHD also includes important environmental risk factors. Our future studies will examine the effects of each of these pollutants, adjusted for the effects of the other pollutants

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ADHD Atten Deficit Hyperact Disord. 2019;11:S76-S77.

REVIEWING PEER FUNCTIONING IN SCHOOL-AGED GIRLS WITH ADHD.

Kok F, Groen Y, Fuermaier ABM, et al.

Objectives: To gain insight into peer functioning difficulties in school-aged girls with ADHD. These girls experience many peer interaction problems and are at risk of peer rejection and victimisation. Although many studies have investigated problematic peer functioning in boys with ADHD, disregarding inherent sex differences. Hence this literature review focused on peer functioning in girls with ADHD compared to typically developing (TD) girls.

Methods: A systematic electronic database search was performed to identify relevant literature comparing peer functioning in school-aged girls with ADHD to their TD counterparts. Peer relationship domains were grouped into 'friendship', 'peer status', 'social skills/competence', and 'peer victimisation and bullying'. In total, thirteen studies were included in the review.

Results: All included studies reported increased difficulties in the domains of friendship, peer interaction, social skills and functioning, peer victimization and externalising behaviour in girls with ADHD relative to TD girls. Studies consistently showed higher 'social disability', very high levels of peer victimisation (large effects), very high levels of social impairment and social skills deficits (large effects), lower rates of friendship participation and stability (small to medium effects) and higher levels of peer rejection (small to large effects) in girls with ADHD. The latter were predicted by girls' conduct problems. Peer rejection in turn predicted poor social adjustment and multiple problem behaviours. Levels of pro-social behaviour varied across studies, but were mostly lower in girls with ADHD (small to large effects).

Conclusions: Congruous evidence was found for peer functioning difficulties in the peer relationship domains of friendship, peer status, social skills/competence, and peer victimisation and bullying in girls with ADHD. Externalising and gender-atypical behaviours often seen in girls with ADHD put them at risk of impairment in many aspects of social functioning. These findings are discussed in light of a social learning model describing a negative spiral of problematic peer functioning and the development of social skills [Mikami and Hinshaw, J Abnorm Child Psychol, 2003]

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ADHD Atten Deficit Hyperact Disord. 2019;11:S14.

ADHD AND BORDERLINE PERSONALITY DISORDER: COMORBIDITY OR COMMON UNDERLYING DISEASE PROCESS.

Teodoro T, Pereira D, Ponte A, et al.

Objectives: ADHD and Borderline Personality Disorder BPD have several overlapping symptoms. The nature of the relationship between these disorders remains unclear including the possibility of true comorbidity or variations of a common underlying disease.

Methods: Non-systematic review of literature performed through a literature search using the Pubmed database.

Results: ADHD and BPD have several overlapping symptom dimensions (irritability, impulsivity, emotional dysregulation, executive dysfunction). Despite these common symptoms, there are some features that appear to be fairly specific of BPD including avoidance of abandonment, chronic feelings of emptiness, self-harm, and suicidal behavior, dissociative features. One of the key symptoms in both disorders-impulsivity-is of particular relevance since it is linked to adverse behaviors (self-harm and suicide) and to traumatic childhood events. Indeed, ADHD and BPD, despite treatment, revealed higher levels of impulsivity than healthy controls. There is reported comorbidity of 20% of ADHD in BPD and bipolar disorder. Studies exploring the comorbidity between these disorders reveal that patients present more symptoms of impulsivity, additional psychopathology and cognitive disturbances (lower intellectual and attentional functioning) with psychosocial difficulties. Personality traits studies point to a distinct trait profile between ADHD and BPD patients. Pathophysiological studies propose the possibility that there may be a common etiology and shared risk factors with some studies suggesting the possibility that ADHD in childhood might be a precursor of BPD diagnosis in adulthood. The neurocognitive deficits associated with both disorders, reflecting impaired decision making, in BPD may respond to treatment with stimulant drugs used in ADHD, such as methylphenidate.

Conclusions: A syndromic approach may be more effective in the management of these patients, combining pharmacological and psychotherapeutic techniques classically associated with either disorder individually. The underlying association between these disorders remains unclear and merits further research and understanding

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ADHD Atten Deficit Hyperact Disord. 2019;11:S60-S61.

ADHD/AUTISM SPECTRUM DISORDER TRAITS AND EXPOSURE TO PESTICIDES: A SYSTEMATIC REVIEW.

Tessari L, Angriman M, Conca A, et al.

Objectives: The etiology of neurodevelopmental disorders is multifactorial. Exposure to chemicals may adversely affect neurodevelopment through various toxicological pathways. There is an increasing amount of research showing that pesticides and agrotoxics may increase the risk of neurodevelopmental disorders. However, to fate no evidence synthesis has been conducted. To fill this gap, we conducted a systematic review of population-based studies assessing the relationship between pesticides and agrotoxics during pregnancy and early childhood Attention-Deficit/Hyperactivity Disorder (ADHD) or Autism Spectrum Disorder (ASD).

Methods: Studies published in English up to December 2018 were searched using PubMed, Ovid, Medline, PsycINFO and Web of Science databases. Studies that assessed pesticide exposure (e.g., via questionnaire or interview) or measured pesticide or metabolite levels in biological specimens from study participants or their immediate environment were eligible for inclusion. Two researches selected independently the studies. Disagreements were solved by a third senior author.

Results: From a pool of 772 potentially relevant studies, 28 were retained, including 12 focusing on ADHD, 14 on ASD, and two on both ASD and ADHD. Of these, eigth reported a significant association between exposure to pesticides (Organophosphate, Pyrethroid pesticide, Organochlorine pesticides, Trichlorophenols) and ADHD symptoms. Twelve studies reported a significant association between exposure to pesticides (Organophosphate, Pyrethroid pesticide, Organochlorine pesticides, Imidacloprid) and ASD or ASD traits.

Conclusions: The majority of the studies included in this systematic review suggest a significant association between exposure to pesticides/ agrotoxics and ADHD or ASD, albeit their results should be considered with caution due to a number of methodological issues. A meta-analysis is warranted to gain quantitative insight into this possible association

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Adv Ther. 2019;36:1370-87.

GENDER EFFECTS IN THE EFFICACY OF RACEMIC AMPHETAMINE SULFATE IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Childress AC, Newcorn JH, Cutler AJ.

Introduction: A laboratory classroom study in children aged 6ΓÇô12-áyears with attention-deficit/hyperactivity disorder (ADHD) found that racemic amphetamine sulfate (RA-AMPH) significantly improved performance versus placebo from 45min through 10h post-dose (NCT01986062). A secondary analysis assessed gender as a potential moderator of response to treatment comparing the ADHD Rating Scale-IV (ADHD-RS-IV) and Swanson, Kotkin, Agler, M-Flynn and Pelham (SKAMP) rating scales.

Methods: After 8weeks of open-label RA-AMPH dose optimization using improvement in ADHD-RS-IV symptoms as a guide, 97 subjects (38 females and 59 males) were randomized to the sequence of 2weeks of double-blind treatment with the optimized dose of RA-AMPH followed by placebo or vice versa during a laboratory classroom day. Efficacy measures included the SKAMP and the Permanent Product Measure of Performance (PERMP). The average difference for RA-AMPH versus placebo was estimated using least-square (LS) means. Treatment interaction by gender was analyzed using a cross-sectional fixed-effects model.

Results: ADHD-RS-IV scores were comparable for males and females at study entry and at the end of open-label treatment. During double-blind treatment, LS mean scores significantly improved for both genders versus placebo on the SKAMP scale and the PERMP (average p < 0.0001 for all post-dose time points). Beginning at baseline, males had significantly higher (worse) SKAMP scores than females but not worse ADHD-RS-IV or PERMP scores.
Conclusion: Both genders responded well to treatment with RA-AMPH, with comparable onset and duration of effect. The ADHD-RS-IV and SKAMP scales both measure changes in attention and hyperactive-impulsive behavior, but the SKAMP scale also measures associated disruptive behaviors, such as frustration, lying, and interpersonal conflict, that are more characteristic of oppositional and conduct disorders and more prevalent in boys with ADHD. Therefore, the SKAMP may be more sensitive for measuring the range of symptoms of boys with ADHD than the ADHD-RS-IV. Funding: Arbor Pharmaceuticals, LLC

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Am J Med Genet Part B Neuropsychiatr Genet. 2019.
KCNJ6 VARIANTS MODULATE REWARD-RELATED BRAIN PROCESSES AND IMPACT EXECUTIVE FUNCTIONS IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.
Ziegler GC, et al.
KCNJ6, encoding a potassium channel subunit, regulates the excitability of dopaminergic neurons and is expressed in attention-deficit/hyperactivity disorder (ADHD)-relevant brain regions. As a potential ADHD risk gene, KCNJ6, therefore, may contribute to the endophenotypic variation of the disorder. The impact of two SNPs, rs7275707 and rs6517442, both located in the transcriptional control region of KCNJ6, on reporter gene expression was explored in cultured cells. The KCNJ6 variants were then tested for association with ADHD and personality traits in a family-based sample (165 affected children) and an adult caseΓÇôcontrol sample (450 patients, 426 controls). Furthermore, the genotypic influence on performance in an n-back task and a cued continuous performance test (cCPT) was investigated by electroencephalography recordings. Finally, rs6517442 function was assessed by a reward anticipation paradigm using functional magnetic resonance imaging. Different haplotypes of rs7275707 and rs6517442 significantly influenced KCNJ6 gene expression proving their functional relevance on the molecular level. In the family-based children sample rs7275707 was associated with ADHD (p =.038). Moreover, rs7275707 showed association with the personality trait of Reward Dependence (p =.031). In the ADHD group, both rs7275707 and rs6517442 influenced the Go-centroid location in the cCPT and the N200 amplitude in the n-back task. Furthermore, ventral striatal activation was impacted by rs6517442 during reward anticipation. Our data indicate that functional variants of KCNJ6 influence brain activity during reward-related and executive processes supporting the view of a differential, age-dependent modulatory impact of dopamine-related brain processes in ADHD risk

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Anadolu Psikiyatr Derg. 2016;17:393-402.
EVALUATING EMOTIONAL REGULATION IN CHILDREN WITH ADHD AND THEIR MOTHERS.
Ozyurt G, Pekcanlar AA, et al.
Objective: Attention deficit hyperactivity disorder (ADHD) is one of the most common childhood neurodevelop-mental disorder. Due to prior studies, emotion dysregulation can cause externalizing behavior problems and social impairment. Parental factors are important for children's emotional regulation. We aimed to evaluate emotional dysregulation in children with ADHD and their mothers comparing with controls.
Methods: The study group con-sisted of 62 children (6-12 years old) diagnosed with ADHD. The control group (62 children) comprised patients of other clinics at hospital and was matched for gender and age to the ADHD patients. The Kiddie Schedule for Affec-tive Disorders and Schizophrenia for School Aged Children-Present and Lifetime Version (K-SADS-PL) was used to diagnose ADHD and allowed comorbidities. We evaluated disorder severity at the time of assessment using the Clinic Global Impression Scale (CGI-S).

All patients were treatment-naive. Emotional Regulation Checklist (ERC) and child behavior checklist (CBCL) were used to examine children emotional regulation and behavioral profiles. Difficulties in Emotion Regulation Scale (DERS) was used to indicate maternal emotional dysregulation status.
Results: There was no significant difference between sociodemographic data of two groups. Children with ADHD had difficulties in anxiety, social functioning, thought problems, attention, agression and rule breaking areas of CBCL. Mothers of children with ADHD had higher scores in all goals, impulsivity, strategies, and nonacceptance subscales of DERS. Emotional lability scores were statistically significant higher in ADHD group.
Conclusion: ADHD generally continues into adolescence and adulthood and multiple functional impairments can be occured due to ADHD. If the relationship between emotion regulation and ADHD is understood well, treatment of ADHD and emotion dysregulation will be provided easily. Further studies are needed for improving treatment of ADHD and emotion dysregulation

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Anadolu Psikiyatr Derg. 2018;19:411-18.

INVESTIGATION OF ALEXITHYMIA, DEPRESSION AND CHILDHOOD ADHD SYMPTOM LEVELS IN PARENTS OF CHILDREN WITH ADHD.

Gules Z., et al.

Objective: The aim of this study was to compare the severity of alexithymia, depression and childhood attention deficit hyperactivity disorder (ADHD) symptoms in the biological parents of children with ADHD and to investigate the relationship between scale scores.
Methods: Sixty-four children diagnosed with ADHD according to the DSM-5 criterion based on clinical interview and Schedule of Affective Disorders and Schizophrenia Interview for School Children and their parents who admitted to Adnan Menderes University Department of Child and Adolescent Mental Health Outpatient Clinic and 64 children who did not have a psychiatric diagnosis and their parents admitted to Pediatrics Outpatient Clinic between January 2015 and December 2015 were included. Parents filled out socio-demographic data form, DSM-IV-Based Child and Adolescent Disruptive Behavior Disorders Screening and Rating Scale-parent form (T-DSM-IV-S), Wender-Utah Rating Scale, Toronto Alexithymia Scale (TAS-20), and Beck De-pression Inventory.
Results: It was found that childhood ADHD symptom levels and present depressive symptom levels in parents of children with ADHD were higher than the control group. There were no significant differences between the two groups in terms of alexithymia levels. In addition, there was a positive moderate correlation be-tween total score, hyperactivity subscale, opposition defiant disorder subscale of T-DSM-IV-S and difficulty de-scribing feelings, total and difficulty identifying feelings subscale scores of TAS-20 whereas there was no significant relationship between total score and subscale scores of T-DSM-IV-S and TAS-20 externally-oriented thinking.
Discussion: Results showed that parents of children with ADHD whose hyperactivity and opposing defiant symp-tom severity are high, are more likely to experience difficulty in describing and identifying feelings. Additionally, due to the high severity of depressive symptoms in parents of children with ADHD, we believe that investigation the presence of mental disorders in parents and the implementation of appropriate parental intervention programs will contribute positively to the success of follow-up and treatment of children with ADHD

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Anadolu Psikiyatr Derg. 2018;19:624-30.

DOES ATTENTION DEFICIT HYPERACTIVITY DISORDER HAVE CARDIAC ARRHYTHMIA POTENTIAL?

Araz AM.

Objective: Attention deficit hyperactivity disorder (ADHD) is quite common in the general pediatric population. In this population, sympathomimetic drugs, which are at risk of arrhythmia, are frequently used. In this study, ECG characteristics of drug naive ADHD patients were compared control group.

Methods: This study was performed 43 drug naive ADHD patients and 36 healthy children who admitted to the child and adolescent psychiatry outpatient clinic between November 2017 and January 2018. A standard 12-lead ECG of the patient and control group were evaluated. The ADHD and control group data were compared by calculating the minimum and maximum QT inter-val, corrected QT (QTc), QT dispersion (QTd), the peak and the end of the T wave (Tp-e) and Tp-e dispersion (Tp-ed) on 12-lead surface ECG. Tp-e interval was measured tangent method. The Bazett formula was used for QT correction.

Results: The mean age of the patients with ADHD was 10.6-¦3.2 and 62.8% of them were male and similar to the control group. There was no significant difference between ADHD and control groups in terms of heart rate, min QT, max QT and min Tp-e values. QTc, QTd, max Tp-e and Tp-ed intervals were statistically higher ADHD patients than control group.

Conclusion: QT dispersion and Tp-e is a measure of transmural dispersion of repolari-zation and related to cardiac arrhythmias. High QTd, QTc, max Tp-e and Tp-ed intervals in ADHD patients may indicate a potential cardiac arrhythmia. Physicians should make careful assessments of ADHD patients before pre-scribing sympathomimetic drugs

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Anadolu Psikiyatr Derg. 2018;19:405-10.

PEER VICTIMIZATION IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Orengul A.C., Sabuncuo-ƒlu OT.

Objective: The purpose of this study is to compare the presence of bullying behavior (both being a bully and being a victim) in newly diagnosed, medication naive children with attention-deficit/hyperactivity disorder (ADHD) with those who have been on a regime of regular methylphenidate treatment for ADHD for at least the past two school terms.

Methods: A total of 34 medication-naive children (mean age 10.3-¦1.81) and 30 children (10.5-¦1.83) who were between 8 and 16 years, were evaluated with Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime Version (K-SADS-PL) for diagnoses of ADHD and coexisting psychiatric disorders. Children completed the Revised Olweus Bully/Victim Questionnaire and their parents and teachers completed a form based on the same questionnaire to identify the bullying involvement of the children.

Results: In self-report measures, 41.2% (n=14) of the newly diagnosed children were classified as victims and 8.8% (n=3) as bully/victims. In the treatment group, 22.6% (n=7) of the children were classified as victims, 6.5% (n=2) as bullies and 12.9% (n=4) as bully/victims. The difference in victimization rates between the two groups did not reach the statistically significant levels. Bullying involvement rates were lower than self-reports according to the parent and teacher-rated bullying questionnaires (13.8% and 3.1% respectively). 26.7% (n=8) of the parents and 50% (n=4) of the teachers reported a decrease in bullying involvement after methylphenidate treatment.

Conclusion: Peer victimization should be a part of clinical examination in children with ADHD. In addition to medication use, school interventions aiming at re-ducing peer victimization is indicated in children with ADHD

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Anadolu Psikiyatr Derg. 2018;19:509-17.

TREATMENT OF ADHD FOR AT LEAST THREE YEARS MAY PREVENT LONG-TERM COMPLICATIONS: A PRELIMINARY STUDY ON LONG-TERM PROGNOSIS OF CHILDREN DIAGNOSED WITH ADHD AT A SINGLE CENTER IN TURKEY.

Sari GE, Saday DN, U+ºkun B, et al.

Objective: ADHD is known to be associated with psychiatric comorbidities and psychosocial adversities in the long term. The existing literature is focused on predominantly Western samples. There are no studies evaluating long-term functionality of youth diagnosed with ADHD in Turkey.

Methods: Patients diagnosed with ADHD at a study center in between 2011 and 2012 were contacted and current functionality was assessed via phone interviews. Univariate and bivariate analyses were conducted to determine correlates of functioning. Sequential logistic regres-sion analyses were conducted to evaluate predictors of still receiving treatment for ADHD, improvement in attention/ academics, improvement in behavior and in peer relationships. p was set at 0.05.

Results: Information on func-tioning of 433 patients (78.3% male) could be collected. Male patients with ADHD tended to be more frequently under treatment at follow-up and they displayed behavior problems at follow-up significantly more frequently. Legal problems were reported in 3.7% and substance use in 2.3%.

Discussion: Treatment for ADHD lasting at least 3 years predicted improved functioning and less psychosocial adversity. Earlier diagnosis of ADHD and longer treat-ment appears to protect against psychosocial adversity also in Turkish samples. Multi-center studies from Turkey with larger samples are needed

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Anadolu Psikiyatr Derg. 2018;19:485-92.

NEUROPEPTIDE-Y, LEPTIN AND GHRELIN LEVELS IN CHILDREN WITH ADHD: EFFECTS OF METHYLPHENIDATE TREATMENT.

Demirci E, Lushi-San Z., Irmak A, et al.

Objective: This study aims to evaluate the plasma levels of neuropeptide-Y (NPY), leptin and ghrelin and in children with attention deficit hyperactivity disorder (ADHD) and investigate the neurobiological mechanisms beneath side effects of methylphenidate such as lack of appetite, weight loss and/or decrease in weight gain.

Methods: Thirty children diagnosed as ADHD with DSM-5 and 21 healthy children similar to study group with age and gender were included in the study. All subjects are evaluated with Kiddie Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL). All parents filled sociodemographic data form, also parents of the chil-dren with ADHD filled Conners Parent Rating Scale (CPRS). ADHD group evaluated with Barkley Stimulant Side Effect Evaluation Form after two months of extended release methylphenidate (OROS-MPH) therapy. Plasma NPY, leptin and ghrelin levels were evaluated in control group for once and in ADHD group for twice, before and 2 months after treatment with enzyme-like immune-sorbent assay (ELISA) kits.

Results: In our study, when plasma leptin, ghrelin and NPY levels of healthy controls and ADHD group were compared; NPY level was lower in the ADHD group. Compared with healthy controls, post-treatment ADHD group leptin level was observed to be lower. In the ADHD group, only NPY level was found to be higher after treatment than before treatment.

Conclusion: It was observed that NPY levels were found to be lower in the ADHD group than in the healthy group, and plasma levels increased after treatment. In addition, leptin and ghrelin levels not changed after treatment. Thus, further studies with larger study groups are needed whether these changes will be more meaningful when the treatment duration is prolonged. New studies may reveal neurobiological mechanisms beneath loss of appetite and/or weight loss associated with methylphenidate treatment

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Anadolu Psikiyatr Derg. 2018;19:493-500.

HEART RATE VARIABILITY AS AN INDICATOR OF AUTONOMOUS NERVOUS SYSTEM ACTIVITY IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Yuksel T, Ozcan O.

Objective: The aim of the present study was to evaluate heart rate variability (HRV) in children newly diagnosed as attention-deficit/hyperactivity disorder (ADHD).

Methods: A total of 51 children with new ADHD diagnosis who were not received any treatment formed the study group and 51 age and sex-matched healthy children were en-rolled as the control group. 24-hour heart rate (HR) recordings were performed with rhythm Holter monitoring and HRV parameters indicating autonomous nervous system (ANS) functions were evaluated. Children in ADHD group were further divided into two groups as severe and mild ADHD according to Clinical Global Impressions-ADHD-Severity scale.

Results: HRV parameters were comparable between ADHD and control groups. Whereas, percent-age of consecutive NN intervals over 50 msn (pNN50) and minimum Spectral Power per hour (minSPH) values were lower; while, maximum 1-hour heart rate Holter (maxHRH) and mean heart rate (HR) values were higher in severe ADHD group than those of control group.

Conclusion: These results support that as the severity of ADHD increases, ANS dysfunction becomes more overt. Further large scale, multi-centered, randomized-controlled clinical trials are needed to clarify possible role of ANS dysfunction in ADHD etiopathogenesis

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Anadolu Psikiyatr Derg. 2018;19:300-06.

MIGHT BPA AND PHTHALATES HAVE A ROLE IN ETIOPATHOGENESIS OF ADHD?

Oztop DB, et al.

Objective: Although the etiology ofattention deficit hyperactivity disorder (ADHD) is unknown, it is thought that endocrine disruptors may be involved in the etiopathogenesis. The aim of this study was to investigate the relation-ship between ADHD development and exposure to mono-(2-ethylhexyl) phthalate (MEHP), di-(2-ethylhexyl) phtha-late (DEHP), and bisphenol A (BPA).

Methods: The study included 44 children who were diagnosed with ADHD according to DSM IV-TR diagnostic criteria and 51 healthy children as controls. In all subjects, serum MEHP, DEHP, and BPA were measured by using high performance liquid chromatography (HPLC).

Results: Serum MEHP and BPA levels were found to be significantly higher in the ADHD group (0.47-¦0.22 -Ág/ml, 1.48-¦0.28 ng/ml) than the controls (0.31-¦0.13 -Ág/ml, 0.91-¦0.23 ng/ml). There was no difference in the level of DEHP between the ADHD group and healthy controls (2.17-¦0.69 -Ág/ml, 2.26-¦0.56 -Ág/ml).

Conclusion: Our results could be accepted as an evidence to support an association between BPA, MEHPlevels and ADHD. However, further studies are needed to clarify the linkage between ADHD and endocrine disruptors

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Appl Neuropsychol Child. 2019 Apr;8:101-12.

PRAGMATIC COMPETENCE OF CHILDREN WITH AUTISM SPECTRUM DISORDER IMPACT OF THEORY OF MIND, VERBAL WORKING MEMORY, ADHD SYMPTOMS, AND STRUCTURAL LANGUAGE.

Baixauli-Fortea I, Miranda Casas A, Berenguer-Forner C, et al.

The primary aim of this study is to increase the existing knowledge about the pragmatic skills of children with autism spectrum disorders (ASD). Specifically, the study has two objectives. The first is to provide a profile of characteristics based on The Children's Communication Checklist (CCC-2) pragmatics scales (inappropriate initiation, stereotyped language, use of context, nonverbal communication, and general pragmatics) and narrative task indicators. To this end, children with ASD will be compared to children with typical development (TD), controlling the effects of sex and structural language (speech, syntax, semantics, coherence). The second objective is to analyze whether theory of mind (ToM), verbal working memory,

ADHD symptoms, and structural language can predict pragmatic competence in children with ASD without intellectual disability (ID). The results showed worse performance in the group with ASD on the majority of the pragmatic aspects evaluated. In addition, the application of ToM skills and structural language were significant predictors of the pragmatic skills of the children with ASD. These findings reinforce the importance of focusing intervention programs on mentalist abilities through experiences in real social scenarios, along with strengthening structural language components

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Appl Neuropsychol Child. 2019 Apr;8:140-57.

DIFFERENTIAL LONG-TERM MEDICATION IMPACT ON EXECUTIVE FUNCTION AND DELAY AVERSION IN ADHD.

Rubio Morell B, Hernández Expósito S.

The objective was to compare long-term effects of methylphenidate (MPH) and atomoxetine (ATX) on executive functions (EF) and delay aversion (DAv) in ADHD. A randomized controlled trial was conducted. A comprehensive neuropsychological battery was administered at three moments (Naive, Post-1, Post-2). ADHD participants who showed deficits in the naive evaluation (n = 26) were randomized to receive either MPH (n = 13; Mage = 11 ± 1, MIQ 96 ± 8) or ATX (n = 13; Mage = 10 ± 1, MIQ 106 ± 16.5) optimal dosages. Parallel test forms were administered after three (Post-1) and six months (Post-2) of treatment. A control group (n = 19; Mage = 11 ± 1; MIQ = 106 ± 16.5) performed the neuropsychological battery similarly. Both MPH and ATX significantly improved scores in verbal working memory (vWM) (Naive: $p < 0.0001$, $d = 0.75$; Post-1: $p = 0.71$, $d = 0.12$), spatial working memory (sWM) (Naive $p < 0.0001$, $d = 0.63$; Post-2 $p = 0.44$; $d = 0.03$), planning (Naive $p < 0.0001$, $d = 0.54$; Post-2 $p = 0.6$, $d = 0.18$), decision making (Naive $p < 0.001$ $d = 0.28$; Post-1 = 0.06 $d = 0.12$) and inhibition (Naive < 0.0001, $d = 0.66$; Post-2 $p = 0.08$, $d = 0.00$), reaching an improved treatment response after three months of treatment in vWM and after six months in sWM, planning, and inhibition. No beneficial effect on DAv and risk taking was found with MPH and neither with ATX. Long-term treatment in range of optimal clinical dosages with either MPH or ATX improves EF, but not DAv in children with ADHD

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Australasian Medical Journal. 2018;11:522-28.

SCREENING OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN CHILDREN AGED 3 TO 6 YEARS AND 11 MONTH OLDS OF TABRIZ, NORTH-WEST OF IRAN.

Amiri S, Malek A, Sadeghi-Bazargani H, et al.

Background ADHD (Attention deficit hyperactivity disorder) is a multifactorial disorder, defined by hyperactivity, impulsivity and attention deficits. Symptoms of ADHD begins during early childhood and negatively affects functionality at various levels.

Aims This descriptive and cross-sectional study was conducted in 2016 to screen for Attention Deficit Hyperactivity Disorder in children aged 3 to 6 years, 11 months olds of Tabriz in Iran. Methods A total of 737 children aged 36 months to 6 years, 11 months in Tabriz were randomly selected from kindergarten and preschool centres. Both the Conners Early Childhood-Parent and -Teacher forms were used to estimate the prevalence of ADHD.

Results The results indicated that the prevalence of ADHD was 337 (45.7 per cent) based on Conners EC-Parent, 416 (56.4 per cent) according to Conners EC-Teacher, and 225 (30.5 per cent) based on the both Conners EC-Teacher & Parent scales. The results of FischerΓÇÖs exact test showed that the prevalence of ADHD in boys (n=117, 35.3 per cent) was significantly higher than that of the girls (n=108, 26.6 per cent) (p=0.01, X2=6.57). The results of Chi-square test indicated that there was no difference among different age groups in terms of the prevalence of ADHD (X2=2.86, p=0.41).

Conclusion ADHD screening based on the Conners EC-Teacher & Parent forms was estimated to be 30.5 per cent. The regional prevalence of ADHD appears to be greater among children under the age of 7,

although the use of the new Conners EC tool in this study could have possibly affected the ADHD prevalence estimates

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Aust New Zealand J Psychiatry. 2019;53:112.

'PATHWAY TO CARE' SURVEY FOR ADULT ATTENTION-DEFICIT HYPERACTIVITY DISORDER IN PRIVATE PRACTICE: ANALYSIS OF ISSUES AND PITFALLS IN SERVICE DELIVERY.

Guha S.

Background and objectives: There are not many publications or research regarding a pathway to care for adult attention-deficit hyperactivity disorder (ADHD) in Australia or other countries. There is a notion that adults with symptoms of ADHD, who have not been formally diagnosed with ADHD as a child, may not be a major 'target-population' for most mental health services (MHS). Most such studies in this area are mapping the 'gaps' in transitioning between adolescents diagnosed with ADHD to adults. The progression of ADHD across the lifespan from childhood to adulthood is between 40% and 55%. New incidences of diagnosis of adult ADHD are increasing. This is estimated between 3% and 5%. Unmanaged and undiagnosed ADHD in adults has a significant negative socioeconomic impact on our society. Also, there is a high prevalence for co-morbidities, which further increases the burden of care. There is a perceived lack of a well-defined 'pathway to care' for adults with ADHD in Australia, both in private and public MHS. The present paper aims at providing an overview of the Pathway to Care for adult ADHD in a private psychiatric practice setting in Brisbane.
Methods: A total of 50 randomly selected adult ADHD patients registered with the practice were sent an anonymous electronic survey with 31 questions in 2018.
Results and conclusions: The results of this survey were analysed to provide a unique snapshot of the issues with pathway to care for adults with suspected ADHD. Their experiences and reported issues will be discussed at length in this presentation to assist future service provision decisions across the MHS

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Aust New Zealand J Psychiatry. 2019;53:50-51.

FACTORS INFLUENCING THE COURSE OF MENTAL DISORDERS IN CHILDHOOD AND BEYOND.

Middeldorp CM, Scott JG, Tunbridge M, et al.

Background: Epidemiological studies have shown that about 50% of the children with mental disorders still fulfil the criteria for a mental disorder in adulthood.
Objectives: The symposium discusses factors influencing course of childhood psychopathology and possible interventions to prevent poor outcome.
Methods: The symposium will start off with a presentation about the role of genetic and other familial factors influencing childhood psychopathology, including anxiety, depression, attention-deficit hyperactivity disorder (ADHD) and behavioural problems. The other presentations will focus on specific disorders or symptoms (i.e. aggression, social problems and ADHD).
Findings: All mental problems in childhood show some continuity into adulthood, but there is also variation in course.
Conclusions: Interventions should particularly focus on improving long-term outcomes for childhood psychopathology

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Aust New Zealand J Psychiatry. 2019;53:52-53.

PLOTTING THE COURSE OF ATTENTION-DEFICIT HYPERACTIVITY DISORDER: UNDERSTANDING THE DEVELOPMENTAL TRAJECTORIES ACROSS THE LIFESPAN.

Coghill D.

Background: Attention-deficit hyperactivity disorder (ADHD) was for many years considered a disorder of childhood. It has now become clear that, while ADHD does sometimes remit early in life, many of those with ADHD continue to have impairing symptoms as adults.
Objectives: This presentation will describe the developmental trajectories for ADHD and investigate mediators and moderators of persistence and remission.
Methods: The presentation is based on a review of recently reported findings in the international literature.
Findings: There is a consensus that many of those with ADHD as a child continue to suffer from ADHD-related impairments as adults and that a proportion of those with childhood ADHD will continue to meet full diagnostic criteria. While the initial data from the United States suggested rates of persistence around 20% more recent data from Europe puts the figures much higher (even as high as 90%). There are both continuities and discontinuities at the clinical level across development. Several theories have been proposed to explain these differences. More recently, it has been proposed that ADHD can arise de novo in adults. This claim has been extremely controversial and is still being hotly debated. The mediators and moderators of persistence and remission have been difficult to identify; however, several candidates have been identified.
Conclusions: ADHD is a complex neurodevelopmental disorder that usually starts in childhood but often continues into adulthood. The trajectories of ADHD are varied but there are clear patterns. The clinical skills required to assess and manage ADHD are common to other aspects of our clinical work

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Autism Res. 2019.

EFFECTS OF THE CO-OCCURRENCE OF ANXIETY AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER ON INTRINSIC FUNCTIONAL NETWORK CENTRALITY AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER.

Wan B, Wang Z, Jung M, et al.

Children with autism spectrum disorder (ASD) present with a high co-occurrence of anxiety and attention-deficit/hyperactivity disorder (ADHD). However, it remains unclear how the co-occurrence of anxiety and ADHD in children with ASD alters whole-brain functional networks. Here, we aimed to examine anxiety- and ADHD-related brain network centrality in children with ASD separately and their relationships with ASD symptoms. Clinical anxiety and ADHD levels in children with ASD, aged 6Γ Çô13 years old, were assessed. Participants were categorized into four groups: ASD only (n = 28), ASD + anxiety (n = 19), ASD + ADHD (n = 25), and ASD + both anxiety and ADHD (n = 28). Subsequently, we compared voxel-wise network degree centrality (DC) among the four groups. We found that: (a) compared with ASD only, children with ASD + anxiety showed higher DC in the left middle temporal gyrus, right lingual gyrus, and left cuneus, and lower DC in the right precuneus; (b) children with ASD + ADHD presented higher DC in the right calcarine and left superior frontal gyrus (SFG) compared with ASD only; (c) children with ASD + both displayed higher DC in the right calcarine and lower centrality in the right middle occipital gyrus compared with ASD only; and (d) across all children with ASD, there was a positive correlation between DC of the right calcarine with nonverbal behavior scores, and DC of the left SFG was negatively correlated with social scores. Our findings suggest that the right calcarine, left SFG, and default mode network nodes play important roles in the co-occurrence of anxiety and ADHD among children with ASD. Autism Res 2019. -® 2019 International Society for Autism Research, Wiley Periodicals, Inc. Lay Summary: The co-occurrence of anxiety and attention-deficit/hyperactivity disorder (ADHD) has been shown to influence the brain function of children with ASD. In order to gain a better understanding of this, the present study compared degree centrality, the amount of effective brain functional connectivity that reflects the characteristics of brain networks, among four groups: ASD only, ASD + anxiety, ASD + ADHD, and ASD + both anxiety and ADHD. We found that some areas located in the language processing network and primary visual cortex were associated with the co-

occurrence of ADHD, and some other areas located in the default mode network were associated with the co-occurrence of both anxiety and ADHD. These findings provide more knowledge about the neural basis underlying behavioral changes related to the co-occurrence of anxiety and ADHD in children with ASD

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Behav Neurol. 2019;2019.

ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) AMONG CHILDREN AGED 6 TO 17 YEARS OLD LIVING IN GIRJA DISTRICT, RURAL ETHIOPIA.

Lola HM, Belete H, Gebeyehu A, et al.

Objective. Attention deficit hyperactivity disorder (ADHD) is one of the most common behavioral disorders in childhood with long-term outcomes. Although ADHD is the most studied behavioral disorders of childhood in developed countries, few studies have been conducted in Ethiopia. The aim of this study was to determine the prevalence of ADHD in rural parts of Ethiopia.

Method. A cross-sectional study was conducted from May to June 2015 among children aged 6 to 17 years living in rural areas. A multistage cluster sampling technique was used to select 1302 participants. The Disruptive Behavior Disorder Rating Scale was used to collect the data. Logistic regression analysis was used to see statistically significant variables.

Result. The prevalence rate of attention deficit hyperactivity disorder (ADHD) among children was 7.3%. Being male (Adjusted Odds Ratio (AOR) = 1.81, 95% CI: (1.13, 2.91)); living with a single parent (AOR = 5.0, 95% CI: (2.35, 10.65)); child birth order/rank (AOR = 2.35, 95% CI: (1.30, 4.25)); and low family socioeconomic status (AOR = 2.43, 95% CI: (1.29, 4.59)) were significantly associated with ADHD.

Conclusion. The ADHD prevalence rate was found to be similar with global reports. Prevention and early management of maternal complications is important to reduce the prevalence of ADHD among children

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Biol Psychiatry. 2019.

PREFRONTAL CORTEX DOPAMINE TRANSPORTER GENE NETWORK MODERATES THE EFFECT OF PERINATAL HYPOXIC-ISCHEMIC CONDITIONS ON COGNITIVE FLEXIBILITY AND BRAIN GRAY MATTER DENSITY IN CHILDREN.

Miguel PM, Pereira LO, Barth B, et al.

Background: Genetic polymorphisms of the dopamine transporter gene (DAT1) and perinatal complications associated with poor oxygenation are risk factors for attentional problems in childhood and may show interactive effects.

Methods: We created a novel expression-based polygenic risk score (ePRS) reflecting variations in the function of the DAT1 gene network (ePRS-DAT1) in the prefrontal cortex and explored the effects of its interaction with perinatal hypoxic-ischemicΓÇôassociated conditions on cognitive flexibility and brain gray matter density in healthy children from two birth cohorts MAVAN from Canada (n = 139 boys and girls) and GUSTO from Singapore (n = 312 boys and girls).

Results: A history of exposure to several perinatal hypoxic-ischemicΓÇôassociated conditions was associated with impaired cognitive flexibility only in the high-ePRS group, suggesting that variation in the prefrontal cortex expression of genes involved in dopamine reuptake is associated with differences in this behavior. Interestingly, this result was observed in both ethnically distinct birth cohorts. Additionally, parallel independent component analysis (MAVAN cohort, n = 40 children) demonstrated relationships between single nucleotide polymorphism based ePRS and gray matter density in areas involved in executive (cortical regions) and integrative (bilateral thalamus and putamen) functions, and these relationships differ in children from high and low exposure to hypoxic-ischemicΓÇôassociated conditions.

Conclusions: These findings reveal that the impact of conditions associated with hypoxia-ischemia on brain development and executive functions is moderated by genotypes associated with dopamine signaling in the prefrontal cortex. We discuss the potential impact of innovative genomic and environmental measures for the identification of children at high risk for impaired executive functions

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Biological Psychiatry: Cognitive Neuroscience and Neuroimaging. 2019;4:472-83.

AN INTEGRATED ANALYSIS OF NEURAL NETWORK CORRELATES OF CATEGORICAL AND DIMENSIONAL MODELS OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Pruim RHR, Beckmann CF, Oldehinkel M, et al.

Background: Attention-deficit/hyperactivity disorder (ADHD)is a heterogeneous neurodevelopmental disorder, putatively induced by dissociable dysfunctional biobehavioral pathways. Here, we present a proof-of-concept study to parse ADHD-related heterogeneity in its underlying neurobiology by investigating functional connectivity across multiple brain networks to 1) disentangle categorical diagnosis-related effects from dimensional behavior-related effects and 2) functionally map these neural correlates to neurocognitive measures.

Methods: We identified functional connectivity abnormalities related to ADHD across 14 networks within a large resting-state functional magnetic resonance imaging dataset (n = 409; age = 17.5 -¦ 3.3 years). We tested these abnormalities for their association with the categorical ADHD diagnosis and with dimensional inattention and hyperactivity/impulsivity scores using a novel modeling framework, creating orthogonalized models. Next, we evaluated the relationship of these findings with neurocognitive measures (working memory, response inhibition, reaction time variability, reward sensitivity).

Results: Within the default mode network, we mainly observed categorical ADHD-related functional connectivity abnormalities, unrelated to neurocognitive measures. Clusters within the visual networks primarily related to dimensional scores of inattention and reaction time variability, while findings within the sensorimotor networks were mainly linked to hyperactivity/impulsivity and both reward sensitivity and working memory. Findings within the cerebellum network and salience network related to both categorical and dimensional ADHD measures and were linked to response inhibition and reaction time variability.

Conclusions: This proof-of-concept study identified ADHD-related neural correlates across multiple functional networks, showing distinct categorical and dimensional mechanisms and their links to neurocognitive functioning

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Biological Psychiatry: Cognitive Neuroscience and Neuroimaging. 2019.

THE MODULATION OF NEURAL NOISE UNDERLIES THE EFFECTIVENESS OF METHYLPHENIDATE TREATMENT IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Pertermann M, Bluschke A, Roessner V, et al.

Background: Various lines of research suggest that the stability of neural processes is low in attention-deficit/hyperactivity disorder (ADHD). Considering overarching neural principles, this lack of stability relates to increased levels of neural noise. However, no study has directly examined neural noise in ADHD. Likewise, it is unknown whether the modulation of neural noise reflects a mechanistic link as to why methylphenidate (MPH) is effective in treating impulsivity in ADHD.

Methods: We compared neural noise between 29 juvenile patients with ADHD and 32 healthy control subjects and examined the effects of MPH. We examined 1/f neural noise of electroencephalogram data collected while participants performed a response inhibition (Go/NoGo) task.

Results: Specific during NoGo trials, children with ADHD showed more neural noise than healthy control subjects. This was especially the case with regard to the theta frequency band, which is very closely related to cognitive control. MPH treatment reduced neural noise in ADHD to the level of healthy control subjects. Correlational analyses showed a direct relationship between decreases in neural noise and increases in

behavioral performance. Mechanistically, this can be explained by the MPH-induced increase in dopaminergic neurotransmission that enhances the signal-to-noise ratio in neural networks and thus reduces neural noise.
Conclusions: This study is the first to demonstrate increased (pink) neural noise in patients with ADHD and its reduction through MPH treatment. The study reveals an important mechanistic link as to why MPH is effective in treating impulsivity in ADHD

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BMC Pediatr. 2019;19.
PARENTAL AGE AND DEVELOPMENTAL MILESTONES: PILOT STUDY INDICATED A ROLE IN UNDERSTANDING ADHD SEVERITY IN INDIAN PROBANDS.
Maitra S, Mukhopadhyay K.
Background: In different ethnic groups, birth related factors have shown significant influence in the etiology of Attention deficit hyperactivity disorder (ADHD). Based on these interesting findings, we aimed to investigate association between different pre- and post natal variables and ADHD associated traits in Indian subjects.
Methods: ADHD Probands recruited based on the DSM-IV, were assessed by the ConnerΓÇÖs Parent Rating Scale for behavioral problem (BPr), inattention (IA), hyperactivity (HA) and ADHD index (AI). Impulsivity (Imp) was assessed by the Tsukuyama scale.
Results: Higher paternal (Std +¦ = 0.23) and lower maternal (Std +¦ = 0.21) age showed significant association with Imp of the probands. Higher paternal age also revealed association with BPr (Std +¦ = 0.18). Age of onset was distinctly associated with AI (Std +¦ < 0.16) while developmental delay was negatively correlated with BPr, Imp, IA and birth weight (r < ΓêÆ 0.13); also confirmed by Posthoc-ANOVA (P < 0.05).
Conclusion: We infer that parental age, developmental delay and birth related variables may have a cumulative effect on ADHD symptom severity

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BMJ Open. 2019;9.
PERCEPTUAL TIMING IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD) AS MEASURED BY COMPUTER-BASED EXPERIMENTS VERSUS REAL-LIFE TASKS: PROTOCOL FOR A CROSS-SECTIONAL EXPERIMENTAL STUDY IN AN AMBULATORY SETTING.
Marx I, Reis O, Berger C.
Introduction The goal of this study is to get a better understanding of the fundamentals of perceptual timing deficits, that is, difficulties with estimating durations of explicitly attended temporal intervals, in children with attention-deficit/hyperactivity disorder (ADHD). Whereas these deficits were repeatedly demonstrated in laboratory studies using computer-based timing tasks, we will additionally implement a more practical task reflecting real-life activity. In doing so, the research questions of the planned study follow a hierarchically structured path +ó from lab to life': Are the timing abilities of children with ADHD really disturbed both in the range of milliseconds and in the range of seconds? What causes these deficits? Do children with ADHD rather display a global perceptual timing deficit, or do different 'timing types' exist? Are timing deficits present during real-life activities as well, and are they based on the same mechanisms as in computerised tasks?
Methods and analyses A quasi-experimental study with two groups of male children aged 8-12 years (ADHD; controls) and with a cross-sectional design will be used to address our research questions. Statistical analyses of the dependent variables will comprise (repeated) measures analyses of variance, stepwise multiple regression analyses and latent class models. With an estimated dropout rate of 25%, power analysis indicated a sample size of 140 subjects (70 ADHD, 70 controls) to detect medium effect sizes.
Ethics and dissemination Ethics approval was obtained from the ethics committee of the Faculty of Medicine, University of Rostock. Results will be disseminated to researcher, clinician and patient communities in peer-reviewed journals and at scientific conferences, at a meeting of the local ADHD

competence network and on our web page which will summarise the study results in an easily comprehensible manner

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Br J Psychiatry. 2019;214:339-44.

SURFACE-BASED SHARED AND DISTINCT RESTING FUNCTIONAL CONNECTIVITY IN ATTENTION-DEFICIT HYPERACTIVITY DISORDER AND AUTISM SPECTRUM DISORDER.

Jung M, Tu Y, Park J, et al.

Background Both attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) are neurodevelopmental disorders with a high prevalence. They are often comorbid and both exhibit abnormalities in sustained attention, yet common and distinct neural patterns of ASD and ADHD remain unidentified.

Aims To investigate shared and distinct functional connectivity patterns in a relatively large sample of boys (7-to 15-year-olds) with ADHD, ASD and typical development matched by age, gender and IQ.

Method We applied machine learning techniques to investigate patterns of surface-based brain resting-state connectivity in 86 boys with ASD, 83 boys with ADHD and 125 boys with typical development.

Results We observed increased functional connectivity within the limbic and somatomotor networks in boys with ASD compared with boys with typical development. We also observed increased functional connectivity within the limbic, visual, default mode, somatomotor, dorsal attention, frontoparietal and ventral attention networks in boys with ADHD compared with boys with ASD. In addition, using a machine learning approach, we were able to discriminate typical development from ASD, typical development from ADHD and ASD from ADHD with accuracy rates of 76.3%, 84.1%, and 79.3%, respectively.

Conclusions Our results may shed new light on the underlying mechanisms of ASD and ADHD and facilitate the development of new diagnostic methods for these disorders.Declaration of interest J.K. holds equity in a startup company, MNT

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Can Bull Med Hist. 2019;36:51-79.

"SNIPS AND SNAILS AND PUPPY DOG TAILS": BOYS AND BEHAVIOUR IN THE USA.

Smith M.

In The Adventures of Tom Sawyer and Huckleberry Finn, Mark Twain introduced two of the most iconic boys in American literature. Tom and Huck become heroic figures, despite their penchant for bad behaviour. Indeed, it is their propensity to be impulsive, break rules and defy authority that win them the day. Today, however, Tom Sawyer and Huck Finn have become the posterboys for a psychiatric disorder, Attention Deficit Hyperactivity Disorder, or ADHD. I trace how and why attitudes about pathological boys' behaviour reversed during the twentieth century, from a focus on shy, introverted, and physically passive boys to the very opposite - boys like Tom and Huck. I argue that, rather than imposing limits on childhood behaviour, we should be more accepting and encouraging of all types of children

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Child Neuropsychol. 2019.

PARENT VERSUS TEACHER RATINGS ON THE BRIEF-PRESCHOOL VERSION IN CHILDREN WITH AND WITHOUT ADHD.

Schneider H, Ryan M, Mahone EM.

Caregiver rating scales represent an important component of comprehensive child neuropsychological assessments for conditions such as Attention-deficit/Hyperactivity Disorder (ADHD); however, low inter-rater reliability (parent vs. teacher) often complicates interpretation. It has been challenging to identify the factors contributing to inter-rater variability, particularly when parents and teachers complete slightly different

versions of the same rating scale. The present study examined the associations between parent- and teacher-reported executive functions in 84 children, ages 4ΓÇô5 years, with and without symptoms of ADHD, using the Behavior Rating Inventory of Executive Function-Preschool (BRIEF-P). Use of the BRIEF-P allows for direct comparison of symptom ratings because parents and teachers complete the exact same measure. Significant associations between raters were observed on 4 of 5 BRIEF-P subscales when rating children with ADHD, but on only 1 subscale when rating typically developing (TD) children. The Shift scale in particular displayed low, non-significant inter-rater association in both groups. Significant group-by-rater interactions were observed for Working Memory and Plan/Organize scales, and driven by larger inter-rater T-score discrepancies in the TD group, such that teachers rated children as having more symptoms than parents. Conversely, examination of raw scores reflected no significant rater differences in the TD group, but significant or nearly significant differences on multiple scales in the ADHD group, such that parents rated more symptoms than teachers. Inter-rater associations for the BRIEF-P appear to vary based on who is being rated (i.e., children with or without ADHD), the specific subscales, and whether standardized or raw scores are analyzed

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Child Psychiatry Hum Dev. 2019 Apr;50:222-29.

HIGH-END SPECIFICITY OF THE ATTENTION-DEFICIT/HYPERACTIVITY PROBLEMS SCALE OF THE CHILD BEHAVIOR CHECKLIST FOR AGES 15–5 IN A SAMPLE OF YOUNG CHILDREN WITH DISRUPTIVE BEHAVIOR DISORDERS.

Hong N, Comer JS.

In practice, ADHD is commonly assessed with parent-reports in the absence of diagnostic interviews or behavioral observations, yet little is known about how accurately rating scales can independently detect ADHD. We used receiver operating characteristic analysis to evaluate the CBCL 1.5–5 Attention-Deficit/Hyperactivity Problems scale's ability to correctly classify the presence/absence of ADHD within a sample of young children with disruptive behavior disorders (N = 44), offering a conservative test of the scale's ability to distinguish ADHD symptoms from neighboring problems (i.e., 'high-end specificity'). Across cut scores, the scale accurately differentiated between children with and without co-occurring ADHD (AUC = 0.83, SE = 0.07). Applying a cut score in the range of 61–64 yielded the most favorable balance across diagnostic utility properties (i.e., sensitivity = 0.71, specificity = 0.91, positive predictive power = 0.88, negative predictive power = 0.78). Findings provide empirical support to bolster confidence regarding use of this scale to assess early child ADHD, even in the context of complex diagnostic profiles

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Clin Case Stud. 2019.

A CASE STUDY OF PARENT–CHILD INTERACTION THERAPY FOR THE TREATMENT OF HIGH-FUNCTIONING AUTISM SPECTRUM DISORDER.

Cambric M, Agazzi H.

Youth with autism spectrum disorder (ASD) may have difficulties with compliance, impulsivity, and attention, which can affect daily adaptive functioning leading to disruptions in family social interactions, communication skills, academic achievement, and engagement in the community. Although previous research has identified behavioral treatments such as applied behavior analysis (ABA) therapy for youth with ASD, it is important to explore more interventions that can be effective in decreasing problematic behaviors while also building positive social skill development. This case study illustrates the effectiveness of ParentΓÇôChild Interaction Therapy (PCIT) to address behavioral problems in a 7-year-old boy with high-functioning ASD (HF-ASD) and comorbid ADHD. Overall, the results demonstrated a decrease in child challenging behaviors and an increase in child compliance. In addition, the childΓÇÖs mother increased her use of positive parenting skills and effective commands. This study provides additional support for PCIT for children with ASD, but was not

without challenges. These challenges, characteristic of families affected by ASD, and treatment implications for clinicians working with this population are discussed

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Clin Neurophysiol. 2019;130:e84.

P59-F ERP RECORDING SHOWS SUBCLINICAL DIFFERENCES IN ADHD PATIENTS WITH AND WITHOUT TUBEROUS SCLEROSIS.

Valeriani M, Pro S, Moavero R, et al.

Background To investigate whether among children and adolescents with attention deficit and hyperactivity disorder (ADHD) those with Tuberous Sclerosis (TS) show specific abnormalities of event-related potentials (ERPs).

Material and Methods We recruited 10 ADHD patients: 5 with TS (mean age: 12.6 ± 4.3 years) and 5 without TS (mean age: 11.6 ± 3 years). By using an oddball paradigm, auditory mismatch negativity (MMN) and P3b responses were recorded from Fz and Pz electrodes, respectively. All patients were administered with cognitive, executive functioning, and behavioural questionnaires.

Results No difference was found in cognitive and executive functioning between two groups. The P3b amplitude was significantly higher in TS patients (15.6 ± 9 μV) than in children and adolescents without TS (5.5 ± 2.7 μV) ($p = 0.04$). The MMN amplitude was higher in TS patients (19 ± 18 μV) than in those without TS (9 ± 6.9 μV), although the difference was not significant ($p = 0.3$).

Conclusions Our results show that P3 and MMN amplitudes are higher in ADHD patients with TS than in those without TS. This means that among children and adolescents with ADHD involuntary and mostly voluntary attention capabilities are better in those with TS. Since this difference was not found by neuropsychological testing, ERP recording can be useful to unravel subclinical differences between two groups

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Cogn Emot. 2019;33:825-31.

VARIABILITY OF ATTENTION BIAS IN SOCIALLY ANXIOUS ADOLESCENTS: DIFFERENCES IN FIXATION DURATION TOWARD ADULT AND ADOLESCENT FACE STIMULI.

Wieckowski AT, Capriola-Hall NN, Elias R, et al.

Prior research on attention bias in anxious youth, often utilising a visual dot probe task, has yielded inconsistent findings, which may be due to how bias is assessed and/or variability in the phenomenon. The present study utilises eye gaze tracking to assess attention bias in socially anxious adolescents, and explores several methodological and within-subject factors that may contribute to variability in attention bias. Attention bias to threat was measured in forty-two treatment-seeking adolescents (age 12ΓÇô16 years) diagnosed with Social Anxiety Disorder. Bias scores toward emotional stimuli (vigilant attention) and bias scores away from emotional stimuli (avoidant attention) were explored. Bias scores changed between vigilance and avoidance within individuals and over the course of stimulus presentation. These differences were not associated with participant characteristics nor with self-reported social anxiety symptoms. However, clinician rated severity of social anxiety, explained a significant proportion of variance in the bias scores for adult, but not the adolescent, stimuli. Variability in attention bias among socially anxious adolescents is common and varies as a function of stimulus duration and type. Results may inform stimulus selection for future research

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Cogn Behav Pract. 2019.

RESEARCH TO PRACTICE: IMPLEMENTATION OF FAMILY SCHOOL SUCCESS FOR PARENTS OF CHILDREN WITH ADHD.

Morris SH, Nahmias A, Nissley-Tsiopinis J, et al.

'Family-School Success' (FSS) is an efficacious intervention improving the home and school functioning of children with ADHD in grades 2ΓÇô6. An extension of this intervention designed for a younger population also showed positive effects for kindergarten and first grade students in a pilot study. Following the completion of these trials, FSS was implemented in a fee-for-service tertiary care ADHD center. The implementation process included adapting the manual and treatment procedures to be feasible outside the structure and support of a federally funded randomized control trial (RCT). The current study examines the process of adapting the treatment protocol and examines the acceptability and effectiveness of the adapted FSS, as well as predictors of family treatment response including parent engagement in treatment (as measured by attendance and homework adherence). A case study illustrates the adaptations to the intervention and its implementation in the clinic-based setting. In line with findings from clinical trials, families reported high satisfaction with the adapted FSS intervention and showed significant improvement in parental self-efficacy, child academic homework performance, and reduction in child impairment. Additionally, as in the initial FSS RCT, parental attendance in the adapted FSS program predicted child attention to academic homework, controlling for parental adherence to between-session homework. Furthermore, controlling for attendance at FSS sessions, parent adherence to between-session homework assignments predicted improvements in parent self-efficacy as well as child's homework productivity. These results replicate those of the original RCT and confirm that both session attendance and between-session homework completed are important for improvement during the program. Overall, this study provides support for the acceptability and effectiveness of this treatment model and suggests that future work toward dissemination to community-based settings would be worthwhile

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Complement Ther Med. 2019 Feb;42:389-99.

MASSAGE THERAPY FOR THE TREATMENT OF ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD) IN CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Chen SC, Yu BY, Suen LK, et al.

OBJECTIVE: To summarize the current evidence on the effects and safety of massage therapy for the treatment of ADHD in children and adolescents.

METHOD: A systematic review of 8 randomized controlled trials (RCTs) and 3 case series studies was conducted with a meta-analysis of 4 of the RCTs.

RESULTS: Pooled analysis showed that massage produced more improvement in ADHD symptoms in terms of effective rate compared to Ritalin (risk ratio: 1.39, 95%CI: 1.16-1.66; P=0.0004). Individual RCTs suggested that massage was differed significantly from waitlist control in improving the conditions of anxious-passive (mean difference: -11.7; 95%CI [-17.84, -5.56]; P=0.0002), and asocial behavior (mean difference=-8.60; 95%CI [-15.87, -1.33]; P=0.02).

CONCLUSION: Evidence suggests that massage therapy is beneficial for treating ADHD in children and adolescents

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Complement Ther Med. 2019 Feb;42:151-55.

WHITE NOISE AS A POSSIBLE THERAPEUTIC OPTION FOR CHILDREN WITH ADHD.

Pickens TA, Khan SP, Berlau DJ.

Attention deficit/hyperactivity disorder (ADHD) is a condition that affects many children and adults throughout the world. ADHD symptoms have been associated with changes in catecholamine release. Current therapies for ADHD have a variety of limitations that invite additional therapeutic options. White noise therapy has

previously been utilized to improve sleep and aspects of cognition in a variety of patient populations. Through a proposed phenomenon called stochastic resonance, white noise may have the ability to improve symptoms in children with ADHD. Empirically, white noise therapy has been able to improve certain tasks affected by ADHD symptoms, including speech recognition and reading and writing speed. Not all tasks affected by ADHD are improved, however, and significant logistical challenges remain before this therapy could be realistically implemented. In this review, there appears to be evidence that white noise therapy could be beneficial for patients with ADHD, and therefore further research is encouraged to establish parameters for maximum therapeutic benefit

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Developmental Medicine & Child Neurology. 2019 May;61:547-54.

COGNITIVE, ADAPTIVE, AND BEHAVIORAL PROFILES AND MANAGEMENT OF ALTERNATING HEMIPLEGIA OF CHILDHOOD.

Jasien JM, Bonner M, D'alli R, et al.

Aim: To determine the neuropsychological abnormalities that occur in alternating hemiplegia of childhood (AHC) and report on our experience in managing them.

Method: Patients underwent evaluations according to our standardized AHC pathway. Data were entered into our prospective AHC database and then analyzed.

Results: Of the cohort of 25 consecutive patients (ages 15 mo–42 y), eight had initial chief complaints about cognition, 14 language, five attention, and 11 behavior. As compared to population norms means, neuropsychological and behavioral assessment tools (including Child Behavior Checklist, Vineland Adaptive Behavior Scales, Peabody Picture Vocabulary, and Wechsler Intelligence Quotient tests) showed significant impairments in multiple domains: cognition, expressive and receptive language, executive function/attention, and behavior ($p < 0.05$ in all comparisons). Evaluations generated management recommendations in all patients. Twenty had neuropsychiatric diagnoses: 10 attention-deficit/hyperactivity disorder (ADHD), seven disruptive behavior, and three anxiety disorder. Eight out of nine patients with ADHD who were prescribed medications responded to pharmacotherapy.

Interpretation: Patients with AHC have developmental difficulties related to impairments in multiple neuropsychological domains. This supports the hypothesis that the underlying AHC pathophysiology involves diffuse neuronal dysfunction. Testing generated recommendations to help manage these difficulties. Patients with AHC also have a range of neuropsychiatric diagnoses, the most common being ADHD which responds to pharmacotherapy. What this paper adds Patients with alternating hemiplegia of childhood (AHC) have developmental difficulties with underlying neuropsychological impairments. The findings in this study are consistent with an underlying AHC pathophysiology which involves diffuse neuronal, probably largely GABAergic, dysfunction. Patients with AHC have a range of neuropsychiatric diagnoses, the most common being attention-deficit/hyperactivity disorder.

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Dev Neurorehabilitation. 2019.

SPECIFIC EFFECTS OF INDIVIDUALIZED COGNITIVE TRAINING IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): THE ROLE OF PRE-TRAINING COGNITIVE IMPAIRMENT AND INDIVIDUAL TRAINING PERFORMANCE.

Minder F, Zuberer A, Brandeis D, et al.

Objective: We investigated the impact of the pre-training neuropsychological (NP) impairment and of the training progress on the NP and behavioural outcome after computerized cognitive training (CogT) in children with ADHD.

Method: Thirty-one participants underwent individualized CogT (focussing on one or two cognitive domains: working memory, inhibition, attention) over 12-áweeks. NP tests and behaviour ratings served as outcome measures.

Results: After CogT, significant improvements emerged according to parents ratings, but only on very few NP test measures. Children with milder/no pre-training NP impairment showed larger improvements on behavioural ratings than more impaired children. A steeper training performance slope was related to better behavioural outcomes.
Conclusion: We find partial support for specific effects of CogT, but the assumption that an individually tailored selection of training tasks would be particularly beneficial for children with ADHD with NP deficits was not confirmed.
Trial registration number: NCT02358941

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Discov Med. 2018 Nov;26:197-206.

CLINICAL UTILITY OF THE COLD PRESSOR TEST: EVALUATION OF PAIN PATIENTS, TREATMENT OF OPIOID-INDUCED HYPERALGESIA AND FIBROMYALGIA WITH LOW DOSE NALTREXONE.

Oaks Z, Stage A, Middleton B, et al.

BACKGROUND: The cold pressor test (CPT) has been used in experimental paradigms to measure pain tolerance. It is used clinically to evaluate for opioid-induced hyperalgesia (OIH), as part of the clinical evaluation of fibromyalgia, to document reversal of OIH by low dose naltrexone (LDN), and to document the clinical response of fibromyalgia to LDN.
METHODS: We reviewed charts of 254 outpatients admitted to addiction medicine with chronic opioid treatment for pain, opioid addiction, or fibromyalgia. Controls were 46 non-addicted support persons. We invented the term "morphine years," a year at 60 mg/day, to estimate opioid exposure.
RESULTS: The mean age of patients was 41.4 years and controls 51.5. Age was not significantly correlated with CPT within each group. Female patients' mean CPT score (in seconds) was 35.0, male patients' 56.1, female controls' 110.8, male controls' 114.3. More morphine years correlated with younger age, more depression, higher prevalence of borderline personality disorder and attention deficit hyperactivity disorder, and low CPT. LDN increased CPT and reduced pain symptoms for both opioid users and fibromyalgia patients, with the increase being significantly higher for opioid users.
CONCLUSIONS: CPT is an objective complement to the subjective FACES pain scale. It gives an objective measure of changes in pain sensitivity accompanying administration of LDN. Limitations of a case series report are noted. SIGNIFICANCE: CPT is shown to be an objective test of pain tolerance with clinical applications: evaluation of OIH, evaluation of fibromyalgia, reversal of OIH, protracted withdrawal with LDN, and amelioration of fibromyalgia with LDN

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Emot Behav Difficulties. 2019.

TRACING UNIQUE TRAJECTORIES OF PARTICIPATION FOR A 'GIRL WITH ADHD': FROM 'UNWILLING STUDENT' TO 'AGENTIVE LEARNER'.

Evaldsson A-C, Svahn J.

The overall aim of this study is to explore how individual children with long-term school difficulties follow unique trajectories of participation in special educational needs settings, sometimes in unexpected ways, and how this contributes to alternative forms of identification and processes of learning. The data draws on long-term video-ethnographic work, tracing trajectories of participation during the course of a school year for an individual girl with an ADHD diagnosis who is a newcomer to a special support school in Sweden. We use a multi-layered theoretical and methodological framework to learning, identities and participation as situated practices to explore how the focal girl, through her everyday participation in classroom contexts structured to amplify the student's capabilities, gradually moves from an unwilling student to an agentive learner. Through a multimodal interactional analysis, we demonstrate how the focal girl's actions and the teacher's scaffolding responses are interactionally organised, and the emotional and relational dimensions in the creation of participation frameworks for learning. It is argued that the students agency and emerging

emotional engagement in school-based learning are intimately linked to the pursuit of building long-term learning relationships based on mutual trust

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Emot Behav Difficulties. 2019.

THE PREMISE, PROMISE AND DISILLUSION OF THE ADHD CATEGORISATION–FAMILY NARRATIVE ABOUT THE CHILD'S BROKEN SCHOOL TRAJECTORY.

Honkasilta J, Vehkakoski T.

This study presents co-narrated school experiences of a young Finnish girl diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) and those of her parents. The discourse analysis of the family interview focused on the discrepant ways family members gave meanings to and mobilised the ADHD categorisation while narrating their broken school trajectory. The results showed that the ADHD diagnosis was laden with the promise of the whole family being recognised differently by the school. However, this cultural promise proved disillusioning as daughterΓÇÖs support needs and parentsΓÇÖ expertise were not recognised nor did the diagnostic category emancipate from stigmatising identities and blame. Interestingly, the parents leaned more on the diagnostic categorisation while accounting for the disillusion of these promises, whereas the daughter aimed at distancing herself from the ADHD category and behaviour characteristics related to it. The discussion concludes by comparing the viewpoints of cure and care when catering to childrenΓÇÖs needs

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Emot Behav Difficulties. 2019.

TEACHING AND LEARNING IN THE SPECIAL EDUCATION SETTING: AGENCY OF THE DIAGNOSED CHILD .

Hjorne E, S+ñlj+Â R.

This article is based on an extensive study of teaching-learning processes in special educational settings organised for children diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). There is a general assumption that childrenΓÇÖs learning will be supported through placement in a special class with few students and one or more teachers present. The issues explored concern what educational practices unfold in these settings, i.e. what are the children learning, and how do they participate in the activities? The empirical study is based on video-recorded classroom interaction in eight ADHD-classes during a period of seven years, in total about 200 h. The results show that the interactional format dominating is characterised by one teacher instructing one child at a time. These situations usually seem to follow the well-known Initiative-Response-Feedback (I-R-F) structure. The contributions from the children are generally minimal, and there is no indication that the studentΓÇÖs role in such dyads is more active. Thus, there is little evidence that childrenΓÇÖs learning will improve and that they become more focussed and assume a more participatory role in the interactional formats offered in special classes. Also, it is not obvious how experiences of this kind will prepare children for a return to regular classroom or develop towards becoming active citizens

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Environ Health Perspect. 2019 Mar;127:34001.

ATTENTION WORTHY: PRENATAL PHTHALATE EXPOSURE AND SUBSEQUENT ADHD DIAGNOSIS.

Barrett JR.

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Epidemiol Psychiatr Sci. 2019.

A RISK CALCULATOR TO PREDICT ADULT ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: GENERATION AND EXTERNAL VALIDATION IN THREE BIRTH COHORTS AND ONE CLINICAL SAMPLE.

Caye A, Agnew-Blais J, Arseneault L, et al.

Aim Few personalised medicine investigations have been conducted for mental health. We aimed to generate and validate a risk tool that predicts adult attention-deficit/hyperactivity disorder (ADHD).

Methods Using logistic regression models, we generated a risk tool in a representative population cohort (ALSPAC - UK, 5113 participants, followed from birth to age 17) using childhood clinical and sociodemographic data with internal validation. Predictors included sex, socioeconomic status, single-parent family, ADHD symptoms, comorbid disruptive disorders, childhood maltreatment, ADHD symptoms, depressive symptoms, mother's depression and intelligence quotient. The outcome was defined as a categorical diagnosis of ADHD in young adulthood without requiring age at onset criteria. We also tested Machine Learning approaches for developing the risk models: Random Forest, Stochastic Gradient Boosting and Artificial Neural Network. The risk tool was externally validated in the E-Risk cohort (UK, 2040 participants, birth to age 18), the 1993 Pelotas Birth Cohort (Brazil, 3911 participants, birth to age 18) and the MTA clinical sample (USA, 476 children with ADHD and 241 controls followed for 16 years from a minimum of 8 and a maximum of 26 years old).

Results The overall prevalence of adult ADHD ranged from 8.1 to 12% in the population-based samples, and was 28.6% in the clinical sample. The internal performance of the model in the generating sample was good, with an area under the curve (AUC) for predicting adult ADHD of 0.82 (95% confidence interval (CI) 0.79-0.83). Calibration plots showed good agreement between predicted and observed event frequencies from 0 to 60% probability. In the UK birth cohort test sample, the AUC was 0.75 (95% CI 0.71-0.78). In the Brazilian birth cohort test sample, the AUC was significantly lower -0.57 (95% CI 0.54-0.60). In the clinical trial test sample, the AUC was 0.76 (95% CI 0.73-0.80). The risk model did not predict adult anxiety or major depressive disorder. Machine Learning approaches did not outperform logistic regression models. An open-source and free risk calculator was generated for clinical use and is available online at https://ufrgs.br/prodah/adhd-calculator/.

Conclusions The risk tool based on childhood characteristics specifically predicts adult ADHD in European and North-American population-based and clinical samples with comparable discrimination to commonly used clinical tools in internal medicine and higher than most previous attempts for mental and neurological disorders. However, its use in middle-income settings requires caution

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Epilepsy Behav. 2019;95:61-64.

AUTISM SPECTRUM DISORDER AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER-RELATED SYMPTOMS IN BENIGN CHILDHOOD EPILEPSY WITH CENTROTEMPORAL SPIKES: A PROSPECTIVE CASEΓÇôCONTROL STUDY.

Bektas G, Tekin U, Yildiz EP, et al.

Background: Benign childhood epilepsy with centrotemporal spikes (BECTS), one of the most common idiopathic epilepsy syndromes in children, has been associated with neuropsychological problems. Purpose: The objective of this study was to investigate the frequency of symptoms related to comorbid neurodevelopmental disorders, the autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) in children with typical BECTS, and to identify corresponding risk factors.

Methods: Children and adolescents with typical BECTS aged 6ΓÇô16 years were included in the study period from January 1, 2017, to December 31, 2017. Children with atypical presentations of BECTS, other neurological disorders, and preexisting neuropsychiatric disorders were excluded. The ASD and ADHD were assessed by the Social Communication Questionnaire (SCQ) and the Turgay Diagnostic and Statistical Manual of Mental Disorders 4th Edition Disruptive Behavior Disorders Rating Scale (T-DSM-IV-S), respectively. Patients' scores were compared with those of healthy subjects. Correlation analyses were performed to evaluate the association between the age at seizure onset, the total number of seizures and the SCQ and T-DSM-IV-S scores.

Results: Fifty-eight children with BECTS and 60 healthy children participated in the study. The total SCQ score, the SCQ reciprocal social interaction score, and the SCQ communication score significantly differed

between children with BECTS and the control group (p = 0.001, p < 0.001, p = 0.001, respectively). The total ADHD score was significantly different between patients and controls (p < 0.001). A significant difference was observed between patients and controls in terms of the T-DSM-IV-S hyperactivity impulsivity score and the T-DSM-IV-S inattention score (p = 0.012, p < 0.001, respectively). The age at seizure onset was significantly correlated with the total SCQ score (p = 0.03). The Spearman's correlation coefficient was 0.352 for the total SCQ score, indicating a positive association between the age at seizure onset and the total SCQ score.
Conclusion: Children with typical BECTS may have an increased risk of suffering from symptoms of ASD and ADHD. Children with late onset of seizures may be more likely to develop neuropsychological disturbances regarding ASD and ADHD

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Eur Psychiatry. 2019 Apr;57:1-9.
AWARENESS AND PERCEPTIONS OF CLINICAL GUIDELINES FOR THE DIAGNOSTICS AND TREATMENT OF SEVERE BEHAVIOURAL PROBLEMS IN CHILDREN ACROSS EUROPE: A QUALITATIVE SURVEY WITH ACADEMIC EXPERTS.
Gatej AR, Lamers A, van DL, et al.
BACKGROUND: Severe behavioural problems (SBPs(1)) in childhood are highly prevalent, impair functioning, and predict negative outcomes later in life. Over the last decade, clinical practice guidelines for SBPs have been developed across Europe to facilitate the translation of scientific evidence into clinical practice. This study outlines the results of an investigation into academic experts' perspectives on the current prevalence, implementation, and utility of clinical guidelines for SBPs in children aged 6-12 across Europe.
METHODS: An online semi-structured questionnaire was completed by 28 psychiatry and psychology experts from 23 countries.
RESULTS: Experts indicated that approximately two thirds of the included European countries use at least an unofficial clinical document such as textbooks, while nearly half possess official guidelines for SBPs. Experts believed that, although useful for practice, guidelines' benefits would be maximised if they included more specific recommendations and were implemented more conscientiously. Similarly, experts suggested that unofficial clinical documents offer a wide range of treatment options to individualise treatment from. However, they stressed the need for more consistent, evidence-based clinical practices, by means of developing national and European clinical guidelines for SBPs.
CONCLUSIONS: This study offers a preliminary insight into the current successes and challenges perceived by experts around Europe associated with guidelines and documents for SBPs, acting as a stepping stone for future systematic, in-depth investigations of guidelines. Additionally, it establishes experts' consensus for the need to develop official guidelines better tailored to clinical practice, creating a momentum for a transition towards European clinical guidelines for this population

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Eur Arch Psychiatry Clin Neurosci. 2019.
ATTENTION AS NEUROCOGNITIVE ENDOPHENOTYPE OF ADHD ACROSS THE LIFE SPAN: A FAMILY STUDY.
Boxhoorn S, Lopez E, Schmidt C, et al.
Endophenotypes mediate pathways between genetic variations and the psychiatric phenotype, or share genetic risk with the psychiatric phenotype. Identifying endophenotypes is an important step to unravel disease pathways underlying complex psychiatric phenotypes such as ADHD. Potential viable endophenotypes for ADHD across the lifespan are neurocognitive measures of basic attention functions, such as sustained attention, and executive attention functions (EF), such as inhibition. The present study evaluated the endophenotype criteria of familiality and state-independency for measures of basic attention and EF in affected- and unaffected parents of children with ADHD (N = 139), and typically developing children (N = 60). In addition, the added value of neurocognitive measures relative to questionnaire data in genetically informed designs was explored by comparing the intergenerational transmission of neurocognitive measures

to those of ADHD symptom scores. Results revealed small-to-medium-sized familial effects of ADHD for reaction time measures of EF components and state-independency given familial effects. ParentΓÇôchild correlations as estimates of intergenerational transmission of those neurocognitive measures were not higher than those of behavioral ADHD symptom ratings. Taken together, our results argue against neurocognitive measures as pivotal endophenotypes for ADHD across the lifespan. If studied as neurocognitive endophenotypes of ADHD in adults, reaction time measures of executive rather than basic attention function seem to be more sensitive

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Eur Child Adolesc Psychiatry. 2019;28:719-29.

OXIDATIVE STRESS AND IMMUNE ABERRANCIES IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): A CASE-CONTROL COMPARISON.

Verlaet AAJ, Breynaert A, Ceulemans B, et al.

The objective of this study is to compare oxidative stress and immune biomarkers between attention-deficit/hyperactivity disorder (ADHD) patients and controls without ADHD. A caseΓÇôcontrol comparison between 57 paediatric (6ΓÇô12-áyears) untreated ADHD patients from the Antwerp University Hospital and 69 controls without ADHD from random schools in Flanders, Belgium, was conducted. Erythrocyte glutathione (GSH) and plasma lipid-soluble antioxidants (retinol, +¦-tocopherol, +¦-tocopherol, retinyl palmitate, +¦-carotene, and co-enzyme Q10) were determined by HPLC with electrochemical detection, plasma malondialdehyde (MDA) by HPLC with fluorescence detection, plasma cytokines (interleukin (IL)-1+¦, IL-5, IL-6, IL-8, IL-10, tumour necrosis factor (TNF) and interferon (INF)-+¦) and immunoglobulins (IgE, IgG and IgM) by flow cytometry and urinary 8-hydroxy-2ΓÇ¦deoxyguanosine (8-OHdG) levels by ELISA assay. Dietary habits were determined by a food frequency questionnaire. Plasma MDA levels were on average 0.031-á-ÁM higher in patients than in controls ($p < 0.05$), and a trend for higher urinary 8-OHdG was observed. Erythrocyte GSH and plasma retinyl palmitate levels, as well as IgG and IgE levels, were higher in patients than in controls as well (on average 93.707-á-Ág/ml, 0.006-á-Ág/ml, 301.555-á-Ág/ml and 125.004-á-Ág/ml, resp., $p < 0.05$). Finally, a trend for lower plasma IL-5 levels was observed. After Bonferroni correction for multiple testing, the difference in GSH levels remained statistically significant (nominally significant for retinyl palmitate), while significance was lost for MDA, IgG and IgE levels. Dietary habits do not appear to cause the observed differences. These results point at the potential involvement of slight oxidative stress and immune disturbances in ADHD

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Eur Child Adolesc Psychiatry. 2019.

GENETIC AND ENVIRONMENTAL INFLUENCES ON ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS IN CHINESE ADOLESCENTS: A LONGITUDINAL TWIN STUDY.

Zheng Y, Pingault J-B, Unger JB, et al.

Attention-deficit/hyperactivity disorder (ADHD) is a highly heritable neurodevelopmental disorder. However, no study has examined genetic and environmental influences in the longitudinal developmental course of ADHD symptoms in a non-Western population. This study investigated changes of genetic and environmental influences and their contributions to the stability and change of ADHD symptoms of hyperactivity/impulsivity and inattention in Chinese adolescent twins. A prospective sample of 602 twin pairs (48% male) self-reported both DSM-IV ADHD symptom subscales three times at the approximate age of 12, 13, and 15-áyears. Longitudinal multivariate genetic analyses through structural equation modelling examined genetic and environmental contributions to the developmental course of ADHD symptoms. From early (time 1 and 2) to middle adolescence (time 3), both symptoms showed modest and non-significant genetic influences that became substantial and significant, whereas shared environmental influences were substantial and significant and became modest and non-significant. The same genetic factors influenced ADHD symptoms throughout adolescence, while shared and non-shared environmental influences largely came from new

emerging factors. In early adolescence, genetic factor contributed to the stability of inattention, whereas shared environmental factor contributed to the stability of hyperactivity/impulsivity. Genetic influences of ADHD tended to be smaller, whereas shared environmental influences tended to be larger in Chinese than in Western populations. Genetic factors played a large role in the stability of ADHD throughout adolescence, while shared and non-shared environment primarily contributed to its change. Findings highlight the importance of shared family, neighbourhood, and community experiences on child psychopathology in a collectivistic culture such as the Chinese society

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Eur J Health Econ. 2013;14:939-45.

TREATMENT COSTS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN GERMANY.

Braun S, Zeidler J, Linder R, et al.

Background: Attention deficit hyperactivity disorder (ADHD) is one of the most common behavioural disorders among children and adolescents. The number of patients as well as prescriptions to treat this disease has continuously increased over the past few years. The aim of the present study was to analyse the costs for treating ADHD patients from the perspective of a major German health insurance fund.

Methodology: Anonymised administrative claims data were available for the study. All services reimbursed by the health fund for the selected ADHD patients were recorded. Apart from the resource use attributed directly to ADHD, co-morbidities as well as incremental costs were described based on a control group design.

Results: A total of 30,264 ADHD patients were diagnosed in 2008. The total costs for these patients were 3,888, and the incremental costs were 2,902. The largest proportions of incremental costs were due to therapeutic devices and remedies like occupational therapy amounting to 1,270. Proportionate costs of Γé¼263 have been settled for pharmacotherapy with Methylphenidate and Atomoxetine. However, 41 % of the patients were not treated with ADHD-related pharmaceuticals.

Conclusions: ADHD costs are relevant from health insurance perspective. The expenses for occupational therapy constitute the cost driver. Compared to the findings of studies from the United States and contrarily to the backdrop of public discussions about considerably increased prescriptions of ADHD-specific drugs, the significantly higher additional expenses for occupational therapy services are impressing. This kind of therapy is internationally rather unknown and is therefore not acknowledged as a therapeutic standard. -® 2012 Springer-Verlag Berlin Heidelberg

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Eur J Pediatr. 2019.

RETHINKING ADHD INTERVENTION TRIALS: FEASIBILITY TESTING OF TWO TREATMENTS AND A METHODOLOGY.

Fibert P, Peasgood T, Relton C.

Attention deficit hyperactivity disorder (ADHD) is a lifelong condition associated with considerable costs. The long-term effectiveness and acceptability of treatments to improve outcomes remains in doubt. Long-term trials are needed comparing interventions with standard care and each other. The Sheffield Treatments for ADHD Research (STAR) project used the Trials within Cohorts (TwiCs) approach. A cohort of children with ADHD was recruited and outcomes collected from carers and teachers. A random selection was offered treatment by homoeopaths (hom) or nutritional therapists (NT). Their outcomes (Conners Global ADHD Index) were compared with those not offered interventions. The feasibility of the methods and interventions was assessed. The TwiCs approach was feasible with modifications. 144 participants were recruited to the cohort, 83 offered treatment, 72 accepted, and 50 attended 1+ appointments. Results according to carers assessments at 6-ámonths were as follows: t = 1.08, p =.28 (ΓêÆ 1.48, 4.81) SMD.425 (hom); t = 1.71, p =.09 (ΓêÆ.347, 5.89), SMD =.388 (NT). TeachersΓÇÖ responses were too few and unstable. No serious treatment adverse events occurred. Conclusion: the STAR project demonstrated the feasibility of the TwiCs approach for testing interventions for children with ADHD.What is Known:ΓÇó Attention deficit hyperactivity

disorder (ADHD) is a lifelong condition associated with considerable costs to ADHD stakeholders. Children are at risk of negative outcomes and in need of pre-emptive strategiesΓÇó The long-term effectiveness and acceptability of recommended treatments to improve outcomes remains in doubtWhat is New:ΓÇó A small-scale test of the design demonstrated that the Trials within Cohorts (TwiCs) approach is feasible and can make a useful contribution regarding testing the effectiveness of interventions for children with ADHD to improve long-term negative outcomesΓÇó Treatment by homoeopaths and nutritional therapists may offer novel opportunities to improve outcomes

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Evidence-Based Practice in Child and Adolescent Mental Health. 2019;4:18-41.

THE COLLABORATIVE LIFE SKILLS PROGRAM IN SPANISH (CLS-S): PILOT INVESTIGATION OF INTERVENTION PROCESS, OUTCOMES, AND QUALITATIVE FEEDBACK.

Haack LM, Araujo EA, Delucchi K, et al.

Behavioral intervention trials for Attention-Deficit/Hyperactivity Disorder (ADHD) consistently document favorable fidelity and outcome results. However, less is known about the generalizability of these findings to non-English-speaking minority groups. To address existing gaps in the availability and evaluation of school-home interventions for Spanish-speaking Latinos, we adapted the Collaborative Life Skills (CLS) Program for Spanish-speaking families (i.e., CLS-S) and implemented/evaluated the adapted program in a pilot study. Participants included 24 Latino children in grades second-fifth across four elementary schools; two of these schools (n = 12) were assigned to receive CLS-S and two schools (n = 12) were assigned to usual school services followed by CLS-S after completion of the trial. Results suggest CLS can be successfully implemented in Spanish, as evidenced by high levels of CLS-S fidelity to intervention, as well as high levels of participant attendance and adherence to treatment strategies. Results also suggest promising outcomes from CLS-S, as evidenced by significant post-treatment improvement in ADHD and ODD symptoms reported by parents/caregivers and teachers, social skills reported by parents/caregivers, and organizational problems reported by teachers for treated families compared to families receiving school services as usual. Parent/caregiver reports of ADHD and ODD symptom improvement also are significant at follow-up during the next school year. Qualitative themes emerged supporting CLS-S process and outcome results, including parent/caregiver appreciation of the collaborative design, rapport with staff, and ease of CLS-S employment. Taken together, mixed-method findings support translating evidence-based interventions for theoretically-guided implementation/evaluation in our increasingly diverse communities

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Expert Opin Drug Saf. 2019 Apr;18:333-37.

COLLABORATION BETWEEN PATIENT AND PHARMACOVIGILANCE ORGANIZATIONS TO GAIN INSIGHT INTO ADULTS' EXPERIENCES WITH DRUG USE AND ADRS FOR THE TREATMENT OF ADHD.

Weits G, Harmark L, Hartman J, et al.

BACKGROUND: Patient organizations have good access to patients, which can be of interest in gaining knowledge about patients' experiences with drugs. The aim of this study is to investigate if a collaboration between a pharmacovigilance center and an ADHD patient organization can give more insight in patients' experiences with drug use and ADRs for the treatment of AD(H)D.

METHODS: Pharmacovigilance Centre Lareb and ADHD patient organization Impuls & Woortblind created a web-based questionnaire asking about patients' experiences with drug use and ADRs. Patients were approached to participate by e-mail and an open web-link. They were also asked to report ADRs through the official reporting form of Lareb.

RESULTS: A total of 1160 patients completed the questionnaire, of which 75.2% of the respondents experienced ADRs and 60.7% discontinued treatment because of an ADR. More than 70% experienced positive effects of their drugs. Additionally, 5.0% of the respondents reported their ADRs to Lareb.

CONCLUSIONS: Collaboration with patient organizations provide useful insight into patients' experiences with drug use and ADRs taking into account establishing clear 'rules of engagement'. An active approach to collaborate with patient organizations is a way forward to gain more information about drug use and ADRs in a selective cohort

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Frontiers in Neuroscience. 2019;13.

DIFFERENTIAL GENETIC EFFECT OF THE NOREPINEPHRINE TRANSPORTER PROMOTER POLYMORPHISMS ON ATTENTION PROBLEMS IN CLINICAL AND NON-CLINICAL SAMPLES.

Nemoda Z, Angyal N, Tarnok Z, et al.

Among the monoaminergic modulatory neurotransmitters, norepinephrine is involved in task orienting, hence noradrenergic genetic variants have been studied in connection to attentional processes. The role of this catecholamine system is also highlighted by the selective norepinephrine transporter blocking atomoxetine, which has proved to be effective in the pharmacological treatment of Attention Deficit Hyperactivity Disorder (ADHD). In the present genetic association study three single nucleotide polymorphisms (rs28386840, rs2242446, rs3785143 SNPs) were analyzed from the 5ΓÇ¦ region of the norepinephrine transporter (NET, SLC6A2) gene, which have been linked to ADHD previously. Attention problems scores of the mother-rated Child Behavior Checklist (CBCL) were used in separate analyses of 88 preschoolers (59.1% male, 6 years of age) recruited from the general population and 120 child psychiatry patients with ADHD diagnosis (85.8% male, age: 9.8 -¦ 2.9). The NET SNPs showed associations with attention problems, but the direction was different in the two groups. Regarding the promoter variant rs28386840, which showed the most consistent association, the T-allele-carrier patients with ADHD had lower CBCL attention problems scores compared to patients with AA genotype (p = 0.023), whereas T-allele-carriers in the community sample had more attention problems (p = 0.042). Based on previous reports of lower NE levels in ADHD children and the inverted-U shape effect of NE on cognitive functions, we propose that rs28386840 (- 3081) T-allele, which is associated with lower NET expression (and potentially higher synaptic NE level) would support attention processes among ADHD patients (similarly as atomoxetine increases NE levels), whereas it would hinder cortical functions in healthy children

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Gac Med Mex. 2018;154:657-64.

COMPARISON OF SYMPTOMS OF HYPERACTIVITY AND INATTENTION IN ADOLESCENTS WITH AND WITHOUT A HISTORY OF PREGNANCY.

Aldrete-Cortez V, Tafoya SA, Meillon F, et al.

Introduction: Teenage pregnancy has a negative impact both on mother's health and on her offspring quality life and development. In spite of its important social relevance, behavioral factors that can favor its occurrence have not been extensively explored.

Objective: To compare symptoms of inattention and hyperactivity between adolescents with and without a history of pregnancy.

Method: A sociodemographic record and the attention deficit hyperactivity disorder questionnaire (ADD) of the Neuropsi instrument were applied to 60 adolescents: 30 cases and 30 controls. The ADD was answered by the adolescents themselves, as well as by a close relative (parent or spouse) or by one of their teachers.

Results: From the perspective of others (parents and teachers), adolescents with a history of pregnancy showed more symptoms of attention deficit and higher attention deficit and hyperactivity overall score (both p 0.01). In addition, ADD overall score was found to be associated with adolescent pregnancy (OR = 1.11, 95% CI = 1.01-1.24, p = 0.036)

Conclusions: Symptoms of attention deficit and hyperactivity can represent another factor associated with teenage pregnancy

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Gazi Medical Journal. 2019;30:114-18.

EVALUATION OF NEUROPSYCHOLOGICAL TEST PERFORMANCE OF PATIENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Sebnem Soysal Acar, et al.

Objective: The aim of this study was to assess the neuropsychological test performance of children with attention deficit hyperactivity disorder (ADHD) and normal/high- intelligence.

Methods: Patients who were admitted to the Gazi University School of Medicine, pediatric neurology outpatient clinic for complaints of attention deficit, hyperactivity and had a diagnosis of ADHD and did not use medication for at least 2 months were included the study. The control group was selected among the students who attend the primary schools affiliated to the Ministry of Education in Ankara. After a preliminary evaluation with the Wechsler Children's Intelligence Scale (WISC-R) in the diagnosis group, all participants were assessed by Raven Standard Progressive Matrices Test (RSPM) and Stroop Test TBAG form.

Results: The ADHD group consisted of 80 male 6-10 years (72-131 months) and control group consisted of 73 male, 6-10 years (72-131 months). The scores obtained from the RSPM were found to be higher for all subtests in the control group than in ADHD group. All subtests scores in Stroop Test TBAG form were found to be lower than ADHD group.

Conclusion: This study emphasizes that RSPM is an effective tool for evaluating ADHD subtypes, assessing regular and accurate thinking, mental skill and speed of action, general competence, visual-spatial processes and analytical intelligence, and using it in the follow up of ADHD. Furthermore, the stroop test demonstrated the sensitivity of children to assessing executive functioning in the presence of ADHD, impaired behaviour, and oppositional defiant disorder

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Genes Brain Behav. 2019.

A FUNCTIONAL VARIANT IN SLC1A3 INFLUENCES ADHD RISK BY DISRUPTING A HSA-MIR-3171 BINDING SITE: A TWO-STAGE ASSOCIATION STUDY.

Huang X, Zhang Q, Chen X, et al.

Attention-deficit hyperactivity disorder (ADHD) is one of the most common neuropsychiatric disorders in children and adolescents with high heritability. Evidence is accumulating that SLC1A3 may play a role in ADHD etiology. Therefore, a two-stage case-control study was conducted on 752 cases and 774 controls to explore the role of SLC1A3 in ADHD. Bioinformatic annotations and functional experiments were applied to reveal the potential biological mechanisms. Finally, SLC1A3 rs1049522 showed significant association with ADHD risk in two stages with CA genotype vs AA genotype, odds ratio (OR) = 0.694 (95% confidence interval, CI = 0.570-0.844) and dominant model, OR = 0.749 (95% CI = 0.621-0.904) in the combined stage. Besides, rs1049522 was found to be related to ADHD hyperactive/impulsive symptom, and rs1049522-C showed increased SLC1A3 mRNA expression in the cerebellar cortex. Dual-luciferase reporter assay further indicated that rs1049522-C allele enhanced SLC1A3 expression by disrupting the hsa-miR-3171 binding site. In conclusion, SLC1A3 variant rs1049522 was implicated in ADHD susceptibility in a Chinese Han population probably by enhancing the SLC1A3 expression in a miRNA-mediated manner

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Hong Kong J Paediatr. 2019;24:65-69.

PREVALENCE, RISK FACTORS AND IMPACT OF ADHD ON CHILDREN WITH RECENT ONSET EPILEPSY.

Ngan M, Tsang B, Kwong K.

Introduction: Attention deficit hyperactivity disorder (ADHD) is the most common psychiatric comorbidity amongst children with epilepsy. We identified the prevalence, risk factors associated with ADHD and the impact of ADHD on seizure outcome in Hong Kong children with recent onset epilepsy.

Methods: Children aged 6-18 years old with recent onset epilepsy with follow up in a regional hospital were recruited. Chinese Strengths and Weaknesses of ADHD-Symptoms and Normal-Behaviours Questionnaire was administered. Children with ADHD scores above cut-off were compared to those below cut-off for identification of demographic and seizure related variables.

Results: Forty-eight children with recent onset epilepsy were recruited. Ten (20.8%) had ADHD scores above cut-off. Younger age at seizure onset (OR 1.41, 95% CI 1.05-1.88, p=0.009) and younger age at time of study (OR 1.32, 95% CI 1.01-1.73, p=0.009) were significant risk factors for ADHD. ADHD was not associated with seizure outcome, discontinuation of anticonvulsant or need of polytherapy.

Conclusions: There is an increased prevalence of ADHD amongst children with recent onset epilepsy compared with the general population. Screening for ADHD in children with recent onset epilepsy is recommended

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Hum Brain Mapp. 2019;40:2677-98.

COMORBIDITY OF READING DISABILITIES AND ADHD: STRUCTURAL AND FUNCTIONAL BRAIN CHARACTERISTICS.

Langer N, Benjamin C, Becker BLC, et al .

Reading disabilities (RD) and attention-deficit/hyperactivity disorder (ADHD) are two of the most common developmental disorders. RD and ADHD frequently co-occur, which raises questions about how the disorders interact and to what extent they can be differentiated. To date, the underlying neural mechanisms leading to RDΓÇôADHD comorbidity (COM) are not understood. In this study, structural and functional magnetic resonance imaging (fMRI) were combined with comprehensive behavioral testing in order to characterize the behavior, brain structure, and neural correlates of executive function, phonological processing and reading fluency in 60 children with clinical diagnoses of RD, ADHD, or COM, and controls. Whole-brain analyses of variance were performed on cortical thickness values and on the data of the three fMRI tasks to investigate overall group differences. To validate these findings, a region of interest analysis was performed in regions that have previously been shown to exhibit group differences in children with RD or ADHD using the same paradigms. The neuroimaging results demonstrated structural and functional atypicalities for COM in regions that are frequently associated with deficits in children with isolated ADHD or RD. A combination of shared and distinctive brain alterations between the clinical groups was identified, supporting the multiple deficit model for ADHD, RD, and its comorbidity

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International Journal of Environmental Health Research. 2019.

SWIMMING TRAINING IMPROVES MENTAL HEALTH PARAMETERS, COGNITION AND MOTOR COORDINATION IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Da Silva LA, Doyenart R, Henrique SP, et al.

The aim of this study was to verify the effects of swimmingΓÇôlearning program of mental health parameters, cognition and motor coordination in students with Attention Deficit Hyperactivity Disorder (ADHD). Thirty-three children of both sexes between 11 and 14 years were randomized into trained group (n = 18) and untrained group (n = 15). The training was performed for 8 weeks. Then, before and after 48 h of training period of both groups were submitted to find the mental health, cognition, motor coordination test, and physical fitness. Our results demonstrate that the aquatic exercise program significantly improved the depression parameters (p = 0.048), stress (p = 0.039), cognitive flexibility (p = 0.042) and selective attention

(p = 0.047). In relation to motor coordination and physical fitness, the results showed significant improvements in the coordination of lower limbs laterality (p = 0.05), flexibility (p = 0.049), and abdominal resistance (p = 0.037). Taken together, the results suggest that swimmingΓÇôlearning program significantly improved the mental health, cognition, and motor coordination in children with ADHD

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Int J Environ Res Public Health. 2019;16.

DEVELOPMENT AND VALIDATION OF THE PARENTAL SMARTPHONE USE MANAGEMENT SCALE (PSUMS): PARENTS' PERCEIVED SELF-EFFICACY WITH ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Hsieh Y-P, Yen C-F, Chou W-J.

The psychometric properties of the Parental Smartphone Use Management Scale (PSUMS) and its prospective relationships with symptoms of smartphone addiction and attention deficit hyperactivity disorder (ADHD) were studies in a sample of parents of adolescents with ADHD. This is a scale to measure parentsΓÇÖ perceived self-efficacy on managing their childrenΓÇÖs smartphone use. Construct validity (exploratory factor analysis and confirmatory factor analysis), criterion-related validity (known-group validity and concurrent validity), and reliability (CronbachΓÇÖs alpha) were performed for data analyses. The results showed that the PSUMS had good factorials validity and high reliabilities, with CronbachΓÇÖs alphas ranging between 0.93 and 0.95. The 17-item PSUMS accounted for 78.58% of the total variance and contains three theoretically and statistically appropriate subscales: reactive management, proactive management, and monitoring. Strong relationships were found between parental smartphone use management and symptoms of smartphone addiction and ADHD in expected directions. Moreover, parents of children with smartphone addiction yielded lower scores on all three PSUMS subscales than parents of children without smartphone addiction. The PSUMS is considered a valuable and reliable tool in the study of parental management on their adolescent childrenΓÇÖs smartphone use, while providing us with important targets for intervention

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Int J Environ Res Public Health. 2019;16.

PRE-PREGNANCY WEIGHT AND SYMPTOMS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER AND EXECUTIVE FUNCTIONING BEHAVIORS IN PRESCHOOL CHILDREN.

Fuemmeler BF, Zucker N, Sheng Y, et al.

This study examines pre-pregnancy Body Mass Index (BMI) and gestational weight gain (GWG) in relation to early childhood Attention Deficit Hyperactivity Disorder (ADHD) symptoms and related executive self-regulation behaviors. The analyses sample (n = 331) included a subsample of participants from a birth cohort recruited from prenatal clinics and hospital facilities from April 2005 to June 2011 in Durham, North Carolina. Pre-pregnancy BMI was calculated from weight at the last menstrual period and height was extracted from medical records. Gestational weight gain was calculated from pre-pregnancy weight and weight measured at the time of delivery. ADHD symptoms and executive self-regulation behaviors were assessed by maternal report (mean age = 3 years). Multivariable regression methods with inverse probability weighting (IPW) were used to evaluate associations accounting for sample selection bias and confounding. Pre-pregnancy BMI at levels ΓëÑ35 was positively associated with higher ADHD symptoms and worse executive self-regulation behaviors (inhibitory control and attention). Compared to adequate GWG, less than adequate GWG was related to more ADHD hyperactive-impulsive symptoms, whereas greater than adequate GWG was related to more problematic behaviors related to working memory and planning. The findings support a link between maternal weight and child neurodevelopment. Continued research that help identify biological mechanisms are needed

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J Res Health Sci. 2018 Dec;18:e00432.

THE PREVALENCE OF PSYCHIATRIC DISORDERS IN CHILDREN AND ADOLESCENTS IN HAMADAN PROVINCE, WEST OF IRAN.

Ahmadpanah M, Nazaribadie M, Mohammadi MR, et al.

BACKGROUND: There are numerous reports regarding increasing childhood and adolescent mental health problems. The aim of this study was to determine the prevalence of psychiatric disorders in Hamadan Province, west of Iran from July 2016 to May 2017.
STUDY DESIGN: A cross-sectional study.
METHODS: The sample included 1025 Hamadan residents selected using multistage cluster sampling. Psychiatric disorders were assessed by semi-structured psychiatric interview Kiddie-Sads-Present and Lifetime Version (K-SADS-PL). The data were analyzed using the SPSS software. We used the multivariable logistic regression to predict the Odds Ratios (ORs).
RESULTS: The prevalence of total psychiatric disorder was 8.6%. Psychiatric disorders in boys were higher than girls (12.6% and 4.9%, respectively). The psychiatric disorders were most prevalent in 6-9 yr old age group (11%). The prevalence of behavioral disorder was 3.8% with attention deficit hyperactivity disorder (ADHD) as the most prevalent case (2.0%). The prevalence of anxiety disorder was 2.8% in which the highest prevalence belonged to separation anxiety disorder (SAD) (1.1%). The prevalence of neurodevelopment disorder was 1.5% with the highest prevalence of 1% observed in epilepsy. The prevalence of mood disorder was 1.1% with the depressive disorder as the most prevalent one (1.0%). The prevalence of enuresis was 2.7%. The most common comorbidities were anxiety and mood disorders 5(50.0%).
CONCLUSION: The prevalence of these disorders in Hamadan was less than the prevalence in other cities of Iran. These findings can be helpful for large-scale planning for children and adolescents

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J Abnorm Child Psychol. 2019 Apr;47:605-17.

SENSITIVITY TO PEER FEEDBACK IN YOUNG ADOLESCENTS WITH SYMPTOMS OF ADHD: EXAMINATION OF NEUROPHYSIOLOGICAL AND SELF-REPORT MEASURES.

Babinski DE, Kujawa A, Kessel EM, et al.

Many youth with ADHD experience peer difficulties, but the mechanisms underlying this dysfunction remain unknown. Very little work has examined neurophysiological measures of social feedback processing in relation to ADHD symptoms. The goal of this study was to examine associations of ADHD symptoms with indicators of sensitivity to social feedback in a laboratory task and self-report of rejection sensitivity. A large community sample of 10- to 15-year-old adolescents (N = 391; Mage = 12.64, 48.6% girls) participated in the study. Mothers rated youth ADHD symptoms. Youth completed the Island Getaway task, which elicits neurophysiological (i.e., event-related potentials [ERP]) measures of sensitivity to peer rejection and acceptance feedback, and also completed self-ratings of rejection sensitivity. Greater ADHD symptoms were associated with an enhanced N1 ERP component, which correlated with higher levels of self-reported rejection sensitivity. In addition, greater ADHD symptoms were associated with reduced reactivity to social acceptance, as measured by the later reward positivity ERP component. Youth with elevated ADHD symptoms exhibited enhanced sensitivity to peer rejection at the neurophysiological and self-report level, as well as reduced neurophysiological reactivity to peer acceptance. Future work including neural measures of social functioning may serve to elucidate mechanisms underlying the social dysfunction characteristic of ADHD

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J Autism Dev Disord. 2019.

FROM TODDLERHOOD TO ADOLESCENCE: WHICH CHARACTERISTICS AMONG TODDLERS WITH AUTISM SPECTRUM DISORDER PREDICT ADOLESCENT ATTENTION DEFICIT/HYPERACTIVITY SYMPTOM SEVERITY? A LONG-TERM FOLLOW-UP STUDY.

Zachor DA, Ben-Itzchak E.

High rates of attention deficit/hyperactivity disorder (ADHD) comorbidity have been described in autism spectrum disorder (ASD). This study searched for predictors at toddlerhood of the severity of ADHD symptoms at adolescence. The study included 65 participants, (mean age = 13:8-áyear), diagnosed with ASD at toddlerhood. Participants underwent a comprehensive assessment of cognitive ability, adaptive skills and autism severity at toddlerhood and adolescence. More severe restricted and repetitive behaviors (RRB) in toddlerhood predicted the severity of Inattention symptoms. In addition, more severe RRB and lower adaptive skills in the toddler years significantly predicted the severity of Hyperactivity/Impulsivity symptoms. Adolescents with elevated ADHD symptoms diagnosed at toddlerhood with ASD showed lower cognitive and adaptive skills and more severe autism symptoms

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J Child Adolesc Psychopharmacol. 2019;29:313-17.

GUANFACINE EXTENDED RELEASE FOR THE REDUCTION OF AGGRESSION, ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS, AND SELF-INJURIOUS BEHAVIOR IN PRADER-WILLI SYNDROME - A RETROSPECTIVE COHORT STUDY.

Singh D, Wakimoto Y, Filangieri C, et al.

To examine the role of Guanfacine Extended Release (GXR) in the management of behavioral disturbances in patients with Prader-Willi Syndrome (PWS). Methods: Twenty from a total of 27 individuals with genetically confirmed PWS, 6-26 years of age, with the following symptoms were identified: significant aggression/agitation, skin picking, and/or symptoms of attention-deficit/hyperactivity disorder (ADHD). Response to GXR for the above noted symptoms was categorized as improved, worsened, or unchanged, while assessing for side effects and tolerability. Results: Eleven of the 20 individuals reported skin-picking, 17 reported aggression/agitation, and 16 reported symptoms of ADHD. Nine (81.8%), 14 (82.3%), and 15 (93.7%) individuals showed an improvement in skin-picking, aggression/agitation, and ADHD, respectively, while on GXR treatment. Two patients with prior complaints of psychotic symptoms did not respond to GXR. Of note, no abnormal weight gain or significant adverse reaction was observed in this group, while on GXR. Conclusions: In this study, GXR demonstrated improvement in symptoms of skin picking, aggression/agitation, and ADHD in patients with PWS. GXR was not effective in reducing psychosis or agitation related to psychotic symptoms. Future studies are warranted to further establish the utility of GXR in PWS patients

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J Child Adolesc Psychopharmacol. 2019;29:256-67.

PILOTING A SEQUENTIAL, MULTIPLE ASSIGNMENT, RANDOMIZED TRIAL FOR MOTHERS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND THEIR AT-RISK YOUNG CHILDREN.

Schoenfelder EN, Chronis-Tuscano A, Strickland J, et al.

Parental attention-deficit/hyperactivity disorder (ADHD) is associated with suboptimal parenting and reduces the effectiveness of child ADHD treatments. We conducted a Pilot Sequential, Multiple Assignment, Randomized Trial (SMART Pilot) to evaluate the feasibility and acceptability of sequencing medication and behavioral treatments for mothers with ADHD to target outcomes, including maternal ADHD, parenting, and child ADHD symptoms/impairment in multiplex ADHD families. Methods: Thirty-five mothers with ADHD and their 5- to 8-year-old child with ADHD symptoms were enrolled. Mothers were randomized to 8 weeks of individually titrated stimulant medication (MSM) or behavioral parent training (BPT), followed by rerandomization to 8 weeks of continued first-line treatment (with as-needed modifications) or combined

treatment, leading to four treatment sequences (MSM-MSM, MSM-BPT, BPT-MSM, and BPT-BPT). Results: Recruitment of multiplex ADHD families came primarily from child providers. Mothers were adherent to medication and had high therapy session attendance. Mothers and clinicians found both treatments to be acceptable and preferred combination treatment, especially receiving medication before BPT. Monotherapy treatment visits were viewed as more burdensome (MSM-MSM, BPT-BPT). Conclusions: Maternal stimulant medication and BPT are acceptable and feasible interventions for families in which both the mother and child have ADHD symptoms. Mothers with concerns about their children's ADHD symptoms are receptive to receiving treatment themselves as an initial strategy for improving their children's health and functioning. Fully powered SMART designs show promise in evaluating the sequencing of interventions and helping clinicians develop algorithms for treating multiplex families in real-world practice settings

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J Child Psychol Psychiatry. 2019 May;60:533-44.

HETEROTYPIC TRAJECTORIES OF DIMENSIONAL PSYCHOPATHOLOGY ACROSS THE LIFESPAN: THE CASE OF YOUTH-ONSET ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Manfro AG, Santoro M, Polanczyk GV, et al.

Background: Recent studies have demonstrated the existence of a distinct late-onset attention deficit/hyperactivity disorder (ADHD) trajectory. Our objective is to test if there are distinct ADHD trajectories regarding age of onset from childhood to adolescence and to compare clinical manifestations, cognitive functions and genetic risk for ADHD among distinct longitudinal groups.

Method: Nine hundred and twenty four children and adolescents from the community participated in the study. We compared clinical, cognitive features and genetic risk among four groups of participants: (a) childhood-limited, (b) youth-onset, (c) childhood-onset with youth persistence, and (d) community comparisons without ADHD. Symptomatic and diagnostic assessments were performed using the Development and Well-Being Behavior Assessment, the Strengths and Difficulties Questionnaire, and the Child Behavior Checklist. Cognitive functions were measured using a battery of standardized tests. Genetic risk for ADHD was calculating using summary statistics from the Psychiatric Genomics Consortium.

Results: Half of the adolescents (52%) with ADHD had their symptom onset in adolescence. The impairment level of this group in adolescence is similar to the persistent group. Despite not having ADHD, the youth-onset group already presented in childhood more symptoms from other domains of psychopathology, higher shared variance in psychiatric symptomatology (p-factor), school impairment, and executive dysfunctions than community comparisons. Furthermore, the youth-onset group presented lower levels of genetic risk for ADHD compared to other cases.

Conclusions: A significant proportion of adolescents with ADHD were youth-onset cases and presented similar impairment levels as those cases with early-onset ADHD. The presence of cognitive impairments and higher levels of clinical symptoms in the youth-onset group already at childhood speaks in favor of a heterotypic trajectory of psychopathology suggesting that youth-onset ADHD might be an artificial consequence of categorizing dimensional psychopathology into discrete diagnostic groups

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J Commun Disord. 2019.

EXPLORING GENDER AS A POTENTIAL SOURCE OF BIAS IN ADULT JUDGMENTS OF CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Shimko A, Redmond S, Ludlow A, et al.

The purpose of this follow-up study to Ludlow (2013) was to examine potential sources of variability within attributional ratings adults (age range: 21ΓÇô73) assigned to child speakers affected by either Specific Language Impairment (SLI) or Attention-Deficit/Hyperactivity Disorder (ADHD). Factors considered were rater's gender [Rater Male (RM) or Rater Female (RF)], the reported gender of the speakers [Speaker Male (SM) or Speaker Female (SF)], and the type of neurodevelopmental disorder involved (SLI or ADHD). Eighty

participants (40 male and 40 female) rated brief, transcribed, narratives previously produced in Ludlow (2013) by boys affected by either SLI, ADHD, or who had typical neurodevelopment (TN). Narratives were presented to raters as having been generated by either a boy or a girl. After reading each narrative, participants provided ratings in response to 15 questions about the narrative, the child speaker's attributes, and family background. Analyses revealed a significant main effect for speaker group, such that raters assigned more pejorative attributes to children with a disorder (ADHD = SLI < TN and ADHD < SLI < TN) across all dimensions. Significant speaker gender main effects (SM < SF) were limited to questions targeting the speaker's behavioral attributes. Results obtained in this study with transcription stimuli replicated previous reports that had used audio stimuli. These findings contribute to a growing body of research documenting the presence of robust, multidimensional, implicit, negative biases among most individuals towards children displaying language differences associated with common neurodevelopmental disorders

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Journal of Head Trauma Rehabilitation. 2019;34:E1-E12.

BENEFITS OF METHYLPHENIDATE FOR LONG-TERM ATTENTION PROBLEMS AFTER TRAUMATIC BRAIN INJURY IN CHILDHOOD: A RANDOMIZED, DOUBLE-MASKED, PLACEBO-CONTROLLED, DOSE-TITRATION, CROSSOVER TRIAL.

Kurowski BG, Epstein JN, Pruitt DW, et al.

Objective: To characterize the benefits and optimal dose of long-acting methylphenidate for management of long-term attention problems after childhood traumatic brain injury (TBI).
Design: Phase 2, randomized, double-masked, placebo-controlled, dose-titration, crossover clinical trial.
Setting: Outpatient, clinical research.
Participants: Twenty-six children aged 6 to 17 years who were at least 6 months post-TBI and met criteria for attention-deficit hyperactivity disorder (ADHD) at the time of enrollment.
Outcome Measures: Vanderbilt Rating Scale of attention problems, Pittsburgh Side Effects Rating Scale, and vital signs.
Results: Among the 26 participants randomized, 20 completed the trial. The mean ages at injury and enrollment were 6.3 and 11.5 years, respectively. Eight participants had a severe TBI. On an optimal dose of medication, greater reductions were found on the Vanderbilt Parent Rating Scale for the medicated condition than for placebo (P =.022, effect size = 0.59). The mean optimal dose of methylphenidate was 40.5 mg (1.00 mg/kg/day). Preinjury ADHD diagnosis status was not associated with a differential medication response. Methylphenidate was associated with weight loss (1 kg), increased systolic blood pressure (Γê+3- to 6-point increase), and mild reported changes in appetite.
Conclusion: Findings support use of long-acting methylphenidate for management of long-term attention problems after pediatric TBI. Larger trials are warranted of stimulant medications, including comparative effectiveness and combination medication and nonmedication interventions

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J Med Econ. 2019.

EXAMINING THE HETEROGENEITY OF TREATMENT PATTERNS IN ATTENTION DEFICIT HYPERACTIVITY DISORDER AMONG CHILDREN AND ADOLESCENTS IN THE TEXAS MEDICAID POPULATION: MODELING SUBOPTIMAL TREATMENT RESPONSE.

Grebla R, Setyawan J, Park C, et al.

Objectives: To examine suboptimal responses (SR) in attention deficit hyperactivity disorder (ADHD) among pediatric patients in the Texas Medicaid program receiving osmotic-release oral system methylphenidate (OROS-MPH) or lisdexamfetamine (LDX) and apply an SR prediction model to identify patients most likely to experience an SR to either OROS-MPH or LDX therapies.
Methods: A retrospective cohort study was conducted using Texas Medicaid claims data of ADHD children and adolescents (6ΓÇô17 years of age) initiating OROS-MPH or LDX. Primary SR endpoints were drug discontinuation, switching, and augmentation 12-months post-ADHD drug initiation. Logistic regression

models were developed to predict SR to OROS-MPH and LDX in 1:1 matched groups of children and adolescent cohorts.
Results: A total of 3,633 children and 1,611 adolescents were matched for each cohort. SR was observed among more children (76.4% vs 72.3%; p < 0.001) and adolescents (82.7% vs 78.2%; p = 0.002) initiating OROS-MPH compared to LDX. Patient sub-groups with the highest predicted risk of OROS-MPH SR experienced significantly lower observed SR rates (p < 0.05) when initiating LDX (children: 80.6% for OROS-MPH vs 75.8% for LDX; OR = 0.75, 95% CI = 0.60-0.94; adolescents: 87.2% for OROS-MPH vs 80.6% for LDX; OR = 0.61, 95% CI = 0.41ΓÇô0.89). For patients with highest predicted SR rates to LDX, observed SR rates were not significantly different between patients initiating LDX or OROS-MPH.
Conclusions: This study demonstrated how a personalized medicine approach using administrative claims data can be used to identify sub-groups of child and adolescent ADHD patients with different risks for suboptimal response with OROS-MPH or LDX in a Medicaid population

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J Pediatr Urol. 2019.

THE OVERLOOKED ASSOCIATION BETWEEN LOWER URINARY TRACT DYSFUNCTION AND PSYCHIATRIC DISORDERS: A SHORT SCREENING TEST FOR CLINICAL PRACTICE.

Ozen M.A., Mutluer T, Necef I, et al.

Introduction: Lower urinary tract dysfunction (LUTD) often presents with other associated comorbidities such as urinary tract infections, constipation, fecal incontinence, and vesicoureteral reflux. However, the psychiatric conditions that can be associated with LUTD tend to go unnoticed. The evaluation, diagnosis, and treatment of LUTD and psychiatric disorders in children are difficult and time-consuming. Moreover, there is currently no accepted consensus on this subject. Objective: In this study, the authors aimed to investigate the relationship between the subgroups of both LUTD and psychiatric disorders.
Study design: LUTD were divided into 4 groups by using voiding dysfunction symptom score (VDSS), bladder diary, and uroflowmetry/electromyography (UF/EMG) test. A short screening test for psychological problems was used to detect psychiatric disorders accompanying each LUTD group. In terms of psychiatric disorders, the patients were divided into two groups: externalizing and internalizing disorders.
Results: A total of 156 children were diagnosed with LUTD. Seventy-six patients had overactive bladder (OAB), 53 had dysfunctional voiding (DV), 14 had primary bladder neck dysfunction (PBND), and 13 had underactive bladder (UAB). Psychiatric disorder was detected in 46 children (29.4%). Of these, 32 had an externalizing and 14 had an internalizing disorder. In terms of age, externalizing disorders were more common in children aged between 6 and 11 years (87.5%), whereas internalizing disorders were seen equally in both age groups. Among these, attention deficit hyperactivity disorder (ADHD) was the most common psychiatric disorder (16.1%). The LUTD groups with the most frequent psychiatric disorders were UAB (53.8%), PBND (35.7%), and OAB (28.9%).
Discussion: Most of the studies investigating the relationship between the lower urinary tract and psychiatric disorders so far have been concerned with the lower urinary tract symptom (LUTS) (such as nighttime or daytime incontinence) and ADHD. However, the present study was performed according to the LUTD classification, which is primarily based on VDSS, bladder diary, and UF/EMG tests. Furthermore, psychiatric disorders were classified into their subgroups. The results have shown that around a quarter of children with LUTD also had comorbid psychiatric disorders. The relationship between LUTD and psychiatric disorders constitutes a critical point. Identifying this association can contribute to the comprehensive diagnosis and treatment for these patients.
Conclusions: LUTD and psychiatric disorders can be seen together, and this can be detected by the short screening test for psychological problems. Therefore, the authors think that patients who applied with LUTS should undergo this short test along with the routine urinary system examination and tests. [table-presented]

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J Pediatr. 2019;209:204-11.

PRENATAL OMEGA-6:OMEGA-3 RATIO AND ATTENTION DEFICIT AND HYPERACTIVITY DISORDER SYMPTOMS .

Lopez-Vicente M, Ribas FN, Vilor-Tejedor N, et al .

Objective: To evaluate whether higher omega-6: omega-3 (n-6:n-3) long-chain polyunsaturated fatty acid ratio in cord plasma is associated with more symptoms of attention deficit and hyperactivity disorder (ADHD) at 4 and 7 years of age.

Study design: This study was based on a population-based birth cohort in Spain. N-6 arachidonic acid and n-3 eicosapentaenoic and docosahexaenoic acid concentrations were measured in cord plasma. At 4 years old, ADHD symptoms were reported by teachers through the ADHD Diagnostic and Statistical Manual of Mental Disorders, 4th ed checklist (n = 580). At 7 years old, ADHD symptoms were reported by parents through the Conners Rating Scale-Revised (short form; n = 642). The ADHD variable was treated as continuous (score) and as dichotomous (symptom diagnostic criteria). Child and family general characteristics were prospectively collected through questionnaires. We applied pooled zero-inflated negative binomial and logistic regressions adjusted for covariates.

Results: A higher omega-6:omega-3 long-chain polyunsaturated fatty acid ratio in cord plasma was associated with a higher ADHD index (incidence rate ratio, 1.13; 95% CI, 1.03, 1.23) at 7 years old. The association was not observed at 4 years old (incidence rate ratio, 1.04; 95% CI, 0.92-1.18). No associations were found using ADHD symptom diagnostic criteria.

Conclusions: High prenatal omega-6:omega-3 long-chain polyunsaturated fatty acid ratio preceded the appearance of subclinical ADHD symptoms during mid-childhood. Our findings suggest that maternal diet during pregnancy may modulate the risk to develop long-term ADHD symptoms in the offspring

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J Psychosom Res. 2019;121:155.

FREQUENCY OF ATTENTION DEFICIT DISORDER IN PEDIATRIC PATIENTS WITH ASTHMA IN COMPARISON TO HEALTHY CHILDREN.

Molina D, Chacon JC, Contreras AF.

Aim: To compare the frequency of attention-deficit hyperactivity disorder (ADHD)in a sample of asthmatic children in comparison to healthy children.

Methods: Prospective, transversal, clinical, non-experimental design. Evaluation of a sample of 30 asthmatic children diagnosed with mild asthma using GINA (Global Initiative for Asthma) criteria. Thirty healthy controls were matched by age and gender. Psychiatric diagnosis was made based in DSM-V criteria (Diagnostic and statistical manual of mental disorders- V). Children with mental disabilities were excluded. Comparison was made with nonparametric statistics.

Results: Mean age was 8.3INS; /INS;+INS; /INS;1.2. No differences in pre or perinatal features or psychomotor development were found, except for premature delivery, which is higher in asthma patients (pINS; /INS;= /INS;.015). ADHD was found in 50% asthmatic patients vs 16% controls (pINS; /INS;= /INS;.0001). High frequency of atopic dermatitis (AD)was found in the sample group. ADHD was also higher in AD vs healthy children (pINS; /INS;= /INS;.0001). Higher prevalence of conduct (pINS; /INS;= /INS;.001)and learning disorders (pINS; /INS;= /INS;.002)were found in asthmatic patients. No differences were found in sleeping disorders among the groups (pINS; /INS;= /INS;.22INS;./INS;

Conclusion: Significantly increased frequency of ADHD was found in a sample of asthmatic and atopic pediatric patients compared to healthy children, not related with sleep disorders or asthma severity. Common inflammatory etiology for asthma and ADHD must be researched

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J Am Acad Child Adolesc Psychiatry. 2016;55:521-23.
WHOLE-EXOME SEQUENCING REVEALS INCREASED BURDEN OF RARE FUNCTIONAL AND DISRUPTIVE VARIANTS IN CANDIDATE RISK GENES IN INDIVIDUALS WITH PERSISTENT ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.
Demontis D, Lescai F, B+©rglum A, et al.

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J Am Acad Child Adolesc Psychiatry. 2019;58:525-33.
ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS ARE ASSOCIATED WITH LOWER ADAPTIVE BEHAVIOR SKILLS IN CHILDREN WITH AUTISM.
Yerys BE, Bertollo JR, Pandey J, et al.
Objective: To investigate the predictive power of comorbid attention-deficit/hyperactivity disorder (ADHD) symptoms on adaptive behavior skills in children who have an autism specrum disorder (ASD) diagnosis.
Method: This case-control study recruited 347 children from specialty clinics, primary care, and the community. Linear regression was used to test whether ADHD Rating Scale, Fourth Edition, scores of autistic children associated with poorer adaptive behavior scores, after controlling for the effects of age, intelligence, sex, and ASD symptom severity. Adaptive behaviors were measured with the Vineland Adaptive Behavior Scales, Second Edition. Subsequent analyses tested this relation in a subset of the ASD sample with subclinical ADHD symptoms (n = 179) and another with teacher ratings (n = 153). Prior relations between age with adaptive behaviors and ADHD symptoms were replicated and age was explored as a moderator.
Results: ADHD symptoms predicted poor adaptive behavior scores in the full ASD sample (caregiver ratings, 2 = 0.033-0.119; teacher ratings, 2 = 0.113-0.163) and in the subset with subclinical ADHD symptoms (caregiver ratings, 2= 0.023-0.030; teacher ratings, +öR2 = 0.097ΓÇô0.159) after controlling for confounds. Age correlated negatively with ADHD symptoms (r = 0.21) and adaptive behaviors (0.17 < r < 0.39) in the full ASD sample. Age did not moderate the effect of ADHD symptoms on adaptive behaviors.
Conclusion: ADHD symptoms predict poorer adaptive behavior for autistic children across settings, even for children with subclinical co-occurring ADHD symptoms. Findings support a Research Domain Criteria framework that behavioral impairments and functional outcome measures exist along a continuum

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Neurocomputing. 2019;356:83-96.
A DEEP LEARNING FRAMEWORK FOR IDENTIFYING CHILDREN WITH ADHD USING AN EEG-BASED BRAIN NETWORK.
Chen H, Song Y, Li X.
The convolutional neural network (CNN) is a mainstream deep learning (DL) algorithm. However, the application of DL techniques in attention-deficit/hyperactivity disorder (ADHD) studies is still limited. Electroencephalography (EEG) is an informative neuroimaging tool. In this study, we propose a DL framework for the ADHD identification problem by combining an EEG-based brain network with the CNN. By reorganizing the order of the channels, we proposed a new form of the connectivity matrix to adapt the concept of the convolution operation of the CNN. The correlations between the deep features derived from the CNN models and 13 hand-crafted measures of the brain network were also analyzed. We collected EEG data from 50 children with ADHD (9 girls, mean age: 10.44 -¦ 0.75) and 51 handedness- and age-matched controls, and we used mutual information (MI) to quantify the synchronization between channels. We demonstrated the feasibility of the framework and discussed some critical concerns in the application of the framework. Some of the practical suggestions were also given based on the validation results. The proposed framework achieved a convincing performance with an accuracy of 94.67% on the test data. We also validated the validity of the form of the connectivity matrix, which enabled the models to achieve better performance. This finding suggests that the data representation in the DL framework is important. Seventeen deep features showed significant between-group differences, and had significant correlations with hand-crafted measures, thereby reflecting the amazing learning ability of the method for finding the deviations in the brain network of children with ADHD. The proposed framework is broadly applicable to the ADHD

identification problem. Nevertheless, the validation of this methodology with a large and well-matched sample of children is needed in the future

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NeuroImage Clin. 2019;23.

LINKED ANATOMICAL AND FUNCTIONAL BRAIN ALTERATIONS IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Wu Z-M, Llera A, Hoogman M, et al.

Objectives: Neuroimaging studies have independently demonstrated brain anatomical and functional impairments in participants with ADHD. The aim of the current study was to explore the relationship between structural and functional brain alterations in ADHD through an integrated analysis of multimodal neuroimaging data.

Methods: We performed a multimodal analysis to integrate resting-state functional magnetic resonance imaging (MRI), structural MRI, and diffusion-weighted imaging data in a large, single-site sample of children with and without diagnosis for ADHD. The inferred subject contributions were fed into regression models to investigate the relationships between diagnosis, symptom severity, gender, and age.

Results: Compared with controls, children with ADHD diagnosis showed altered white matter microstructure in widespread white matter fiber tracts as well as greater gray matter volume (GMV)in bilateral frontal regions, smaller GMV in posterior regions, and altered functional connectivity (FC)in default mode and fronto-parietal networks. Age-related growth of GMV of bilateral occipital lobe, FC in frontal regions as well as age-related decline of GMV in medial regions seen in controls appeared reversed in children with ADHD. In the whole group, higher symptom severity was related to smaller GMV in widespread regions in bilateral frontal, parietal, and temporal lobes, as well as greater GMV in intracalcarine and temporal cortices.

Conclusions: Through a multimodal analysis approach we show that structural and functional alterations in brain regions known to be altered in subjects with ADHD from unimodal studies are linked across modalities. The brain alterations were related to clinical features of ADHD, including disorder status, age, and symptom severity

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Neuropsychiatr Enfance Adolesc. 2019 May;67:130-39.

MYTHES ET RÉALITÉS SUR LES ENFANTS À HAUT POTENTIEL INTELLECTUEL EN DIFFICULTÉ : LES APPORTS DE LA RECHERCHE = MYTHS AND REALITIES REGARDING CHILDREN WITH HIGH INTELLECTUAL POTENTIAL AND DIFFICULTIES: CONTRIBUTIONS OF RESEARCH.

Tordjman S, Kermarrec S.

Children with high intellectual potential (HP) can have scholastic and/or psychological difficulties. Epidemiological studies are needed to know the real frequency of HP children with difficulties. The results from the National Center for Assistance to High Potential children and adolescents (CNAHP) indicate that HP children can show notable scholastic problems (including school failure: 7.5% of 611 consulting HP children) and socioemotional problems related to their high intellectual potential (notably anxiety-disorders associated with high verbal potential). This highlights the importance of proposing adapted therapeutic and educational care to HP children in difficulty. This is a question of ethics and society

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Neuropsychobiology. 2019;77:123.

UPREGULATED BRAIN AROUSAL IN MAJOR DEPRESSION AND UNSTABLE BRAIN AROUSAL IN ADHD PREDICT RESPONSE TO PHARMACOTHERAPY.

Hegerl U, Hensch T, Jawinski P, et al.

The human brain can take over different global functional states not only during sleep (sleep stages, e.g. slow wave sleep, REM sleep) but also during wakefulness (arousal levels). A variety of clinical and preclinical arguments indicate that in major depression an upregulated brain arousal and in ADHD an unstable brain arousal regulation play a pathogenetic role. The hyperactivity and sensation seeking observed in overtired children, ADHD and mania is interpreted as an autoregulatory attempt of the organism to stabilize brain arousal by increasing external stimulation. Correspondingly the withdrawal and sensation avoidance in MD is interpreted as a reaction to a state of tonically high brain arousal [1]. The EEG-based Vigilance Algorithm Leipzig (VIGALL 2.1, free download https://research.uni-leipzig.de/vigall/) allows to objectively assess the level as well as the regulation of brain arousal within resting EEG recordings (15-20 minutes according to VIGALL SOPs). Recently, further support for the pathogenetic concept of arousal regulation has been provided by studies applying VIGALL 2.1: In a GWA, the genetic variant most closely associated with upregulated brain arousal has also been found by others to be associated with depression [2]. Additionally, recent studies indicate that an upregulated brain arousal at baseline in major depression predicts response to antidepressants [3] and an unstable brain arousal regulation in ADHD that to psychostimulants. Not yet investigated up to now is the question whether an upregulated arousal also predicts antidepressant response to (es)ketamine

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Neuropsychobiology. 2019;77:141.

METHYLPHENIDATE TREATMENT IN CHILDREN WITH ADHD: DO EEG-RESTING STATE INDEPENDENT NETWORKS ALLOW TO PREDICT RESPONSE?

Heinrich H, Vollebregt M, Palmer D, et al.

Background: Methylphenidate (MPH) may be considered as first-choice medication for short-term treatment in children and adolescents with attention-deficit / hyperactivity disorder (ADHD) [1]. Recently, Arns et al. [2] conducted EEG spectral analysis in a large cohort (international Study to Predict Optimized Treatment for ADHD, iSPOT-A) and found a lower frontal alpha peak frequency in the resting EEG as a predictor for MPH non-response in adolescent boys with ADHD. The aim of the present analysis was to investigate whether EEG-resting state networks also allow to predict MPH treatment reponse.

Methods: 199 children and adolescents with ADHD and 119 typically developing controls selected from the iSPOT-A sample (age: 6-17 years) were included. In patients with ADHD, MPH response was defined as a reduction of at least 25% in the ADHD rating scale between baseline and post-treatment, rated by a non-prescribing clinician. For eyes-closed and eyes-open resting EEG (recorded from 26 sites), exact low resolution brain electromagnetic tomographyindependent component analysis (eLORETA-ICA) [3] was applied across seven frequency bands (delta, theta, alpha1, alpha2, beta, gamma, EMG). To investigate MPH response, an ANOVA with between-subject factors RESPONSE (response vs. non-response) and AGEGROUP (6-12.5 years vs. 12.5-17 years) and within-subject factor CONDITION (eyes-closed vs. eyes-open) was computed for those independent components not reflecting EMG artefacts. Corresponding analyses were conducted to study developmental effects and ADHD vs. control differences.

Results: While eLORETA-ICA revealed developmental effects in our preliminary analysis, no clear differences were found between patients and typically developing controls when controlling for multiple testing. None of the independent components turned out as a significant predictor variable for MPH response. Final results will be presented at the conference.

Conclusions: Preliminary analysis of resting-state independent networks did not provide additional value for MPH treatment prediction in children and adolescents with ADHD

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Neuropsychobiology. 2019;77:150.

MOVEMENT-RELATED POTENTIALS IN CHILDREN WITH ADHD - ALTERED ACTIVATION OF MOTOR AREAS AND EFFECTS OF METHYLPHENIDATE.

Jarczok TA, Haase R, Bluschke A, et al.

Introduction: Abnormalities in the functioning of cortical motor areas such as the supplementary motor area (SMA) may play a role in the pathology of attention deficit hyperactivity disorder (ADHD). The Bereitschaftspotential (BP) and lateralized readiness potential (LRP) are movement-related potentials generated by cortical motor areas. We hypothesized that the BP and the LRP would be altered in children with ADHD and assessed effects of methylphenidate (MPH) on electrophysiological parameters.

Methods: A 64-channel DC-EEG was registered in 17 children with ADHD (mean age: 11.5 -¦ 1.9 years) and a matched control group of 16 unaffected children (mean age: 12.2 y -¦ 2.0) while participants performed movements with their right or their left thumb at self-chosen irregular intervals. The procedure was performed twice (t1 and t2) with ADHD subjects medicated with MPH at t2. BP was measured as the mean amplitude at electrode Cz in a time window of 1000 ms before movement onset. LRP was calculated according to Coles [1] over the primary motor cortex.

Results: BP was significantly lower in the ADHD group (ANCOVA: F (1; 29) = 13.7; p = 0.001) and there was a trend towards increasingly negative BP amplitudes with increasing age (F(1; 29) = 1.4; p = 0.06). BP had a positive polarity in ADHD but negative polarity in controls. LRP amplitudes were significantly lower in ADHD subjects at baseline but no significant difference was detectable after administration of MPH (GROUPXMEDICATION interaction effect: F(1; 29)= 5.3; p = 0.03).

Conclusions: Lower BP amplitudes point to altered SMA activation before movements in ADHD. The positive BP polarity together with increasingly negative BP with age may reflect delayed cortical maturation in ADHD, as the findings resemble those in younger typically developing children [2]. The LRP reflects interactions of basal ganglia with cortical motor areas and may possibly be a biomarker of MPH effects in ADHD

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Neuropsychobiology. 2019;77:119-20.

THE NEUROPHYSIOLOGY OF ADHD - A TRANSLATIONAL UPDATE ON MECHANISMS, BIOMARKER CANDIDATES AND TREATMENT.

Brandeis D.

ADHD is a common neurodevelopmental disorder in children and adolescents that often persists into adulthood. The severe and pervasive inattention, impulsivity and hyperactivity that often cooccur impair cognitive and social functioning of those affected. Recent neurophysiological research has shifted from a focus on a core inhibition deficit to multiple pathways reflecting the heterogeneity of the disorder, and to networks reflecting also impaired state regulation, motivation and maturation. Biomarkers candidates like an increased resting EEG theta/beta ratio have proven less consistent or ADHD-specific than in initial studies but continue to be promoted as diagnostic aids. Multivariate classification using multiple neurophysiological features has yielded some promising candidate patterns, but no independent large-scale replication meeting standard criteria. Neurofeedback, i.e. training neurophysiological self-regulation, involves nonspecific and specific effects. Robust and personalized standards protocols ensuring specific regulation learning and transfer still remain to be validated. In sum, recent research has identified multiple neurophysiological patterns reflecting functional impairment and potential treatment targets in ADHD. However, the findings also identify an urgent need for better validation of potential diagnostic and predictive markers, and caution against premature commercial translation

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Neuropsychobiology. 2019;77:159-60.

ANNUAL VARIATION IN ATTENTIONAL IMPROVEMENT AFTER METHYLPHENIDATE TREATMENT.

Vollebregt MA, Kenemans JL, Buitelaar JK, et al.

Previous studies demonstrated that prevalence rates of ADHD diverge with geographical areas varying in sunlight intensity. The current study aimed to extend this finding to variation in response to Methylphenidate (MPH) treatment with varying sunlight intensity, i.e. with annual variation. Annual patterns in change in inattention and inattention at baseline and endpoint were studied in children and adolescents with ADHD. 336 individuals with ADHD (mean age 11.9 yrs; 245 males) were treated with MPH in a multicenter, international, prospective open-label trial (iSPOT-A). The primary endpoint was the ADHD symptoms severity as assessed by clinician rated ADHD-Rating Scale-IV at baseline and endpoint (6 weeks). False negative errors made on a Continuous Performance Task (CPT-inattention) were used as a secondary endpoint and served to replicate findings. The relative likelihood of different annual patterns explaining the data was determined and statistically tested. After selection, 185 participants were included in the main analyses. 7.8% of the change after treatment in inattention and 5.8% in CPT-inattention was explained by annual variation. A larger treatment effect (d = 1.502) was found in the period between summer and winter solstice (decreasing daylength) relative to between winter and summer solstice (increasing daylength, d = 0.989). Annual variation for inattention symptoms was observed only after treatment. This study demonstrates annual variation in attentional improvement after MPH treatment on two uncorrelated inattention measures, suggestive of an interaction between MPH effects and daylength changes. This opens new avenues to unravel the neurobiology of ADHD and optimize treatment

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Neuropsychology. 2019;33:470-81.

DO CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD) HAVE SET SHIFTING DEFICITS?

Irwin LN, Kofler MJ, Soto EF, et al.

Objective: Set shifting, or cognitive flexibility, is a core executive function involving the ability to quickly and efficiently shift back and forth between mental sets. Meta-Analysis suggests mediummagnitude shifting impairments in attention-deficit/hyperactivity disorder (ADHD). However, this conclusion may be premature because the evidence-base relies exclusively on tasks that have been criticized for poor construct validity and may better reflect general neuropsychological functioning rather than shifting specifically.

Method: A well-characterized sample of 77 children ages 8-13 (M = 10.46, SD = 1.54; 32 girls; 66% Caucasian/non-Hispanic) with ADHD (n = 43) and without ADHD (n = 34) completed the criterion global-local set shifting task and 2 counterbalanced control tasks that were identical in all aspects except the key processes.

Results: The experimental manipulation was successful at evoking set shifting demands during the global-local versus both nonshift control tasks (p = .001; =2 = .12-.14). Mixed-model analyses of variance (ANOVAs) revealed that the ADHD group did not demonstrate disproportional decrements in speed shift costs on the shifting versus nonshift control tasks (p = .30; =2 = .002), suggesting no evidence of impaired set shifting abilities in ADHD. In contrast, the ADHD group made disproportionately more shifting errors than the non-ADHD group (p = .03; =2 = 0.03) that were more parsimoniously attributable to prerequisite (nonshifting) processes necessary for successful performance on the global-local task.

Conclusions: Children with ADHD's impaired performance on shifting tasks may be attributable to difficulties maintaining competing rule sets and/or inhibiting currently active rule sets prior to shifting. However, when these higher-order processes are executed successfully, there is no significant evidence to suggest a unique set shifting deficit in ADHD

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Neuropsychology. 2019 May.

A DIFFUSION-MODEL ANALYSIS OF TIMING DEFICITS AMONG CHILDREN WITH ADHD.

Shapiro Z, Huang-Pollock C.

Objective: Deficits in the ability to perceive time have been proposed as an etiologic mechanism in the development of the cognitive and behavioral characteristics associated with ADHD. However, previous studies testing the presence of timing deficits have produced idiosyncratic results. This is in large part due to the underutilization of insights from basic timing research, and from the inherent difficulty that arises when a single index of performance (i.e., reaction time [RT] or accuracy) is used to index the health of what is essentially a multiple-component process. The current article utilizes a diffusion model approach to isolate the component processes involved in timing (i.e., internal clock speed, decision-making speed, speed/accuracy trade-off strategies, and nondecision time) using a well-validated timing task.

Method: Fifty children with ADHD and 32 non-ADHD controls aged 8–12 completed a temporal bisection procedure.

Results: Diffusion model parameters indicated that both the internal clock and decision-making speeds were slower among children with ADHD. However, the strength of evidence for slowed decision making far outweighed evidence for a slower internal clock.

Conclusions: Slower evidence accumulation during decision making is domain-general deficit in ADHD. Such slowing is consistent with adaptive-gain theories, which posit that a suboptimal ratio of neural signal-to-noise is characteristic of children with ADHD

General Scientific Statement—The ability to accurately estimate the passage of time is fundamental to a range of adaptive processes, and some have suggested that timing is impaired among children with Attention Deficit Hyperactivity Disorder. Using cutting-edge methodology, we find that while children with ADHD do have slower internal clocks, its influence on performance is far outweighed by evidence for slower decisional processing speed

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NeuroRegulation. 2019;6:23-37.

EEG SOURCE LOCALIZATION AND ATTENTION DIFFERENCES BETWEEN CHILDREN EXPOSED TO DRUGS IN UTERO AND THOSE WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A PILOT STUDY.

Kelley L, Strunk W, Cannon RL, et al.

Introduction: Intrauterine drug exposure (IUDE) including neonatal abstinence syndrome (NAS) is a group of problems that occur in a newborn exposed to drugs in the womb. Currently, there is no consensus on diagnostic criteria for addressing the cluster of problems present in children suffering from IUDE. The current data sought to examine differences between IUDE and attention-deficit/hyperactivity disorder (ADHD) clients to elucidate specific differences between these groups in the Conners Continuous Performance Test (CPT-3/K-CPT) and EEG source localization data using standardized low-resolution electromagnetic brain tomography (sLORETA).

Methods: This study utilizes archived data from two groups 14 IUDE and 9 clients with standing diagnosis of ADHD between the ages of 4 and 13 without the presence of fetal alcohol syndrome (FAS). All clients completed a standard protocol to assess functional domains, including diagnostic interview, review of records, and tests of attention, executive functions, and psychological status. IUDE clients at time of initial assessment were taking one or more medications. ADHD clients consisted of medicated and unmedicated individuals.

Results: Significant differences were found between resting-state baseline sLORETA parameters in temporal, limbic, and precuneus regions.

Conclusions: IUDE presents a growing problem in the United States due to current opioid problems, and it is imperative to accurately classify these children according to this specific set of problems. sLORETA assessment may be useful as one marker of IUDE. Directions for future treatment paradigms are discussed as well as potential applications of neurofeedback and learning

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Neurosci Lett. 2019;705:118-23.

INCREASED SERUM THIOREDOXIN LEVELS ARE NOT CORRELATED WITH EXECUTIVE FUNCTIONS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Guney E, Buyuktaskin D, Tas TY, et al.

The first step of this study aims to determine whether thioredoxin (Trx) has a potential role in attention deficit hyperactivity disorder (ADHD) by measuring serum Trx levels in children with ADHD. In the second step, this study aims to reveal whether there is any relationship between Trx and executive functions. This is the first study investigating the serum levels of Trx in children with ADHD. This study sample included 45 patients diagnosed with ADHD and 30 healthy controls. Conners Teacher Rating Scale (CTRS) and Behavior Rating Inventory of Executive Function (BRIEF) are used to evaluate ADHD presentation, severity and executive functions, respectively. Trx levels were measured using an enzyme-linked immunosorbent assay (ELISA) kit. Significantly higher Trx levels were found in children with ADHD. No significant correlations were found between serum Trx levels and executive functions for controls or ADHD group; although hyperactive/impulsive ADHD presentation showed positive correlations with some subdomains of executive function. Serum Trx levels and disease severity, measured by CTRS, showed non-significant correlations. This study may be the first step in the study of the role played by Trx and oxidative stress in ADHD, further research is needed to support these preliminary findings

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NeuroToxicology. 2019;74:1-6.

OCCUPATIONAL PESTICIDE EXPOSURE AND SYMPTOMS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN ADOLESCENT PESTICIDE APPLICATORS IN EGYPT.

Rohlman DS, Ismail A, Bonner MR, et al.

Background: Exposure to environmental chemicals, including organophosphorus pesticides, is associated with behavioral disorders such as attention deficit hyperactivity disorder (ADHD). However, the impact of occupational pesticide exposure on ADHD development in adolescents has not been examined. Objective: We examined the association between exposure to chlorpyrifos and ADHD symptoms among adolescents in Egypt.

Methods: Adolescent pesticide applicators and non-applicators, 12ΓÇô21 years old, participated in a 10-month longitudinal study examining health effects from pesticide exposure. Repeated urine and blood samples were collected at various time points during the 10-months to assess biomarkers of chlorpyrifos exposure (urinary trichloro-2-pyridinol or TCPy) and effect (blood acetyl cholinesterase activity and butyryl cholinesterase activity). Parents from a subset of the cohort (N = 64) completed the Short Form of Conners' Parent Rating Scale ΓÇô Revised. Poisson regressions were used to examine the associations between the number of ADHD symptoms and occupation and biomarkers.

Results: Pesticide applicators had significantly more symptoms of ADHD than participants in the non-applicator group. Urinary TCPy levels were associated with increased symptoms, demonstrating a dose-response effect. Applicators with ADHD reported applying pesticides for more hours during the application season and had greater cumulative TCPy levels than participants without ADHD. One fourth of all applicators met the criteria for an ADHD diagnosis (having 6 or more reported symptoms).

Conclusions: This study provides preliminary evidence of an association between occupational exposure to chlorpyrifos and ADHD symptoms among adolescent pesticide applicators in spite of its limited small sample size. There is a critical need to investigate the susceptibility of children and adolescents to repeated occupational and environmental exposures to pesticides because the developing brain may be uniquely sensitive to the neurotoxic effects of these agents

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Nord J Psychiatry. 2019.

THE EFFECTS OF PRACTICING TARGET-SHOOTING SPORT ON THE SEVERITY OF INATTENTIVE, HYPERACTIVE, AND IMPULSIVE SYMPTOMS IN CHILDREN: A NON-RANDOMISED CONTROLLED OPEN-LABEL STUDY IN DENMARK.

Gohr MA, Elmose M, Mejldal A, et al.

Purpose: Target-shooting sport requires mental effort and concentration. Training may reduce inattentiveness and distractibility. There is little knowledge if children with symptoms of attention-deficit/hyperactivity disorder (ADHD) benefit from practicing target-shooting sport.

Materials and methods: Our study aims to investigate this in a non-randomised controlled open-label study of 128 children, 10-14 years of age, with ADHD-symptoms. The intervention-group (n = 64) practiced target-shooting in local shooting associations once a week for 6 months. The control group (n = 64) received treatment as usual. Primary outcome: teacher-rated ADHD-RS-IV-total score. Secondary outcomes: (a) parent-rated ADHD-RS-IV-total score; (b) teacher- and parent-rated Strengths-and-Difficulties-Questionnaire (SDQ); (c) self-rated quality of life (KIDSCREEN-27-total score); and (d) four objective measurements of ADHD-symptoms using the QbTest. The data were collected at baseline and after 6 months.

Results: When estimating the marginal effect of the intervention on our primary outcome, the teacher-rated ADHD-RS-IV, we found no significant effect (mean change between groups (contrast)=2.23; p = 0.193). However, we did find significant beneficial effects on four of the eight secondary outcomes, including the parent-rated ADHD-RS-IV-total score (contrast = 4.76; p = 0.024), the parent-rated SDQ-total score (contrast = 2.09; p = 0.027), and on the QbTest measurements of the Reaction Time Variation (RTVar) (contrast = 36.96; p = 0.013), and of Omission Errors (contrast = 7.57; p = 0.019).

Conclusions: Despite the negative result on the primary outcome, the robust findings on these secondary outcomes in this open-label study indicate proof of concept that practicing target-shooting sport may have some beneficial effects on the severity of ADHD-symptoms in children. No adverse events were reported. Randomised trials of this non-pharmacological intervention are needed

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Nord J Psychiatry. 2019;73:132-40.

THE PREVALENCE OF CHILDHOOD PSYCHOPATHOLOGY IN TURKEY: A CROSS-SECTIONAL MULTICENTER NATIONWIDE STUDY (EPICPAT-T).

Ercan ES, Polanczyk G, Akyol AcU, et al.

Aim: The aim of this study was to determine the prevalence of childhood psychopathologies in Turkey.

Method: A nation-wide, randomly selected, representative population of 5830 children (6-13 years-old) enrolled as a 2nd,3rd or 4th grade student in 30 cities were evaluated for presence of a psychiatric or mental disorder by a Sociodemographic Form, Kiddie Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version (K-SADS-PL), and DSM-IV-Based Screening Scale for Disruptive Behavior Disorders in Children and Adolescents scales. Impairment criterion was assessed via a 3 point-Likert scale by the parent and the teacher independently.

Results: Overall prevalence of any psychopathology was 37.6% without impairment criterion, and 17.1% with impairment criterion. Attention-deficit hyperactivity disorder was the most frequent diagnosis, followed by anxiety (19.5% and 16.7% without impairment, 12.4% and 5.3% with impairment, respectively). Lower education level and presence of a physical or psychiatric problem of the parents were independent predictors of any psychopathology of the offspring.

Conclusion: This is the largest and most comprehensive epidemiological study to determine the prevalence of psychopathologies in children and adolescents in Turkey. Our results partly higher than, and partly comparable to previous national and international studies. It also contributes to the literature by determining the independent predictors of psychopathologies in this age group

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Open Forum Infectious Diseases. 2016;3.

SUDDEN INFANT DEATH SYNDROME, ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND VACCINES: POPULATION-LEVEL ANALYSES, 2003-2013.

Shaw J, Yang YT.

Background. Majority of infants initiate primary vaccination series when they are between 2 to 4 months old. This age range coincides with the peak time for sudden infant death syndrome (SIDS), the cause of which remains unknown. The timing of the 2 month and 4 month vaccinations and SIDS has led parents question whether they might be related. Also, there have been persistent concerns about the link between attention-deficit/hyperactivity disorder (ADHD) and vaccines. This study evaluated whether there was a statistically significant relationship between vaccination uptake and SIDS, and ADHD.

Methods. State-specific vaccination coverage data for 2003-2013 from the National Immunization Survey (NIS) at the 13-month milestone were used for the following vaccine doses: (1) 3 + DTaP, (2) 2 + Polio, (3) 1 + MMR, (4) 3 + Hib, and (5) 3 + HepB. Annual infant mortality rates due to SIDS were obtained from the National Vital Statistics Reports for 2007 to 2013 years. State-level ADHD prevalence for 2003, 2007, and 2011 years were obtained from the National Survey of Children's Health. The analysis employed multivariable regression and mixed effects models using STATA statistical software. The analyses were adjusted to control for variation due to socio-demographic factors.

Results. Mean incidences for SIDS and ADHD were 39.9 per 100,000 live births and 8.9 per 100 children, respectively. While SIDS rates decreased over time from 55.6 to 38.7 per 100,000 live births ($p = 0.4$); ADHD diagnoses increased from 7.8% to 11.0% ($p = 0.3$). Mean coverage for each of the five vaccines varied significantly from 47.7% to 95.1% ($p < 0.01$). State-level vaccination coverage was not found to be associated with SIDS or ADHD rates for each of the vaccines evaluated ($p > 0.2$).

Conclusion. Vaccination coverage did not influence SIDS nor ADHD rates. Concerns about the links between SIDS, ADHD and vaccines were unfounded by our population level analysis. Our findings may help pediatricians facing vaccine hesitant parents by providing a current and evidence based vaccine safety information

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Pakistan Journal of Medical and Health Sciences. 2019;13:210-16.

EVALUATION OF THE EFFECTIVENESS OF WITHANIA SOMNIFERA ROOT EXTRACT ON THE ANXIETY SYMPTOMS AMONG CHILDREN WITH ADHD IN MASHHAD.

Hosseini N, Moharari F, Soltanifar A, et al.

Background: The aim of this study was to investigate the effect of Withania somnifera root extract on the symptoms of anxiety among children with ADHD.

Methods: In total, 28 children referred to Ibn Sina Hospital in Mashhad were randomly assigned into intervention (Withania somnifera root extract) and control groups (placebo). The participants were selected according to the results of a clinical interview conducted by a child and adolescent psychiatrist based on the criteria of the diagnostic and statistical manual of mental disorders. The data were collected using the Revised Children's Manifest Anxiety (RCMA) and Attention Deficit Hyperactivity Disorder Rating Scale questionnaires at the beginning of the study and on the third and sixth weeks after the intervention.

Results: The mean age of the participants in the intervention and control groups was 9.71 and 9.29 respectively. There were no significant differences between the two groups in terms of the patient's clinical features, such as age, and gender ($P>0.05$). The total result of RCMA showed a decrease in the scores of both groups during the third and sixth weeks, compared to the beginning of the study. Moreover, the difference between the intervention and control groups was statistically significant.

Conclusion: The use of Withania somnifera root extract among ADHD children suffering from anxiety symptoms reduced the symptoms of physiological anxiety, sensitivity, social concerns (i.e., hypersensitivity and centralization), and an overall score of RCMA

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Pediatr Neurol. 2019.

THE TIMING, NATURE, AND RANGE OF NEUROBEHAVIORAL COMORBIDITIES IN JUVENILE MYOCLONIC EPILEPSY.

Almane DN, Jones JE, McMillan T, et al.

Background: Accumulating evidence suggests that considerable cognitive and psychiatric comorbidity is associated with juvenile myoclonic epilepsy, for which the etiology remains controversial. Our goal was to comprehensively characterize the status of multiple neurobehavioral comorbidities in youth with new- or recent-onset juvenile myoclonic epilepsy, before effects of chronic seizures and medications.

Methods: A total of 111 children aged eight to 18 years (41 new- or recent-onset juvenile myoclonic epilepsy and 70 first-degree cousin controls) underwent neuropsychological assessment (attention, executive, verbal, perceptual, speed), structured review of need for supportive academic services, parent reports of behavior and executive function (Child Behavior Checklist and Behavior Rating Inventory of Executive Function), and formal structured psychiatric interview and diagnosis (Kiddie Schedule for Affective Disorders and Schizophrenia Present and Lifetime Version).

Results: Children with juvenile myoclonic epilepsy performed worse than controls across all tested cognitive domains ($F(1,105) = 3.85$, $P < 0.01$), utilized more academic services (47% versus 19%, $P = 0.002$), had more parent-reported behavioral problems and dysexecutive function with lower competence ($P < 0.001$), and had a higher prevalence of current Axis I diagnoses (attention-deficit/hyperactivity disorder, depression, and anxiety; 54% versus 23%, $P = 0.001$). Academic and psychiatric problems occurred antecedent to epilepsy onset compared with comparable timeline in controls.

Conclusion: Comprehensive assessment of cognitive, academic, behavioral, and psychiatric comorbidities in youth with new- or recent-onset juvenile myoclonic epilepsy reveals a pattern of significantly increased neurobehavioral comorbidities across a broad spectrum of areas. These early evident comorbidities are of clear clinical importance with worrisome implications for future cognitive, behavioral, and social function. It is important for health care providers to avoid delays in intervention by assessing potential comorbidities early in the course of the disorder to optimize their patientsΓÇÖ social, academic and behavioral progress

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Pediatr Res. 2019.

AN EXPLORATORY STUDY OF PARENTΓÇÔCHILD ASSOCIATION IN SENSORY MODULATION DISORDER INVOLVING ADHD-RELATED SYMPTOMS.

Kalig-Amir M, Berger I, Rigbi A, et al.

Background: Sensory modulation disorder (SMD) and attention deficit hyperactivity disorder (ADHD) can co-occur and have overlapping symptoms, thus challenging practitioners. This study aimed to phenotypically explore parentΓÇôchild associations in SMD, and the interplay between SMD- and ADHD-related symptoms in children with SMD and their parents.

Methods: A cross-sectional study examined 70 parents (n = 35 mothers; n = 35 fathers) and their 35 children with and without SMD, aged 4ΓÇô6 years. Parents completed care-giver reports: The Short Sensory Profile (SSP) and the ADHD Rating Scale, and self-reports: The Sensory Responsiveness Questionnaire (SRQ) and the ADHD Self-Report Scale (ASRS).

Results: In the entire sample, we found a motherΓÇôoffspring correlation between SSP and SRQ-Aversive scores ($r_s = 0.68$; $p < 0.001$), but no such father offspring correlation. However, when testing the ADHD Rating Scale and ASRS scores, we found correlations between mothers and offspring ($r_s = 0.54$, $p = 0.0008$), and between fathers and offspring ($r_s = 0.34$, $p = 0.0494$). In the entire sample a high correlation was found between SSP and ADHD Rating Scale scores ($r_s = 0.837$, $p < 0.001$). We further found a high correlation in mothers ($r_s = 0.70$, $p < 0.001$), and a moderate correlation in fathers ($r_s = 0.40$, $p = 0.019$) between SRQ-Aversive and ASRS scores.

Conclusions: Novel findings reveal that parentsΓÇôoffspring heritability patterns differ in both these related conditions. These may contribute to familial practice and research

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Pharmacopsychiatry v52 iss2 2019. 2019;52:109.

FOOD INTOLERANCE AND ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Clement H, et al.

Introduction: A potential correlation between hyperactivity and food has already been described in the beginning of the last century. The systematic review and metaanalysis of SonugaBarke (2013) summarizes all nonpharmacological treatments of ADHD, including the elimination diet. Referring to the INCA study of Pelsser (2011) our study investigates the influence of dietary regimes on symptoms of children suffering ADHD, with the objective of evaluating individual food recommendation as a therapeutic approach in ADHD treatment.

Methods: The study includes 24 children between 7 and 18 years with the diagnosis of ADHD without stimulant medication and is performed in an ambulatory setting. Our study protocol takes four weeks of strict oligoantigenic diet, followed by a food reintroduction phase with personal food recommendations. The children's behavior is assessed with the ADHDRatingScale (parent report inventory). Responders with a change of behavior of at least 40% after the diet continue the study phase.

Results: 14 of 24 patients showed improvement upon dietary treatment with values between 27 - 82% on the ADHDRatingScale. The mean outcome of improvement of Responders is 51%. The followup showed a further fall on the ARS upon strict food recommendations.

Conclusion: Our study suggests, that oligoantigenic diet reduces symptoms in children suffering ADHD and that individual food recommendations should be a valid therapeutic approach

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PLoS ONE. 2019;14.

IMPAIRMENTS IN ERROR PROCESSING AND THEIR ASSOCIATION WITH ADHD SYMPTOMS IN INDIVIDUALS BORN PRETERM.

Rommel A-S, James S-N, McLoughlin G, et al.

Preterm birth is associated with heightened risk for attention-deficit/hyperactivity disorder (ADHD)-like symptoms and neurocognitive impairments, including impairments in performance monitoring. Here, we investigate the cognitive and neurophysiological processes from a performance-monitoring task in preterm-born adolescents and examine whether these processes in preterm-born adolescents reflect identical neurophysiological impairments to those observed in term-born adolescents with ADHD. We compared 186 pretermborn individuals to 69 term-born individuals with ADHD and 135 term-born controls on cognitive-performance measures and event-related potentials (ERPs) of conflict monitoring (N2) and error processing (ERN, Pe) from a flanker task. Preterm-born adolescents demonstrated reduced N2, ERN and Pe amplitudes, compared to controls, and similar ERN and Pe impairments to term-born adolescents with ADHD. While ADHD symptoms correlated with ERN amplitude at FCz among the preterm-born, ERN amplitude at Fz, N2 and Pe amplitude were not associated with ADHD symptoms. Preterm-born individuals show impairments on neurophysiological indices of conflict monitoring (N2) and error processing (ERN and Pe). Early neurophysiological error processing may be a marker underlying the processes linked to the increased risk for ADHD among preterm-born individuals. Error detection processes are malleable and potential targets for non-pharmacological interventions. Preterm-born individuals are likely to benefit from early interventions

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PLoS ONE. 2019;14.

THE COMPLEXITY OF THE INTERACTION BETWEEN BINGE-EATING AND ATTENTION.

Halevy-Yosef R, Bachar E, Shalev L, et al.

Objective To investigate whether binge-eating in patients with eating disorders (EDs) is associated with attentional deficits.

Methods We studied ED patients with binge-eating (n = 51), no binge-eating (n = 59) and controls (n = 58). ED patients were assessed following the stabilization of weight and ED pathology. Attention assessment included evaluation of attention deficit hyperactivity disorder (ADHD) diagnosis, the Adult ADHD Self-Report (ASRS) and ADHD Rating Scale-IV-Home Version (ADHD-RS) questionnaires, and attention functioning assessed with neuropsychological tools. The severity of eating-related pathology, depression, anxiety and obsessionality was also monitored.
Results Patients with binge-eating showed more ADHD symptomatology on the ADHD-RS compared with non-binge-eating patients. No differences were found between binge-eating and non-binge-eating patients in ADHD diagnosis and neuropsychological functioning. Among the specific ED subtypes, patients with anorexia nervosa binge/purge type (AN-B/P) showed the highest rates of ADHD symptomatology on the ADHD-RS, and were characterized with sustained attention deficits.
Conclusion Binge-eating is not associated with attention deficits as measured by objective neuropsychological tools. Nonetheless, it is associated with attentional difficulties as measured with the self-reported ADHD-RS. AN-B/P patients are the only ED category showing objective sustained attention deficits

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PLoS ONE. 2019;14.

TOWARDS INTERPRETABLE MACHINE LEARNING MODELS FOR DIAGNOSIS AID: A CASE STUDY ON ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Itani S, Rossignol M, Lecron F, et al.

Attention Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that has heavy consequences on a childΓÇÖs wellbeing, especially in the academic, psychological and relational planes. The current evaluation of the disorder is supported by clinical assessment and written tests. A definitive diagnosis is usually made based on the DSM-V criteria. There is a lot of ongoing research on ADHD, in order to determine the neurophysiological basis of the disorder and to reach a more objective diagnosis. The advent of Machine Learning (ML) opens up promising prospects for the development of systems able to predict a diagnosis from phenotypic and neuroimaging data. This was the reason why the ADHD-200 contest was launched a few years ago. Based on the publicly available ADHD-200 collection, participants were challenged to predict ADHD with the best possible predictive accuracy. In the present work, we propose instead a ML methodology which primarily places importance on the explanatory power of a model. Such an approach is intended to achieve a fair trade-off between the needs of performance and interpretability expected from medical diagnosis aid systems. We applied our methodology on a data sample extracted from the ADHD-200 collection, through the development of decision trees which are valued for their readability. Our analysis indicates the relevance of the limbic system for the diagnosis of the disorder. Moreover, while providing explanations that make sense, the resulting decision tree performs favorably given the recent results reported in the literature

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PLoS ONE. 2019;14.

FRACTAL FLUCTUATIONS IN EXPLORATORY MOVEMENTS PREDICT DIFFERENCES IN DYNAMIC TOUCH CAPABILITIES BETWEEN CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER AND TYPICAL DEVELOPMENT.

Avelar BS, Mancini MC, Fonseca ST, et al.

Children with Attention-Deficit Hyperactivity Disorder (ADHD) struggle to perform a host of daily activities. Many of these involve forceful interaction with objects and thus implicate dynamic touch. Therefore, deficits in dynamic touch could underlie functional difficulties presented by ADHD children. We investigated whether performance on a dynamic touch task (length perception by wielding) differ between children with ADHD and age-matched controls. We further examined whether this difference could be explained by fractal temporal correlations (wielding dynamics). Forty-two children (ADHD: 21; typically developing: 21) wielded unseen wooden rods and reported their perceived length in the form of magnitude productions. The rods varied in

the magnitude of the first principal moment of inertia (I1). Three-dimensional displacements of hand and rod positions were submitted to Detrended Fluctuation Analysis to estimate trial-by-trial temporal correlations. Children with ADHD reported shorter length for rods with higher I1 than their typically developing peers, indicative of reduced sensitivity to mechanical information supporting dynamic touch. Importantly, temporal correlations in wielding dynamics moderated childrenΓÇÖs usage of I1. This finding points to a role of exploratory movements in perceptual deficits presented by children with ADHD and, thus, should be considered a new potential target for interventions

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Prog Neuro-Psychopharmacol Biol Psychiatry. 2019;93:214-20.

SYNERGISTIC EFFECTS BETWEEN ADORA2A AND DRD2 GENES ON ANXIETY DISORDERS IN CHILDREN WITH ADHD.

Fraporti TT, Contini V, Tovo-Rodrigues L, et al.

The prevalence of anxiety disorders in patients with Attention Deficit/Hyperactivity Disorder (ADHD) is around 15-40%, three times higher than in the general population. The dopaminergic system, classically associated with ADHD, interacts directly with the adenosinergic system through adenosine A2A receptors (A2A) and dopamine D2 receptors (D2) forming A2A-D2 heterodimers. Both dopaminergic and adenosinergic systems are implicated in anxiety disorders. Therefore, the aims of this study were: a) to investigate the main effects of ADORA2A and DRD2 gene variants on anxiety disorders in an ADHD sample of children and adolescents; b) to test potential synergism between ADORA2A and DRD2 genes on the same outcome; c) to explore ADORA2A variants functionality using an in silico approach. The sample consists of 478 children and adolescents with ADHD and their parents, totalizing 1.239 individuals. An association between the ADORA2A rs2298383 TT genotype with the presence of anxiety disorders (P =.004) and an interaction between ADORA2A-DRD2 risk haplotypes with the same outcome (P =.005) was detected. The in silico analyses showed that rs2298383 has the highest score for regulatory function among all variants in the ADORA2A gene described up to date. Altogether, the present findings suggested that the ADORA2A gene and the interaction of ADORA2A and DRD2 genes may play a role in anxiety disorders in children and adolescents with ADHD

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Psychiatr Genet. 2019 Jun;29:63-78.

GENETIC RISK FACTORS AND GENE-ENVIRONMENT INTERACTIONS IN ADULT AND CHILDHOOD ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Palladino VS, McNeill R, Reif A, et al.

Attention-deficit/hyperactivity disorder (ADHD) is a common and highly heritable neurodevelopmental disorder. In recent years, genetic studies have revealed several risk gene variants associated with ADHD; however, these variants could only be partly replicated and are responsible for only a fraction of the whole heritability of ADHD estimated from family and twin studies. One factor that could potentially explain the 'missing heritability' of ADHD is that childhood and adult or persistent ADHD could be genetically distinct subtypes, which therefore need to be analyzed separately. Another approach to identify this missing heritability could be combining the investigation of both common and rare gene risk variants as well as polygenic risk scores. Finally, environmental factors are also thought to play an important role in the etiology of ADHD, acting either independently of the genetic background or more likely in gene-environment interactions. Environmental factors might additionally convey their influence by epigenetic mechanisms, which are relatively underexplored in ADHD. The aforementioned mechanisms might also influence the response of patients with ADHD to stimulant and other ADHD medication. We conducted a selective review

with a focus on risk genes of childhood and adult ADHD, gene-environment interactions, and pharmacogenetics studies on medication response in childhood and adult ADHD

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Psychiatry and Clinical Psychopharmacology. 2019.

PARENT-REPORTED SOCIAL PROBLEMS AND CLINICIAN-EVALUATED ADVERSE EFFECTS MAY BE DIFFERENTIALLY AFFECTED BY DIFFERING EXTENDED RELEASE METHYLPHENIDATE FORMULATIONS: A PROSPECTIVE, NATURALISTIC STUDY FROM TURKEY.

Cikili UM, et al.

OBJECTIVE: Medikinet retard-« is a nonosmotic, extended-release formulation of Methylphenidate (MPH) and has been used in Turkey for the last 4ΓÇô5 years. The aim of our study is to compare the efficacy on functionality of Medikinet retard-«-áand Concerta-«-áand their adverse events.

METHODS: Participants were referred to the Kayseri Training and Research Hospital and followed up there between August 2016 and June 2018. This study design is a 16-week prospective trial, each child received 16 weeks of OROS-MPH or MPH-ER. A total of 103 children were enrolled in the study, but only 70 children (n = 35 concerta, n = 35 medikinet retard) completed the study. Weiss Functional Impairment Rating Scale-Parent Report Form (WFIRS-P) and Barkley Side Effect Rating Scale (BSERS) were used for assessment.

RESULTS: In both treatment groups, children improved significantly over time, both in intensity and in the number of problems. Regarding the social problems, Medikinet retard-«-áwas superior to the Concerta in terms of effects. The side effects of insomnia and euphoria were seen more common in the Concerta-«-ágroup than the Medikinet retard-«. Additionally, the mean severity scores of euphoria were shown higher in the Concerta-«-ágroup than the Medikinet retard.

CONCLUSION: From this study, we concluded that Medikinet retard-«-áis also an effective and safety MPH formulation

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Psychiatr Invest. 2018;15:1144-53.

THE RELATIONSHIP OF CLINICAL SYMPTOMS WITH SOCIAL COGNITION IN CHILDREN DIAGNOSED WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER, SPECIFIC LEARNING DISORDER OR AUTISM SPECTRUM DISORDER.

Sahin B., Karabekiro-ƒlu K, Bozkurt A, et al.

Objective: One of the areas of social cognition is Theory of Mind (ToM) is defined as the capacity to interpret, infer and explain mental states underlying the behavior of others. When social cognition studies on neurodevelopmental disorders are examined, it can be seen that this skill has not been studied sufficiently in children with Specific Learning Disorder (SLD).

Methods: In this study, social cognition skills in children diagnosed with attention deficit hyperactivity disorder (ADHD), SLD or Autism Spectrum Disorder (ASD) evaluated before puberty and compared with controls. To evaluate the ToM skills, the first and second-order false belief tasks, the Hinting Task, the Faux Pas Test and the Reading the Mind in the Eyes Task were used.

Results: We found that children with neurodevelopmental disorders as ADHD, ASD, and SLD had ToM deficits independent of intelligence and language development. There was a significant correlation between social cognition deficits and problems experienced in many areas such as social communication and interaction, attention, behavior, and learning.

Conclusion: Social cognition is an important area of impairment in SLD and there is a strong relationship between clinical symptoms and impaired functionality

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Psychiatr Invest. 2019;16:206-12.

TEMPERAMENT AND CHARACTER PROFILES ASSOCIATED WITH INTERNALIZING AND EXTERNALIZING PROBLEMS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Kang NR, Kwack YS.

Objective This study aimed to identify temperament and character profiles associated with internalizing and externalizing problems in children with attention deficit hyperactivity disorder (ADHD).

Methods Children with ADHD (n=114, 8.51-¦1.87 years) were selected from the Department of Child and Adolescent Psychiatry at Jeju National University Hospital. They were diagnosed by Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version and evaluated using the Advanced Test of Attention and Korean Wechsler Intelligence Scale for Children-Fourth Edition. Their parents completed the ADHD Rating Scale, Korean-Child Behavioral Checklist, and Junior Temperament and Character Inventory.

Results The participants with both internalizing and externalizing problem had more severe ADHD symptoms and significantly higher novelty seeking, harm avoidance, and self-transcendence, as well as lower self-directedness and cooperativeness than those who had not comorbid problems. Harm avoidance was correlated with their level of internalizing problems regardless of severity of ADHD symptoms. In addition, novelty seeking and sex (male) were being associated with the level of externalizing problems.

Conclusion Differences were observed in the temperament and character profiles of children with ADHD according to their comorbid psychopathology. Results suggested that temperament and character profiles may affect the comorbid psychopathology in children with ADHD regardless of ADHD symptom severity

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Psychiatry Res. 2019;278:7-11.

ASSOCIATION BETWEEN INFLAMMATORY CYTOKINES AND ADHD SYMPTOMS IN CHILDREN AND ADOLESCENTS WITH OBESITY: A PILOT STUDY.

Cortese S, Angriman M, Comencini E, et al.

Whilst the association between Attention-Deficit/Hyperactivity Disorder (ADHD) and obesity is supported by meta-analytic evidence, the mechanisms underpinning this link need to be further elucidated. Inflammatory processes may increase the risk of ADHD symptoms in individuals with obesity. This pilot study set out to start testing this hypothesis by assessing the correlation between serum levels of inflammatory cytokines and ADHD symptoms severity in a sample of children and adolescents with obesity. We measured ADHD symptoms severity in 52 children/adolescents with obesity (BMI > 95th centile) with the Conners questionnaire, revised, short version, parent (CPRS-R:S) and teacher (CTRS-R:S) versions. Additionally, a categorical diagnosis of ADHD was established using the Kiddie-SADS-PL. Serum levels of IL-6, Il-10, and TNF-alpha were also obtained. The prevalence of ADHD was 9.6%. We found a significant correlation between IL-6, as well as TNF-alpha, and hyperactivity/impulsivity subscores of the CPRS-R:S and CTRS-R:S, that held even after controlling for BMI and oppositional symptoms. This study provides a rationale for larger, longitudinal studies to gain insight into inflammatory processes underpinning the link between obesity and ADHD. This line of research has the potential to lead to novel, pathophysiologically-based management strategies for individuals with obesity and ADHD

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Psychopharmacology. 2019.

EXPOSURE TO ANTIBIOTICS IN THE FIRST 24 MONTHS OF LIFE AND NEUROCOGNITIVE OUTCOMES AT 11 YEARS OF AGE.

Slykerman RF, Coomarasamy C, Wickens K, et al.

Rationale: Antibiotics are commonly prescribed for infants. In addition to increasing concern about antibiotic resistance, there is a concern about the potential negative impact of antibiotics on the gut microbiota and health and development outcomes.

Objective: The aim of this study was to investigate the association between early life antibiotic exposure and later neurocognitive outcomes.
Methods: Participants were infants born to mothers enrolled in the probiotics study. The initial study was designed to evaluate the effect of two different probiotics on allergy outcomes in childhood. Antibiotic exposure was based on parent report and categorised according to the following timing of the first exposure: 0-6months, 6-12months, 12-24months or not at all. At 11years of age, children's neurocognitive outcomes were assessed using psychologist-administered, parent-report and self-report measures. The relationship between the timing of antibiotic exposure and neurocognitive outcomes was examined using regression models.
Results: Of the 474 participants initially enrolled, 342 (72%) children had a neurocognitive assessment at 11years of age. After adjustment for mode of delivery, probiotic treatment group assignment, income and breastfeeding, children who had received antibiotics in the first 6-ámonths of life had significantly lower overall cognitive and verbal comprehension abilities, increased risk of problems with metacognition, executive function, impulsivity, hyperactivity, attention-deficit hyperactivity disorder, anxiety and emotional problems.
Conclusions: These results provide further evidence that early exposure to antibiotics may be associated with detrimental neurodevelopmental outcomes

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Psychosomatic Medicine. 2019;81:A22.

CLINICAL PROFILES OF CHILDREN WITH CO-OCCURRENT ATTENTION DEFICIT / HYPERACTIVITY DISORDER AND ANXIETY DISORDER COMPARED TO THOSE WITH ONLY ANXIETY DISORDER.

Renauld K, Busques GF, Denis I.

Backround: Between twenty-five and forty percent of children with an anxiety disorder (AD) present comorbid attention deficit hyperactivity disorder (ADHD). While children with comorbid AD-ADHD may present with similar symptoms and difficulties, the implications of this comorbidity remain unclear. The purpose of this study is to compare children with AD-ADHD to those with AD alone on anxiety and ADHD symptoms and behaviors associated with executive functions.
Method: Sixty-eight children aged between 8 and 12 years old were recruited at an child psychiatry outpatient clinic. Twenty-seven children (40%) had an AD and 41 children (60%) presented AD-ADHD. The Child Behavior Checklist (CBCL), CONNERS-3 and Behavior Rating Inventory of Executive Function (BRIEF) questionnaires were completed by the parents, and the Beck Youth Inventories were completed by the childrens.
Results: Children in the AD-ADHD group reported significantly more somatic complaints (t = -2,256, p = 0,030), attention problems (t = 2,421, p = 0,020) and conduct problems (t = 2.053, p = 0.048) according to the CBCL than children from the AD group. The same holds true for inattention (t = 4.489, p 0.001), learning problems (t = 4.116, p 0.001), executive functions (t = 3.329, p = 0.002) and impulsivity (t = 2.288, p = 0.029) as measured by the CONNERS-3. However, on the Beck Youth Inventories, the AD group reported more anxiety symptoms than the ADHD group (t = -2.122, p = 0.040). According to the BRIEF, the presence of ADHD was associated with elevated impairment in working memory (t = 3.625, p = 0.001), organizational capacities (t = 2.224, p = 0.031), metacognition (t = 2.595, p = 0.014) and executive capacities (t = 2.178, p = 0.037).
Conclusion: While anxiety symptoms appear to be lessened in children with AD-ADHD, they present more somatic symptoms. Furthermore, AD-ADHD is associated with increased behavioral and cognitive problems, highlighting the vulnerability of these children

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Sci Data. 2019 Apr;6:25.

A PUPIL SIZE, EYE-TRACKING AND NEUROPSYCHOLOGICAL DATASET FROM ADHD CHILDREN DURING A COGNITIVE TASK.

Rojas-Libano D, Wainstein G, Carrasco X, et al.

Attention Deficit/Hyperactive Disorder (ADHD) is diagnosed based on observed behavioral outcomes alone. Given that some brain attentional networks involve circuits that control the eye pupil, we monitored pupil size in

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Sleep. 2019;42:A315-A316.

ADHD SYMPTOMS MODERATE THE NEURAL VULNERABILITY OF INHIBITION TO SLEEP LOSS IN CHILDREN.

Saletin JM, De Queiroz CG, Haddad J, et al.

Introduction: Sleep disruption is a proposed mechanism underlying disinhibition in attention-deficit/hyperactivity-disorder (ADHD); however, whether ADHD symptoms bestow increased vulnerability to sleep loss is unknown. Thus, we combined a behavioral go/ no-go paradigm with functional neuroimaging in a dimensional sample of child ADHD to test whether those with more ADHD symptoms will be less resilient to the consequences of short sleep.

Methods: 13 children (7F; aged 11.7-¦1.3 years) were characterized for ADHD symptomatology (inattention and hyperactivity/ impulsivity) using Conners-3 scales, before sleeping at home for a week (9.5h time-in-bed [TIB]). Each then slept in the laboratory for two consecutive EEG-monitored nights: baseline (9.5h TIB) followed by restriction to 4h TIB (20h extended wake). fMRI-monitored visual go/no-go task assessing the neural systems underlying behavioral inhibition occurred each morning. Mixed-effects modelling assessed whether ADHD symptoms moderate the impact of sleep loss on behavioral and neural indices of inhibition; all models covaried age and gender.

Results: Our sample captured a range of parent-rated ADHD symptoms (inattention T-scores: 38-72; mean: 51.15-¦10.38; hyperactivity/ impulsivity: 41-89; mean: 54.7-¦14.2). Extended wakefulness was associated with faster (213.5 ms) response times (RT) on go/no-go trials after commission errors ($F(1,10.06)=10.46$; $p<.009$). This effect was moderated by inattention ($b=3.65$; $t=2.89$; $p=.016$); that is, error-dependent RT changes were present only for children with few symptoms. Consistent with an increased failure to integrate error into behavior, symptoms (here, hyperactivity/ impulsivity) were also associated with greater decreases in fMRI activation after sleep loss: activity associated with making commission errors in the right insula and activity associated with successful inhibition in the dorsal anterior cingulate cortex (voxel-wise $p<.005$;$k=20mm3$).

Conclusion: These data indicate that a short acute dose of partial sleep loss by extending wakefulness 5.5 hours can disrupt inhibition in children. ADHD symptoms were associated with differential sleep restriction changes in both behavioral and neural indices of inhibition. While preliminary, these results support the hypothesis that ADHD symptoms may bestow increased vulnerability to sleep loss in youth, thus underscoring the importance of supporting healthy sleep in children with this disorder

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Soc Psychiatry Psychiatr Epidemiol. 2019 Apr;54:415-25.

RATES, TYPES AND CO-OCCURRENCE OF EMOTIONAL AND BEHAVIOURAL DISORDERS AMONG PERINATALLY HIV-INFECTED YOUTH IN UGANDA: THE CHAKA STUDY.

Kinyanda E, Salisbury TT, Levin J, et al.

PURPOSE: To describe the rates, types and comorbidity of emotional and behavioural disorders among perinatally HIV-infected children and adolescents attending care at five HIV youth clinics in Central and Southwestern Uganda.

METHODS: 1339 CA-HIV attending care at HIV youth clinics in Uganda were interviewed using the DSM-5-based Child and Adolescent Symptom Inventory-5 (CASI-5; caregiver reported) and the Youth Inventory-4R (YI-4R; youth reported). Prevalence, risk factors and comorbidity for psychiatric disorders were estimated

using logistic regression models. RESULTS: According to caregiver or youth report, the prevalence of 'any DSM-5 psychiatric disorder' was 17.4% (95% CI 15.4-19.5%), while that of 'any behavioural disorder' was 9.6% (95% CI 8.1-11.2%) and that of 'any emotional disorder' was 11.5% (95% CI 9.9-13.3%). The most prevalent behavioural disorder was attention deficit hyperactivity disorder (5.3%), while the most prevalent emotional disorder was separation anxiety disorder (4.6%). The statistically significant risk factors were: for behavioural disorders, sex (more among males than females) and age group (more among adolescents than among children); for emotional disorders, age group (more among adolescents than among children) and the caregiver's highest educational attainment (more among CA-HIV with caregivers with secondary education and higher, than among CA-HIV with caregivers with no formal education or only primary level education). About a quarter (24.5%) of CA-HIV with at least one emotional disorder and about a third (33.5%) of the CA-HIV with at least one behavioural disorder had a comorbid psychiatric disorder.
CONCLUSION: There was a considerable burden of psychiatric disorders among CA-HIV that spanned a broad spectrum and showed considerable comorbidity

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The Lancet Planetary Health. 2019;3:e226-e234.

ASSOCIATION BETWEEN EXPOSURE TO THE NATURAL ENVIRONMENT, RURALITY, AND ATTENTION-DEFICIT HYPERACTIVITY DISORDER IN CHILDREN IN NEW ZEALAND: A LINKAGE STUDY.

Donovan GH, Michael YL, Gatziolis D, et al.

Background: Several small experimental studies and cross-sectional observational studies have shown that exposure to the natural environment might protect against attention-deficit hyperactivity disorder (ADHD) or moderate the symptoms of ADHD in children. We aimed to assess whether exposure to the natural environment protects against ADHD and whether this hypothesised protective effect varies across a child's life course.
Methods: We did a longitudinal study with data collected from all children born in New Zealand in 1998, excluding those without an address history, those who were not singleton births, and those who died or emigrated before 18 years of age. We used Statistics New Zealand's Integrated Data Infrastructure to identify children with ADHD and to define covariates. ADHD was defined according to hospital diagnosis or pharmacy records (two or more prescriptions for ADHD drugs). Exposure to green space for each year of a child's life (from gestation to 18 years of age) was estimated at the meshblock level (the smallest geographical unit for which the New Zealand Census reports data) using normalised difference vegetation index (NDVI), and land-use data from Landcare Research New Zealand. We used logit models to assess the associations between ADHD prevalence and minimum, maximum, and mean lifetime NDVI, as well as rural living, controlling for sex, ethnicity, mother's educational level, mother's smoking status, mother's age at parturition, birth order, antibiotic use, and low birthweight.
Findings: Of the 57 450 children born in New Zealand in 1998, 49 923 were eligible and had available data, and were included in the analysis. Children who had always lived in a rural area after 2 years of age were less likely to develop ADHD (odds ratio [OR] 0 670 [95% CI 0 461-0-À974), as were those with increased minimum NDVI exposure after age 2 years (standardised OR for exposure vs first quartile: second quartile 0-À841 [0-À707-0-999]; third quartile 0-À809 [0-À680-0-963]; fourth quartile 0-À664 [0 5480 805]). In early life (prenatal to age 2 years), neither rural living nor NDVI were protective against ADHD. Neither mean nor maximum greenness was significantly protective against ADHD.
Interpretation: Rurality and increased minimum greenness were strongly and independently associated with a reduced risk of ADHD. Increasing a child's minimum lifetime greenness exposure, as opposed to maximum or mean exposure, might provide the greatest increment of protection against the disorder. Funding: None

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Transl Psychiatry. 2019 Jan;9:12.

REPRODUCIBLE GREY MATTER PATTERNS INDEX A MULTIVARIATE, GLOBAL ALTERATION OF BRAIN STRUCTURE IN SCHIZOPHRENIA AND BIPOLAR DISORDER.

Schwarz E, Doan NT, Pergola G, et al.

Schizophrenia is a severe mental disorder characterized by numerous subtle changes in brain structure and function. Machine learning allows exploring the utility of combining structural and functional brain magnetic resonance imaging (MRI) measures for diagnostic application, but this approach has been hampered by sample size limitations and lack of differential diagnostic data. Here, we performed a multi-site machine learning analysis to explore brain structural patterns of T1 MRI data in 2668 individuals with schizophrenia, bipolar disorder or attention-deficit/ hyperactivity disorder, and healthy controls. We found reproducible changes of structural parameters in schizophrenia that yielded a classification accuracy of up to 76% and provided discrimination from ADHD, through it lacked specificity against bipolar disorder. The observed changes largely indexed distributed grey matter alterations that could be represented through a combination of several global brain-structural parameters. This multi-site machine learning study identified a brain-structural signature that could reproducibly differentiate schizophrenia patients from controls, but lacked specificity against bipolar disorder. While this currently limits the clinical utility of the identified signature, the present study highlights that the underlying alterations index substantial global grey matter changes in psychotic disorders, reflecting the biological similarity of these conditions, and provide a roadmap for future exploration of brain structural alterations in psychiatric patients

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Transl Psychiatry. 2019;9.

ATYPICAL FUNCTIONAL CONNECTIVITY IN ADOLESCENTS AND ADULTS WITH PERSISTENT AND REMITTED ADHD DURING A COGNITIVE CONTROL TASK.

Michelini G, Jurgiel J, Bakolis I, et al.

We previously provided initial evidence for cognitive and event-related potential markers of persistence/remission of attention-deficit/hyperactivity disorder (ADHD) from childhood to adolescence and adulthood. Here, using a novel brain-network connectivity approach, we aimed to examine whether task-based functional connectivity reflects a marker of ADHD remission or an enduring deficit unrelated to ADHD outcome. High-density EEG was recorded in a follow-up of 110 adolescents and young adults with childhood ADHD (87 persisters, 23 remitters) and 169 typically developing individuals during an arrow-flanker task, eliciting cognitive control. Functional connectivity was quantified with network-based graph-theory metrics before incongruent (high-conflict) target onset (pre-stimulus), during target processing (post-stimulus) and in the degree of change between pre-stimulus/post-stimulus. ADHD outcome was examined with parent-reported symptoms and impairment using both a categorical (DSM-IV) and a dimensional approach. Graph-theory measures converged in indicating that, compared to controls, ADHD persisters showed increased connectivity in pre-stimulus theta, alpha, and beta and in post-stimulus beta (all $p < .01$) and reduced pre-stimulus/post-stimulus change in theta connectivity ($p < .01$). In the majority of indices showing ADHD persisterΓÇôcontrol differences, ADHD remitters differed from controls (all $p < .05$) but not from persisters. Similarly, connectivity measures were unrelated to continuous outcome measures of ADHD symptoms and impairment in participants with childhood ADHD. These findings indicate that adolescents and young adults with persistent and remitted ADHD share atypical over-connectivity profiles and reduced ability to modulate connectivity patterns with task demands, compared to controls. Task-based functional connectivity impairments may represent enduring deficits in individuals with childhood ADHD irrespective of diagnostic status in adolescence/young adulthood

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Z Psychosom Med Psychother. 2018 Sep;64:262-80.

ADULT ADHD AND BORDERLINE PERSONALITY DISORDER: A PILOT STUDY ON DIFFERENCES IN ATTACHMENT AND EARLY TRAUMATIZATION.

Schmidt AC, Gablonski TC, Wladika W, et al.

Adult ADHD and borderline personality disorder: A pilot study on differences in attachment and early traumatization

Objective: Attention-deficit/hyperactivity disorder (ADHD) in adulthood and borderline personality disorder (BPD) share commondiagnostic criteria. The present study examined how ADHD in adulthood can be distinguished from BPDregarding attachment style and traumatic experiences.

METHOD: The sample consists of N = 30 persons with 50% (n = 15) ADHD patients and 50% (n = 15) BPD patients. The patients were asked to fill out different questionnaires to investigate the criteria for specific symptoms.

RESULTS: The results show that most of the patients are insecurely attached. In addition, 80% of both the ADHD and BPD sample claimed traumatic experiences in their childhood or adolescence. Most frequently, patients reported traumatisation following emotional neglect and emotional abuse. No group-specific differences concerning traumatic experiences and the individual attachment style were determined.

CONCLUSION: The etiological factors attachment style and traumatic experiences are not suitable for differentiating ADHD in adulthood and BPD

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Zh Nevrol Psikhiatr Im S S Korsakova. 2018;118:31-35.

COGNITIVE CONTROL IMPAIRMENT IN ADULT WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Chutko LS, Surushkina SY, Yakovenko EA, et al.

AIM: To study cognitive impairment in adults with attention deficit hyperactivity disorder (ADHD) and assess the efficacy of cerebrolysin in the treatment of such patients.

MATERIAL AND METHODS: Thirty-eight patients with ADHD, aged from 18 to 45 years were enrolled in the study. Along with general neurological examination, several ADHA-specific scales and tests (ASRS-V1-1, SFQ, BIS, the Emotional Intelligence Self-Evaluation, TOVA) were administered.

RESULTS AND CONCLUSION: There was a significant increase in inattention and impulsivity in comparison with the control group, which can be regarded as a decrease in cognitive control. The results of the study showed that cerebrolysin was an effective tool for improving cognitive control in adult patients with ADHD (a significant improvement was noted in 42.1% of patients, improvement in 31.6% of patients)

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ADHD/autism spectrum disorder traits and exposure to pesticides: a systematic review

L. Tessari*, M. Angriman, A. Conca, S. Cortese

*Bolzano Hospital, Vicenza, Italy

Objectives: The etiology of neurodevelopmental disorders is multi-factorial. Exposure to chemicals may adversely affect neurodevelopment through various toxicological pathways. There is an increasing amount of research showing that pesticides and agro-toxics may increase the risk of neurodevelopmental disorders. However, to fate no evidence synthesis has been conducted. To fill this gap, we conducted a systematic review of population-based studies assessing the relationship between pesticides and agrotoxics during pregnancy and early childhood Attention-Deficit/Hyperactivity Disorder (ADHD) or Autism Spectrum Disorder (ASD).
Methods: Studies published in English up to December 2018 were searched using PubMed, Ovid, Medline, PsycINFO and Web of Science databases. Studies that assessed pesticide exposure (e.g., via

questionnaire or interview) or measured pesticide or metabolite levels in biological specimens from study participants or their immediate environment were eligible for inclusion. Two researches selected independently the studies. Disagreements were solved by a third senior author.

Results: From a pool of 772 potentially relevant studies, 28 were retained, including 12 focusing on ADHD, 14 on ASD, and two on both ASD and ADHD. Of these, eigth reported a significant association between exposure to pesticides (Organophosphate, Pyrethroid pesticide, Organochlorine pesticides, Trichlorophenols) and ADHD symptoms. Twelve studies reported a significant association between exposure to pesticides (Organophosphate, Pyrethroid pesticide, Organochlorine pesticides, Imidacloprid) and ASD or ASD traits.

Conclusions: The majority of the studies included in this systematic review suggest a significant association between exposure to pesticides/agrotoxics and ADHD or ASD, albeit their results should be considered with caution due to a number of methodological issues. A meta-analysis is warranted to gain quantitative insight into this possible association.

Results: No difference was found in cognitive and executive functioning between two groups. The P3b amplitude was significantly higher in TS patients (15.6 ± 9 μV) than in children and adolescents without TS (5.5 ± 2.7 μV) ($p = 0.04$). The MMN amplitude was higher in TS patients (19 ± 18 μV) than in those without TS (9 ± 6.9 μV), although the difference was not significant ($p = 0.3$).

Conclusions: Our results show that P3 and MMN amplitudes are higher in ADHD patients with TS than in those without TS. This means that among children and adolescents with ADHD involuntary and mostly voluntary attention capabilities are better in those with TS. Since this difference was not found by neuropsychological testing, ERP recording can be useful to unravel subclinical differences between two groups.

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P59-F ERP recording shows subclinical differences in ADHD patients with and without Tuberous Sclerosis—Massimilano Valeriani [a,*], Stefano Pro [a], Romina Moavero [a], Federico Vigevano [a], Paolo Curatolo [b] ([a] Bambino Gesu' Children's Research Hospital IRCCS, Rome, Italy, [b] University of Rome Tor Vergata, Rome, Italy)

* Corresponding author.

Background: To investigate whether among children and adolescents with attention deficit and hyperactivity disorder (ADHD) those with Tuberous Sclerosis (TS) show specific abnormalities of event-related potentials (ERPs).

Material and Methods: We recruited 10 ADHD patients: 5 with TS (mean age: 12.6 ± 4.3 years) and 5 without TS (mean age: 11.6 ± 3 years). By using an oddball paradigm, auditory mismatch negativity (MMN) and P3b responses were recorded from Fz and Pz electrodes, respectively. All patients were administered with cognitive, executive functioning, and behavioural questionnaires.

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Reproducible grey matter patterns index a multivariate, global alteration of brain structure in schizophrenia and bipolar disorder

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Abstract

Schizophrenia is a severe mental disorder characterized by numerous subtle changes in brain structure and function. Machine learning allows exploring the utility of combining structural and functional brain magnetic resonance imaging (MRI) measures for diagnostic application, but this approach has been hampered by sample size limitations and lack of differential diagnostic data. Here, we performed a multi-site machine learning analysis to explore brain structural patterns of T1 MRI data in 2668 individuals with schizophrenia, bipolar disorder or attention-deficit/hyperactivity disorder, and healthy controls. We found reproducible changes of structural parameters in schizophrenia that yielded a classification accuracy of up to 76% and provided discrimination from ADHD, through it lacked specificity against bipolar disorder. The observed changes largely indexed distributed grey matter alterations that could be represented through a combination of several global brain-structural parameters. This multi-site machine learning study identified a brain-structural signature that could reproducibly differentiate schizophrenia patients from controls, but lacked specificity against bipolar disorder. While this currently limits the clinical utility of the identified signature, the present study highlights that the underlying alterations index substantial global grey matter changes in psychotic disorders, reflecting the biological similarity of these conditions, and provide a roadmap for future exploration of brain structural alterations in psychiatric patients.

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Introduction

Schizophrenia is a severe neuropsychiatric disorder affecting approximately 0.7% of the population[1]. A large spectrum of experimental approaches has been used to identify neural alterations in schizophrenia[2,3]. Among these, magnetic resonance imaging (MRI) has received

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particularly strong interest[4] due to its non-invasiveness, high efficiency in acquiring brain-wide information on structure and function, and the ubiquitous availability of scanners, enabling the accumulation of large sample sizes. Meta-analyses of MRI data have demonstrated the presence of widespread brain-structural changes in patients[5–14], and machine learning, whereby combined effects of numerous predictors can be exploited, has been used to identify predictive patterns that explain a substantial amount of schizophrenia-associated variation[15,16].

With a few notable exceptions[17–19], pattern recognition studies on brain MRI data have only been performed in single-site studies that demonstrate substantial variability in accuracy of case-control classification between studies. A recent meta-analysis suggests that this variability may be attributable to small sample sizes, with larger studies converging at 70- 80% accuracy[15]. The latter accuracy is consistent with a recent, large-scale multi-site investigation showing reproducible brain-structural differences between individuals with schizophrenia and healthy controls[20]. These limitations in accuracy pose a significant challenge to translate psychiatric MRI tools for diagnostic and predictive applications into clinical practice. The clinical utility of such tools strongly depends on their value for everyday clinical decision making, which usually requires differential diagnosis among different disorders rather than control/case discriminations. Therefore testing diagnostic specificity is of paramount importance[21]. Bipolar disorder has particularly high differential diagnostic relevance for schizophrenia and previous studies have provided promising evidence that structural differences in schizophrenia show specificity against this disorder[22–24]. Furthermore, symptoms of attention-deficit/hyperactivity disorder (ADHD) are among the frequent precursors of schizophrenia[25–31] during adolescence, but have less differential diagnostic relevance in adult individuals. The three conditions show substantially shared genetic risk, and conjointly map to a spectrum of neuropsychiatric disorders with brain structure alterations associated with genetic and environmental risk factors[32].

Based on these considerations, the collaborative FP7 project IMAging GEnetics for MENtal Disoders (IMAGEMEND) has assembled a large, multimodal database that comprises neuroimaging data on cohorts of individuals with schizophrenia and bipolar disorder, adolescent as well as adult individuals with ADHD, and healthy controls[33]. The primary focus of the project is the identification of multivariate biological signatures that can aid diagnosis of these disorders. Using this resource, we analyzed structural MRI data from 2668 individuals in the present study.

Our primary aims were 1) to identify brain structural patterns that can reproducibly differentiate individuals with schizophrenia from controls, 2) explore their diagnostic specificity with regard to other disorders and 3) to identify the underlying brain structures driving successful classification. The availability of matched case-control data from several sites allowed application of a leave-site-out procedure, meaning that data from all but one site were iteratively used for algorithm training and the remaining data used for testing. This was aimed at the identification of differences robust against between-site variability. In order to make use of the complementary information provided by the different measures, we included both 1) FreeSurfer-based measures of cortical morphometry (cortical thickness, surface area and volume) and global and subcortical volumetry as provided by Freesurfer[34], and 2) voxel-based morphometry (VBM) as provided by Statistical Parametric Mapping (SPM)[35]. We also compared two machine learning strategies: (I) random forest machine learning, which captures non-linear and multiplicative effects of predictors and yields an efficient ranking of important predictors, and (II) support vector machines (SVM), the most commonly and successfully applied linear tool in machine learning studies on brain structure[36].

Materials and methods

Cohorts

This study comprised eight cohorts with a total of 2668 participants (consisting of patients with schizophrenia (n = 375, cases in cohorts I-IV), bipolar disorder (n = 222, part of cohort VIII), ADHD (n = 342, cases in cohorts V and VI), as well as healthy control subjects (n = 1729, cohorts I to VIII; n = 368 of these in cohorts I-IV) demographic details are shown in Supplementary Table 1; recruitment details are shown in Supplementary Table 2). All participants gave written, informed consent and the study received approval from the local ethics committees of the participating institutions.

Data pre-processing

Pre-processing of all T1-weighted images was performed centrally at the same site (University of Oslo, Norway) using FreeSurfer 5.3 (http://surfer.nmr.mgh.harvard.edu)[34]. All datasets underwent visual assessment and minor manual intervention to correct for segmentation errors wherever necessary. Data with significant low quality due to, e.g., motion artifacts and image distortions were excluded. Cortical parcellation was performed using the Desikan–Killiany atlas[37,38], and subcortical segmentation was performed based on a probabilistic atlas[39]. The mean thickness, sum surface area, and volume for each cortical region-of-interest (ROI), as well as the volume of subcortical structures were computed, resulting in a set of 152 FreeSurfer features (Supplementary Table 4).

An important question of the present study was whether signatures that combined the effects of multiple brain

structures could be represented through regionally non-specific, 'global grey-matter features'. For this, we manually selected 20 of such 'global features' and these are detailed in Supplementary Table 11. Additionally, the per-subject median of all ventricle features was used as readout for global ventricle size. Furthermore, for VBM- and FreeSurfer-based analyses we determined separately the per-subject median across all features, resulting in a 'median feature', resulting in a set of 22 'global features' in total. To avoid feature redundancy, bilateral features were removed if both uni-lateral features were available.

The dataset was also processed each using VBM[35] as implemented in the CAT12 toolbox (http://dbm.neuro.uni-jena.de/cat/), SPM12 (http://www.fil.ion.ucl.ac.uk/spm/software/spm12/) and MATLAB 2014a (Mathworks, Sherborn, MA, USA) to derive the grey matter (GM) maps. As input, we used the *nu.mgz* volume, an intensity-normalized volume adjusted for the non-uniformity in the original T1-images, obtained from the FreeSurfer pre-processing pipeline (https://surfer.nmr.mgh.harvard.edu/fswiki/ReconAllOutputFiles). Briefly, this volume was tissue-segmented into GM, white matter (WM) and cerebrospinal fluid maps. The modulated GM maps were subsequently registered to the Dartel template, which is based on 550 healthy subjects from the IXI database (http://brain-development.org/ixi-dataset/), using affine registration followed by the Dartel non-rigid registration algorithm[40]. The mean GM density was then computed for each region-of-interest as defined in the Automated Anatomical Labeling (AAL) atlas[41], resulting in a set of 122 VBM features (Supplementary Table 3).

Matching, covariate adjustment and normalization

An overview of the pre-processing and machine learning pipeline is shown in Fig. 1. Cohorts I to IV were used for subsequent training of machine learning algorithms. In cohorts II to IV, propensity score matching (using the R library *MatchIt*[42]) was used to create schizophrenia-control datasets, 1:1 matched on age and sex. Matching was performed separately for each cohort. No matching was performed in cohort I, since it comprised fewer controls than patients and showed no significant case-control differences regarding age and sex. Controls not selected during the matching process were retained for validation of algorithms (cohort VIII).

Covariate adjustment was performed in two steps. The first step was aimed at removing the effects of covariates relevant within a given dataset. For this, linear regression was used to construct normalization models in the matched case-control data (Supplementary Figure 1). Each feature was regressed against age, age^2, sex, and total intracranial volume (ICV, derived from FreeSurfer; this covariate was not included for thickness features derived from FreeSurfer processing). Normalization models were built separately for the cohorts used for training (i.e. during the leave-site-out procedure described below as well as for prediction of the schizophrenia classifier into the validation cohorts), and the resulting coefficients were averaged to obtain a final model per brain feature. These models were then applied to residualize the features in the training as well as the test data. Subsequently, ICV was added as a feature to the residualized training and test data. In the second covariate adjustment step, the effects of between-dataset variables (field strength and scanner vendor) were removed. Using data from the previous step as input, linear models were built to residualize all training data and adjust the test data accordingly. During the leave-site-out testing procedures, as well as for testing classifiers in validation data, the test data were not used to generate normalization models and remained independent. The objective of this two-step procedure was to appropriately account for the effect of potential confounders, without using site-information as additional covariate. This is essential for potential clinical application of a diagnostic tool, when subjects from sites are tested that are not part of the training data. In this case, adjustment against a site-covariate cannot be performed. In a secondary analysis, we set the means of each feature in a given test dataset artificially to 0 (for training data this is already fulfilled due to the residualization procedure). With this we tested whether not using test data for

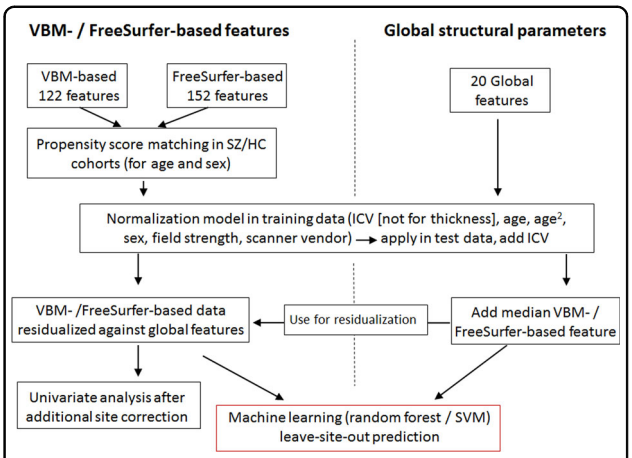

Fig. 1 Overview of analysis procedure. Subjects were first propensity score matched and VBM- / FreeSurfer-based features were then normalized against potential confounders. Normalization models were built in training data only and these models were subsequently applied to adjust the test data. The same normalization strategy was applied for global structural parameters, which were subsequently used to remove the global structural signal from VBM- / FreeSurfer-based features. The resulting data was used for leave-site-out cross-validation analyses. For univariate analyses, as well as for machine learning analyses performed on the entire dataset, data were additionally corrected for a site factor, to account for the impact of site differences (see methods)

building of normalization models impacted on classification performance.

For the machine learning analyses performed on the entire, matched dataset (i.e. for out-of-bag performance evaluation, where accuracy estimates were obtained from observations not selected during the repeated bootstrapping part of the random forest classification procedure, see below), we excluded the impact of a site factor through residualization using linear models, in addition to the covariate adjustment described above. For this residualization, site and scanner vendor were both included as covariates. Such corrected data was also used for the univariate analyses (see below). For principal components analysis, which was applied to explore the global similarity between VBM- and FreeSurfer-based features, data were additionally normalized against diagnosis and subsequently standardized.

Univariate analysis

Univariate analyses were performed to assess the extent of change in individual brain-structural measures prior to and following adjustment for global structural parameters. Univariate analysis was performed on data residualized as described above, to increase comparability against the features' importance determined by machine learning. Case-control differences were evaluated using Student's t-tests and *P*-values were adjusted for the False Discovery Rate (FDR) according to the method of Benjamini and Hochberg[43]. The adjustment was performed separately for VBM- and FreeSurfer-based features.

For the univariate analysis of the features following removal of the global structural signal, we first corrected the global structural features using the same steps described above. These corrected global structural features were then used to adjust the VBM- and FreeSurfer-based features, and the resulting residuals were used for the univariate analysis.

Machine learning – cross-validation and accuracy estimation

Several different procedures were employed to train and test machine learning algorithms: a) 'within-site' classification, where algorithms were trained and tested separately in each given cohort (using cohorts I-IV for schizophrenia-control classification, cohort VIII (selecting University of Oslo data only) for bipolar disorder-control classification, and cohorts V and VI for ADHD-control classification). b) 'Leave-site-out' classification in cohorts I-IV. c) Prediction of a schizophrenia-control classifier in independent test data (the classifier was trained in cohorts I-IV and tested in cohorts V-VIII).

For procedures a) and b), performance of machine learning algorithms was assessed by comparing the predicted class membership against the real class-membership. For 'within-site' classification, this was performed using bootstrapping.

The Receiver Operating Characteristic Area Under Curve (AUC) was determined to quantify accuracy (using the R library *pROC*[44]). For leave-site-out classification, we additionally determined the mean of sensitivity and specificity to explore whether predicted class probabilities were shifted across cohorts.

For procedure c), accuracy was determined as the specificity, i.e. the percentage of subjects correctly classified as being not affected by schizophrenia.

Machine learning – random forests

Random forest is a machine learning tool suitable for classification and regression[45]. It combines the output of a large number of individual classification/regression trees, each of which are built on randomly selected subsets of observations and predictors. The random forest can naturally incorporate interactions between predictors, allows efficient ranking of predictor importance and has been shown to be one of the most accurate classification tools on a large variety of data sets[36].

Random forest machine learning (using the R package *randomForest*[46]) was performed in a site-stratified manner using 5000 trees and the default value for the *mtry* parameter (no tuning of random forest parameters was performed). The number of trees was chosen based on the observation that larger tree numbers do not significantly improve performance[47]. Site-stratification was performed such that for building each tree, an equal number of subjects (equal to the sample size of the smallest training cohort) were randomly drawn without replacement from the data of each site. We determined the importance of the features for prediction during this procedure using the Gini index, a measure of how much a given feature impacts the correct class separation, when used for a split during the tree-building process[48]. Selection of the most important predictors was performed using the R package *varSelRF*[49], also using 5000 trees, and default settings otherwise. During this procedure, the least important variables are successively removed from the model. The optimal number of variables is chosen for the solution where the out-of-bag error is equal to the lowest observed error rate, plus one standard deviation. This leads to a solution with close to optimal error rate but with a lower number of predictors, a scenario generally thought to be beneficial for the generalizability of the classifier. The Gini-index-derived variable importance measure was also used to assess the similarity of features selected by within-site classification. For this, we determined the median Pearson correlation of the variable importance measures across cohorts.

To explore the diagnostic specificity of important variables, we first selected the top *m* (with m being

determined via random forest variable selection; $m = 14$ for VBM-based and m = 11 for FreeSurfer-based features, respectively) variables from the schizophrenia-control comparison. We then determined the Wilcoxon rank sum statistic comparing the importance of these variables against the remaining variables in bipolar disorder, adolescent as well as adult ADHD. To test significance, a 5,000-fold permutation of diagnostic labels was performed. During each repetition, variable importance was re-calculated for the three non-schizophrenia case-control comparisons and the determination of rank sum statistics was repeated. Empirical *P*-values were then calculated as the frequency of permutation rank sum statistic at least as high as those determined from non-permuted data.

Random forest regression was used to determine the amount of variance that could be predicted in individual VBM- and FreeSurfer-based features using the global structural parameters. The explained variance was determined from out-of-bag predictions. For this analysis, the same covariate-adjusted data were used as for the univariate analysis (see above). Accordingly, the global structural parameters were also additionally residualized against a site factor.

Machine learning – Support Vector Machines

A support vector machine is a classification tool that aims to identify a decision boundary with maximal margin between the boundary and observations from a given class[50]. The boundary is defined based on the most proximal observations, making classification insensitive to data variations or outliers, resulting in frequently superior generalization performance[36]. Linear SVM is relatively robust to overfitting and was, in the present study (using the R package *e1071*[51]), tuned using 10-fold cross-validation to optimize the cost parameter (choosing among values from the log sequence between 10^{-5} and 10^{5}). Parameter optimization was performed in training data only.

Exploring the impact of global structural parameters on classification

To explore the effect of the 22 global structural features on classification, these features were adjusted for confounding variables using the same procedure applied for VBM- and FreeSurfer-based features (i.e. residualization against age, age^2, sex, gender, ICV, field strength, and scanner vendor). VBM- and FreeSurfer-based features were subsequently residualized against the covariate-adjusted global features using additive linear models. To explore the impact of this residualization procedure *per se*, it was repeated 1000 times with row order-permuted global features. Similarly, to explore the significance of the accuracy obtained after residualization, the procedure was repeated 1000 times with permuted diagnostic labels. Finally, to explore the classification accuracy obtained from global-features only, we applied random forest machine learning (as described above) using the covariate-adjusted global features.

Results

Brain structural neuroimaging data from a total of 2668 subjects were analyzed. Sample details are presented in Supplementary Tables 1 and 2. The data were processed to extract either 122 VBM-based or 152 FreeSurfer-based morphometry features (Fig. 1, Supplementary Tables 3 and 4, ICV was added as a predictor to each feature set). Machine learning was used to identify structural patterns that could be used to differentiate individuals with schizophrenia from controls and to establish the diagnostic specificity against bipolar disorder and ADHD.

Case-control differences, schizophrenia classification and diagnostic specificity *Univariate case-control differences*

the univariate analysis of matched cases and controls from cohorts I to IV demonstrated significant alterations in VBM-based features of individuals with schizophrenia (Supplementary Tables 3 and 4). A total of 110 of the 123 features showed significant alteration at FDR < 0.05. Similarly, for FreeSurfer-based features, 105 of the 153 features were significant at this threshold.

Machine-learning classification

Using random forest machine learning, we first performed a within-site classification of participants with schizophrenia and controls and found AUC values obtained from out-of-bag predictions ranging from 0.58 to 0.82 for VBM-based and from 0.58 to 0.80 for FreeSurfer-based features, respectively (Supplementary Table 5). Permutation analysis showed that accuracy estimates were significant for three of the four cohorts (Supplementary Table 5). When all case-control cohorts were combined into a single dataset, the AUC obtained from out-of-bag predictions was 0.73 ($P < 0.001$) for VBM-based and 0.72 ($P < 0.001$) for FreeSurfer-based morphometry, respectively. When VBM- and FreeSurfer-based features were combined into a single dataset, the resulting AUC was 0.74 ($P < 0.001$). We further found that features were more consistently selected as important predictors for VBM data (median correlation of variable importance measures across the four cohorts of 0.11) compared to FreeSurfer data (mean correlation -0.02).

Leave-site-out classification

We tested the classification accuracy when all but one of the case-control datasets were used for training. This leave-site-out cross-validation yielded median AUC

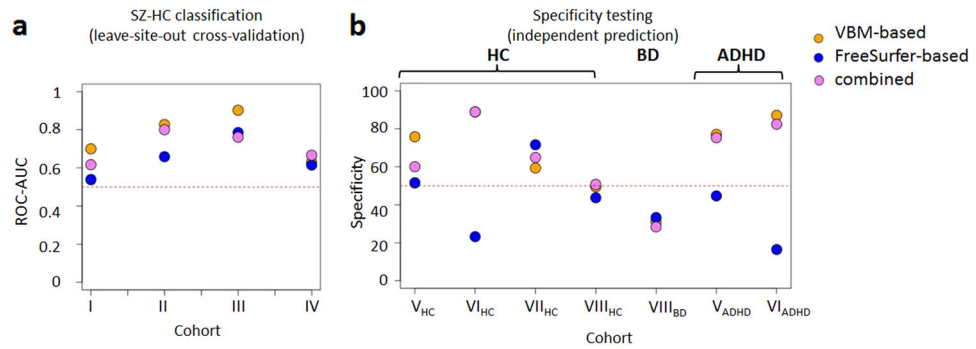

Fig. 2 Accuracy of schizophrenia classifier using VBM- and FreeSurfer-based morphometry features. a) Leave-site-out cross-validation performance measured as the ROC-AUC. **b** Specificity of schizophrenia-control classifier (trained on all SZ-HC cohorts) for prediction in independent cohorts. The red horizontal line demonstrates 50% ROC-AUC or specificity, respectively. The classification was based on random forest machine learning. SZ: schizophrenia; BD: bipolar disorder; ADHD: attention-deficit/ hyperactivity disorder; HC: healthy controls

estimates of 0.76 (range 0.63 to 0.90) and 0.64 (range 0.54 to 0.78) for VBM- and FreeSurfer-based morphometry features, respectively. The median AUC for the combined feature set was 0.71 (range 0.62 to 0.80) (Fig. 2a). For VBM-based data, the observed accuracy corresponded to a sensitivity-specificity mean with a median of 0.70 across cohorts I-IV. We observed that sensitivity and specificity varied substantially across cohorts (Supplementary Table 6). In FreeSurfer-based data, this was even more pronounced with a corresponding estimate of 0.52, showing that the optimal cut-off for classification differed across cohorts (Supplementary Figure 2). This was likely due to shifts of structural volume means across cohorts. The normalization models aim to set structure mean values in the test data to zero, but this is not guaranteed as test data were not used for building the normalization models. Setting test data means to zero (a strategy commonly employed in machine learning) resolved the sensitivity-specificity imbalance (sensitivity-specificity mean with a median of 0.76, 0.71 and 0.71 for VBM-, FreeSurfer and combined data, respectively. AUC values were 0.79, 0.75 and 0.78, respectively; see Supplementary Table 7).

Specificity testing in independent test cohorts

For VBM-based features, the application of an algorithm trained on all four training cohorts resulted in accuracies ranging from 50% to 89% (median 68%) in four independent cohorts of healthy controls (Fig. 2b, Supplementary Table 8). The algorithm showed limited specificity against bipolar disorder as 69% of the 222 individuals were assigned to the schizophrenia class. To explore potential associations between prediction accuracy and the presence of psychotic features among individuals with bipolar disorder, we identified subsets of individuals with severe psychosis (n = 28) and individuals without psychotic features (n = 48). However, we found no evidence that accuracy significantly differed between these clinical groups ($P = 0.63$).

In contrast, when applying the algorithm to adult (n = 85) and adolescent (n = 257) subjects with ADHD, schizophrenia classification showed similar accuracy (87% and 77% correctly classified as not belonging to the schizophrenia class) as for healthy control subjects. Notably, classification based on FreeSurfer-based morphometry features showed substantially poorer accuracy in most independent validation cohorts (Fig. 2b, Supplementary Table 8). As for leave-site-out classification, this was due to mean shifts of covariate-adjusted data that affected FreeSurfer-based morphometry features important for schizophrenia classification and is exemplified for amygdala volumes in Supplementary Figure 3.

Comparison between classifier types

To explore whether prediction results were influenced by the choice of the algorithm, we replaced the site-stratified random forest with a non-site-stratified, linear SVM. This showed that across all conducted tests, SVM outperformed random forest classification by a small margin (Supplementary Table 6, Supplementary Figure 4). Notably, linear SVM application also showed an improved specificity of the schizophrenia classification against bipolar disorder (specificity between 48 and 55%, Supplementary Table 6, Supplementary Figure 4).

Case-control classification of differential diagnoses

VBM-based data showed limited utility for a meaningful differentiation of bipolar disorder (AUC of 0.63, derived from random forest out-of-bag prediction), adult (AUC = 0.58), or adolescent (AUC = 0.62) ADHD from healthy controls within the respective, propensity score-matched cohorts. On the same cohorts, similar performance estimates (AUC of 0.66, 0.56, and 0.63 respectively) were obtained for FreeSurfer-based features.

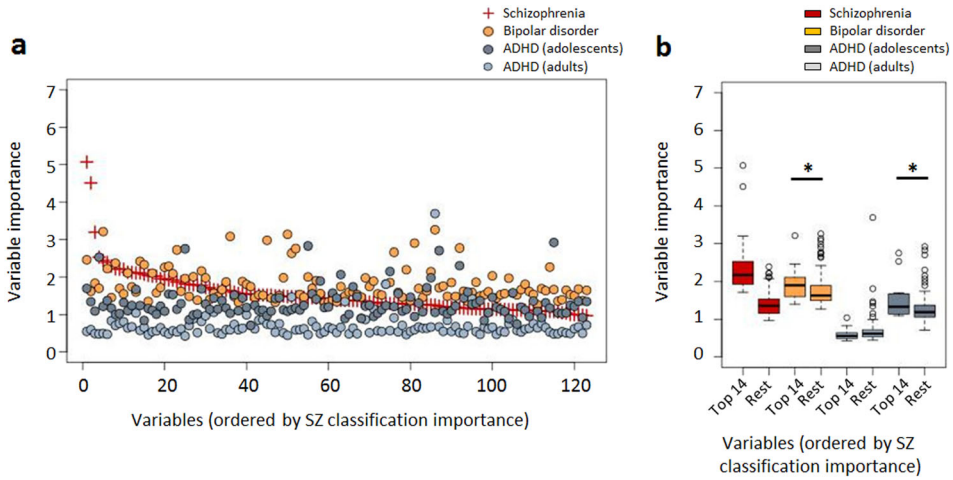

Fig. 3 VBM-based variable importance for classification. a Random-forest variable importance for the schizophrenia vs. control (red, used to order the x-axis), the bipolar disorder vs control and the ADHD vs control comparisons. **b** Boxplot of random-forest variable importance measures, comparing the 14 most important schizophrenia predictors against the remaining predictors in bipolar disorder and ADHD. The asterisk indicates significance determined from permutation testing. Since variable importance was determined from the schizophrenia-control comparison, no significance estimate is shown for the corresponding boxplot

Exploration of features important for classification

The random forest variable importance derived from the site-stratified classifiers based on all case-control cohorts was used to identify the features most relevant for classification. The ranked variable importance measures derived from VBM-based morphometry data are shown in Fig. 3a (and Supplementary Table 9). Using random forest feature selection, we found 14 VBM-based features (11 for FreeSurfer-based data) to be of particular importance for classification, i.e. the respectively smallest feature sets leading to the minimum error rate plus one standard deviation (see methods). Figure 3a further displays the importance of VBM-based features for classification of bipolar disorder (propensity score-matched patients and controls from University of Oslo bipolar disorder and control data part of cohort VIII, n = 444) and ADHD (propensity score-matched patients and controls from cohorts V (adolescent subjects), n = 322, and VI (adult subjects), n = 170). The top 14 features for schizophrenia-control classification had also significantly higher importance for bipolar disorder-control as well as the adolescent subjects with ADHD vs. controls classification ($P = 0.011$ and $P = 0.008$, respectively; permutation test, Fig. 3b), compared to the remaining features. In contrast, these features were of no significant importance for the adult ADHD-control classification ($P = 0.857$, Fig. 3b). Supplementary Figure 5 displays the variable importance measures derived from FreeSurfer-based morphometry data (Supplementary Table 10), showing a similar pattern for schizophrenia markers and those for bipolar disorder ($P = 0.003$) as well as adult ($P = 0.196$) ADHD compared to VBM-based analysis. Notably, for FreeSurfer-based morphometry data, no overlap with adolescent ADHD markers was found ($P = 0.350$).

Relation between VBM-based and FreeSurfer-based predictors

Between the top-14 VBM-based and the top-11 FreeSurfer-based predictors for the schizophrenia-control classification, we found significant pairwise correlations (median Pearson's correlation coefficient of 0.16, using subjects from cohorts I to IV, after additional residualization against diagnosis). Accordingly, in this confounder-corrected dataset, the first principal components (PCs) of the top features (explaining 42% and 38% of variance in FreeSurfer-based and VBM-based features, respectively), were strongly correlated ($\rho = 0.43$, $P = 5.4 \cdot 10^{-34}$). This raised the question whether the numerous, individually weak structural predictors were related to a common global measure of brain structure. To explore this, we tested associations between the principal components and 22 global measures of brain structure and found highly significant correlations with the large majority of these measures (Fig. 4a, Supplementary Table 11). This effect was not due to residual confounding of any PC by total intracranial volume, age, age^2, sex, scanner vendor, field strength or recruitment site (all uncorrected $P > 0.12$).

Effect of global structural parameters on classification and univariate differences

We then explored, whether these global measures explained part of the multivariate signal that allowed case-control differentiation between patients and controls. Figure 4b shows that residualization of VBM- and

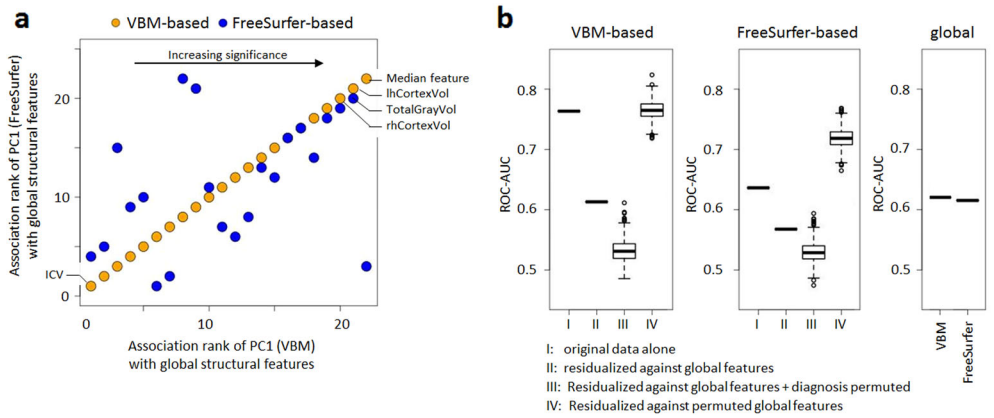

Fig. 4 Effect of global structural covariates on classification. a Comparison of associations between global structural features and the first principal components determined from the 14 selected VBM-based (orange; used to order the x-axis) and the 11 selected FreeSurfer-based (blue) features (see also Supplementary Table 1,0). **b** Effect of residualization against global structural features on classification performance and classification performance obtained from global features only. Notably, AUC values obtained from analyses with permuted diagnoses showed mean values > 0.5, which was due to chance associations in the comparatively small datasets. Furthermore, surface based features showed an increase in performance after residualization against permuted global features. This suggests features with poor cross-site reproducibility were coincidentally prioritized for classification in the original data and this was remedied in the residualized data. The two sets of global features were identical except for the addition of either a median VBM- or FreeSurfer-based feature

FreeSurfer-based features against the 22 global measures led to a decrease in classification performance (measured as the leave-site-out AUC determined on cohorts I to IV) from 0.76 to 0.61 (VBM-based) and from 0.64 to 0.57 (FreeSurfer-based), respectively. These AUC values were close to (VBM-based) or within (FreeSurfer-based) the range of those obtained after randomly permuting diagnostic grouping (Fig. 4b). Accuracy did not decrease substantially, when residualization was performed with permuted global covariates, showing that residualization against large covariate numbers did not per se have a substantial impact (Fig. 4b). Classification using covariate-corrected global features alone led to a leave-site-out AUC of 0.62, regardless of whether the median VBM- or the median FreeSurfer-based feature was included (Fig. 4b). This raises the question why global structural features were strong co-variates of case-control associations, but relatively poor predictors of diagnostic status when used alone. This effect was likely due to site-to-site variability of the global structural features, since random forest learning applied on the entire dataset yielded out-of-bag AUC values of 0.71 for both global structural parameter sets. These values were comparable to the out-of-bag estimates derived from similarly corrected VBM- (AUC = 0.73) or FreeSurfer-based (AUC = 0.72) features. This further supports the extent of signal shared between global features and individual brain structures.

Notably, the residualization against global features also led to substantial decrease in univariate significance (Supplementary Table 3). For VBM-based features, after residualization, FDR-corrected significance was only observed for a bilateral increase in the pallidum (left: $P_{FDR} = 2.5{\cdot}10^{-5}$; right: $P_{FDR} = 1.5{\cdot}10^{-4}$) and a decrease in the right hippocampus ($P_{FDR} = 0.026$). For FreeSurfer-based features, after residualization against global parameters, no significance was observed.

Prediction of individual structural features through global structural parameters

We explored whether individual brain structural features could be accurately predicted based on global structural parameters. Based on random forest regression, the global features explained a mean of 29% ± 13 (range 2.5% – 61.2%) of variance in VBM-based features and a mean of 29% ± 15 (range 0.0% – 64.8%) of variance in FreeSurfer-based features, respectively (Supplementary Tables 3 and 4). In VBM-based data, the variance explained by global features was further correlated with the mean size of the respective structure ($\rho_{VBM} = 0.33$; $P_{VBM} = 0.0002$; $\rho_{surface} = -0.06$; $P_{surface} = 0.44$; Spearman correlation, to prevent overdue influence of larger structures).

Discussion

The primary findings of this multi-site investigation were 1) the presence of reproducible brain-structural patterns that could differentiate individuals with schizophrenia from healthy controls, 2) the specificity of the patterns when applied on data from individuals with ADHD, and the lack thereof in bipolar disorder, 3) the significant overlap of markers important for classification of schizophrenia, bipolar disorder and adolescent ADHD

and 4) the finding that brain-structural changes were strongly associated with global structural parameters.

Based on brain-structural patterns, individuals with schizophrenia could be reproducibly differentiated from healthy controls, with a median AUC of up to 0.76. Performance estimates were derived from unbiased leave-site-out cross-validation and no test set data were used to determine parameters of covariate adjustment or machine learning models. Therefore, the obtained estimates are likely to reflect the performance of the algorithms, when tested in independent data. We observed that when test data were not used during generation of normalization models, sensitivity and specificity fluctuated substantially, which could be resolved by scaling of the test data. This, however, would require at least some data from a given test site to be available prior to testing algorithms in data from that site[20]. It should also be noted that biological heterogeneity resulting from the current diagnostic system limits the accuracy biological predictions can achieve, when aiming to reproduce clinical classifications, constituting a general caveat for the field.

The brain-structural patterns associated with schizophrenia showed significant lack of specificity against bipolar disorder, consistent with the substantial genetic and clinical overlap of the two disorders[30,31,52]. Notably, the signatures were specific against adolescent and adult ADHD. Subjects with ADHD, did not, however, show brain-structural alterations that could be used for accurate classification, nor did those with bipolar disorder. Despite this, the VBM-based feature sets most useful for classification of adolescent ADHD and schizophrenia showed significant overlap. Given the high specificity of the schizophrenia classifier against adolescent ADHD, this supports divergent profiles in the same feature set. A particular strength of the present study was that conclusions regarding differential diagnostic specificity against bipolar disorder were not confounded by site variability. Considering the observed specificity fluctuations during leave-site-out testing, it should, however, be noted that the preferential classification of subjects with ADHD as controls could have been influenced by between-site effects. Similarly, non-specificity of the schizophrenia classifier against bipolar disorder was determined in one cohort and requires further replication. Also, the lack of adolescent subjects in the training data may have confounded the accuracy observed in adolescent ADHD subjects.

We aimed to identify brain-structural features driving reproducible schizophrenia-control classification and to compare these between two different pre-processing strategies. We observed that these strategies led to identification of differential structural patterns but found that these alterations were, to a large extent, capturing overlapping global brain-structural alterations. Removing variation explained by measures of global structural properties also removed most of the identified multivariate signals. Notably, global structural parameters were strong confounders of VBM- and FreeSurfer-based feature associations, but were on their own relatively poor predictors of diagnosis. Our results indicate that this was, to a significant extent, due to between-site variability affecting the global signal. This effect may be due to the fact that the global signal combines multiple signals that are individually affected by site-specific effects (such as the shifts in mean measurement observed in the present study), creating an aggregate signal reflecting site idiosyncrasies. This, in turn, raises the important question to what extent global variables reflect the underlying biology vs. measurement factors (i.e. the signal to noise ratio) in structural imaging data. The observed case-control classification performance is consistent with previous large-scale analyses[15,20], thus it is unlikely that measurement uncertainty specific to the present study accounts for the global effects detected. Furthermore, GM differences have been observed in numerous studies investigating first-episode schizophrenia patients, suggesting that these effects are not primarily related to the specific clinical characteristics of the samples we examined [e.g[53–55]]. One possible interpretation of these results is that schizophrenia entails a combination of isometric and allometric structural changes which may vary between individuals and within patients across different stages of the illness. This explanation may account for the low effect sizes and effect heterogeneities of structural differences previously observed in schizophrenia. Another interpretation is that a shared biological component affecting global variables across multiple disorders discriminates controls from cases, but does not differentiate patients with different diagnoses. Accordingly, previous reports highlighted shared genetic components across multiple psychiatric disorders and personality traits[56,57]. In contrast, the present results may also be interpreted from the perspective of cross-cohort reproducibility. That is, the reduction in classifier accuracy through consideration of global structural features primarily relates to effects on reproducible alterations in GM features. Changes in individual sites, in contrast, may have persisted despite the normalization against the global signals. This interpretation raises the question whether this and previous studies had sufficient resolution, in view of the large site to site differences, to investigate reproducible regional effects. An improved imaging resolution could also allow identifying patterns of structural differences that show higher specificity between schizophrenia and bipolar disorder. A corollary of this view is the question whether, even assuming that structural imaging resolution yields sufficient signal to noise ratio to study regional effects, the correlations between regional and global variables caused by common

underlying biology and by shared measurement uncertainties can be meaningfully disentangled. For example, we found that identification of univariate changes was strongly dependent on global structural alterations. Importantly, if the global signal was indeed more affected by site specific experimental effects than individual brain structures, it would be challenging for single-site investigations or univariate statistics to appropriately account for this effect, limiting the possibility to reproduce findings across studies.

In this context, a limitation of the present study is the lacking incorporation of other data modalities, such as demographic, clinical or psycho-behavioral features, which could potentially have informed on the presence of patient subgroups or illness-dimensions in relation to brain-structural alterations. Similarly, future studies should explore the effects of antipsychotic treatment on GM, which have been observed in schizophrenia (i.e. ref. [9]) and are supported by data from animal models[58,59], but which have also been found in antipsychotic-native subjects[9]. An acerbation of disorder-intrinsic structural changes by medication may be a possible explanation why removal of the global signal almost completely removed structural differences. While this study explores the impact of different pre-processing strategies on machine learning analysis of brain-structural differences, it does not offer a comprehensive analysis of the broad spectrum of preprocessing methods currently available. The sensitivity of machine learning to the choice of preprocessing may contribute to the variability of such analyses as reported in previous studies. Another limitation of the present study is the fact that it involved already diagnosed patients. One of the most significant aspects of clinical utility will be the ability to accurately predict the transition from early signs to full-blown illness, such that appropriate treatment can be started earlier.

Finally, an interesting finding was that linear SVM application showed marginally better classification performance compared to RF machine learning. This suggests that classification did not profit from RF's ability to model complex interactions. Interestingly, schizophrenia classification using linear SVM also showed an improved specificity against bipolar disorder, which requires further validation in independent cohorts.

In conclusion, this study identified reproducible GM patterns that index a multivariate, global alteration of brain structure in schizophrenia and bipolar disorder, but are different from those seen in ADHD. These results may reflect the biological heterogeneity of schizophrenia and are consistent with previous observations of shared genetic determinants between these disorders. The results further demonstrate the need for appropriately accounting for the global signal during analysis of individual brain structures. They underline the importance of biologically dissecting these illnesses as a basis to redefine diagnostic boundaries using biological parameters. These efforts may benefit from integrative analyses of other relevant data modalities, including genetic risk measures or functional neuroimaging, which may yield more accurate and specific classifiers that have clinical utility. Also, substantial differences in the ability to derive reproducible brain-structural signatures were found when using VBM or FreeSurfer features derived from the same individuals, highlighting the importance of preprocessing strategies for machine learning analysis of brain-structural data. Finally, the present results highlight the need for a more in-depth analysis of how individual brain structures contribute to the pathophysiology of these psychiatric disorders.

Code availability

Code used for the analyses described in this manuscriptis available from the corresponding author upon request.

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Karolinska Schizophrenia Project (KaSP) Consortium

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Conflicts of interest

A.M.-L. has received consultant fees from Blueprint Partnership, Boehringer Ingelheim, Daimler und Benz Stiftung, Elsevier, F. Hoffmann-La Roche, ICARE Schizophrenia, K. G. Jebsen Foundation, L.E.K Consulting, Lundbeck International Foundation (LINF), R. Adamczak, Roche Pharma, Science Foundation, Synapsis Foundation – Alzheimer Research Switzerland, System Analytics, and has received lectures including travel fees from Boehringer Ingelheim, Fama Public Relations, Institut d'investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Janssen-Cilag, Klinikum Christophsbad, Göppingen, Lilly Deutschland, Luzerner Psychiatrie, LVR Klinikum Düsseldorf, LWL PsychiatrieVerbund Westfalen-Lippe, Otsuka Pharmaceuticals, Reunions i Ciencia S. L., Spanish Society of Psychiatry, Südwestrundfunk Fernsehen, Stern TV, and Vitos Klinikum Kurhessen. J.K.B. has been in the past 3 years a consultant to / member of advisory board of / and/or speaker for Roche, Medice and Servier. He is not an employee of any of these companies, and not a stock shareholder of any of these companies. He has no other financial or material support, including expert testimony, patents, royalties. A.B. is a stockholder of Roche and has received lecture fees from Otsuka. M.Z. has

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