NEWSLETTER

INDICE:

ISTITUTO DI RICERCHE FARMACOLOGICHE MARIO NEGRI IRCCS

BIBLIOGRAFIA ADHD SETTEMBRE 2018

Acta Paediatr Int J Paediatr. 2018.

ATTENTION DIFFICULTIES AND PHYSICAL DYSFUNCTION COMMON IN CHILDREN WITH COMPLEX CONGENITAL MALFORMATIONS: A STUDY OF PRESCHOOL CHILDREN WITH VACTERL ASSOCIATION .

Kassa A-M, Dahl M, Strinnholm M, et al.

Aim: Knowledge on the neurodevelopmental and physical function in children with vertebral defects, anorectal malformations, cardiac defects, tracheo-oesophageal fistula, renal and limb malformations (VACTERL) is scarce. We evaluated Swedish preschool children with VACTERL and identified whether they would need extra support in school.

Methods: From 2015 to 2017, we recruited children aged 5-7 with VACTERL association from the paediatric surgical centre at the University Children's Hospital at Uppsala. Neurodevelopmental function was assessed by age-appropriate intelligence and visual and auditory attention tests, and the children's behaviour and attention were observed by an experienced psychologist. Physical function was evaluated through parental interviews and examinations. Data on patient characteristics, including any surgery and anaesthesia, were extracted from medical records.

Results: Of the 13 eligible families, 10 agreed to participate. Intelligence was within the normal range for all children, but attention difficulties were found in eight of the children, requiring adjustments at school, and two of these were later diagnosed with attention deficit hyperactivity disorder. All children had physical dysfunctions that affected their daily nutrition, bowel or bladder functions.

Conclusion: Attention difficulties and physical dysfunction were common in Swedish preschool children aged 5-7 with VACTERL and they would need support and adjustments when they started school

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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.

Acta Psychiatr Scand. 2018.

PREVALENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER SYMPTOMS IN PATIENTS WITH SCHIZOPHRENIA.

Arican I, Bass N, Neelam K, et al.

Objective: To investigate the frequency of childhood and adult attention deficit hyperactivity disorder (ADHD) symptoms in a cohort of patients with schizophrenia (SCZ).

Methods: A systematic review was conducted to evaluate existing evidence. Two self-report questionnaires were used to investigate adult ADHD and childhood ADHD symptoms in 126 patients with ICD-10 diagnoses of SCZ.

Results: Five studies were included in the systematic review, with the prevalence of childhood and adult ADHD in SCZ subjects ranging between 17-57% and 10-47% respectively. Within our cohort, 47% of patients reported positive screening for ADHD symptoms either in childhood or adulthood. 23% reported symptomatology consistent with both childhood and adult ADHD.

Conclusions: We demonstrate a greater presence of ADHD symptomatology in SCZ compared to that reported for ADHD in the general population. Our findings highlight the importance of improved clinical assessment and treatment considerations in a subgroup of patients with SCZ

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ADHD Atten Deficit Hyperact Disord. 2018.

ADHD SYMPTOMS IN A YOUNG PATIENT WITH CENTRAL DIABETES INSIPIDUS.

Dupong I, Guilmin-Crepon S, Hugo P.

Diabetes insipidus is known to be associated with neurodevelopmental disorders. In this case report, we present a child suffering from a central diabetes insipidus (DI) and an attention-deficit/hyperactivity disorder (ADHD). The DI was due to a mutation on the vasopressin gene, impairing its secretion. We discuss the effects of this impairment on the central nervous system and how it might be linked to ADHD symptoms

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ADHD Atten Deficit Hyperact Disord. 2018.

WORK PARTICIPATION IN ADHD AND ASSOCIATIONS WITH SOCIAL CHARACTERISTICS, EDUCATION, LIFETIME DEPRESSION, AND ADHD SYMPTOM SEVERITY.

Anker E, et al.

The literature refers to high rates of occupational failure in the population of adults with ADHD. The explanation for this is less known. The aim of the present study was to examine associations between social characteristics and clinical features of adults with ADHD and their occupational outcome. Out of 1050 patients diagnosed with ADHD in a specialized outpatient clinic between 2005 and 2017, 813 (77.4%) agreed to participate in the study. ADHD was diagnosed according to DSM-IV criteria, and ADHD subtypes recorded accordingly. Lifetime depression was diagnosed using the specific module of the Mini International Neuropsychiatric Interview. Occupational status and other social characteristics like marital status and living with children were recorded. Intelligence (IQ) and symptom severity of ADHD (ASRS score) were assessed in subsamples of participants (n = 526 and n = 567, respectively). In this sample of adults with ADHD (mean age 36.9 years, 48.5% women), 55.3% of the women and 63.7% of the men were working at the time of inclusion. Work participation was associated with being male, being married or cohabitant, or living with children, as well as a life story without major depression. Age, education, ADHD subtype, and ADHD symptom severity were not significantly associated with work participation. Neither was IQ when adjusted for other covariates. Occupational outcome in adults with ADHD appears to be more associated with social characteristics and a history of depression, rather than with IQ, ADHD subtype, or ADHD symptom severity

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ADHD Atten Deficit Hyperact Disord. 2018.

THE IMPACT OF SUCCESSFUL LEARNING OF SELF-REGULATION ON REWARD PROCESSING IN CHILDREN WITH ADHD USING FMRI.

Baumeister S, Wolf I, Hohmann S, et al.

Neurofeedback (NF) is a non-pharmacological treatment for attention-deficit/hyperactivity disorder (ADHD) that is targeting self-regulation, is efficacious when standard protocols are used and induces partly specific neurophysiological changes in the inhibitory network. However, its effects on reward processing, which is also considered an important aspect of ADHD and has been linked to neurophysiological deficits, remain unknown. Children with ADHD (N = 15, mean age 11.8, SD 1.52) were randomly assigned to either slow cortical potential NF (n = 8) or EMG biofeedback control training (n = 7) and received 20 sessions of training under comparable conditions. Learning was defined as the slope of successful training runs across all transfer sessions. Whole brain analysis, region-of-interest analysis of anticipatory ventral striatal (VS) activation, and analysis of behavioral data were performed. Clinically, the NF group improved more than the EMG group. Whole brain analysis indicated increased activation in the left superior frontal gyrus in the control group only, and in medial prefrontal cortex and dorsolateral prefrontal gyrus (DLPFC) after treatment across all groups. Only successful learners of self-regulation (n = 8) showed increased left inferior frontal gyrus and DLPFC activation after treatment. Left VS activation was increased after treatment and showed a significant time*medication-status interaction. Specific treatment effects were found in left frontal regions for the control treatment and successful learners. Also, unmedicated participants, irrespective of treatment type or successful learning, showed treatment-induced improvement in reward processing. The results suggest no prominent specific effect of NF on reward processing. However, cautious interpretation is warranted due to the small sample

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ADHD Atten Deficit Hyperact Disord. 2018.

CORRELATES OF NICOTINE DEPENDENCE IN MEN WITH CHILDHOOD ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A 33-YEAR FOLLOW-UP.

Garcìa ML, Ramos-Olazagasti MA, Klein RG, et al.

Identify correlates of nicotine dependence [lifetime (l) and ongoing (o)] in adults with attention-deficit/hyperactivity disorder (ADHD) in childhood. We conducted a 33-year prospective follow-up of boys (mean age 8) with combined type ADHD (n = 135/207, 65% original sample). Correlates of nicotine dependence in adulthood were selected from characteristics obtained in childhood and adolescence. Among selected childhood features, only immature behavior was significantly related to nicotine dependence (OR(o) = 0.29, p = 0.02), indexing decreased risk. In contrast, several adolescent variables significantly correlated (p < 0.01) with nicotine dependence at mean age 41, including alcohol substance use disorder (SUD, OR(l) = 4.97), non-alcohol SUD (OR(o) = 4.33/OR(l) = 10.93), parental antisocial personality disorder (OR(l) = 4.42), parental SUD (OR(l) = 3.58), dropped out of school (OR(l) = 2.29), impulsivity (OR(o) = 1.53/OR(l) = 1.59), hyperactivity (OR(o) = 1.38), and number of antisocial behaviors (OR(o) = 1.10/OR(l) = 1.14). Results highlight the role of adolescent psychopathology in the development of nicotine dependence, motivating prospective longitudinal efforts to better define the developmental trajectories of risk and protection

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ADHD Atten Deficit Hyperact Disord. 2018.

BEHAVIORAL ADJUSTMENT TO ASYMMETRIC REWARD AVAILABILITY AMONG CHILDREN WITH AND WITHOUT ADHD: EFFECTS OF PAST AND CURRENT REINFORCEMENT CONTINGENCIES.

Furukawa E, Alsop B, Caparelli-D+íquer EM, et al .

Altered reinforcement sensitivity is hypothesized to underlie symptoms of attention deficit hyperactivity disorder (ADHD). Here we evaluate the behavioral sensitivity of Brazilian children with and without ADHD to a change in reward availability. Forty typically developing children and 32 diagnosed with DSM-IV ADHD completed a signal-detection task in which correct discriminations between two stimuli were associated with different frequencies of reinforcement. The response alternative associated with the higher rate of

reinforcement switched, without warning, after 30 rewards were delivered. The task continued until another 30 rewards were delivered. Both groups of children developed a response bias toward the initially more frequently reinforced alternative. This effect was larger in the control group. The response allocation of the two groups changed following the shift in reward availability. Over time the ADHD group developed a significant response bias toward the now more frequently reinforced alternative. In contrast, the bias of the control group stayed near zero after an initial decline following the contingency change. The overall shift in bias was similar for the two groups. The behavior of both groups of children was sensitive to the asymmetric reward distribution and to the change in reward availability. Subtle group differences in response patterns emerged, possibly reflecting differences in the time frame of reward effects and sensitivity to reward exposure

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Afr Health Sci. 2018;18:488-95.

EXPLORATION OF THE UNDERSTANDING AND ETIOLOGY OF ADHD IN HIV/AIDS AS OBSERVED BY ADOLESCENTS WITH HIV/AIDS, CAREGIVERS AND HEALTH WORKERS-USING CASE VIGNETTES.

Mpango RS, Kinyanda E, Rukundo GZ, et al.

Background: Attention-Deficit/ Hyperactivity Disorder (ADHD) is one of the most prevalent behavioural disorder among children and adolescents with HIV infection (CA-HIV).

Objective: To explore the explanations used by adolescents with HIV/AIDS, caregivers and health workers to understand and explain ADHD in HIV/AIDS.

Methods: This was a qualitative sub-study nested within a larger research project whose focus was on mental health among HIV infected children and adolescents in Kampala and Masaka, Uganda (CHAKA study, 2014-2017).

Participants were recruited from five study sites: two in Kampala and three in Masaka. We purposively sampled 10 ADHD adolescent-caregiver dyads equally divided between the Masaka and Kampala sites, age groups and gender. Semi-structured interviews were carried out within 12 months of baseline. Ten HIV health workers (two from each study site) participated. The ten health workers were assessed about their knowledge related to psychiatric disorders (especially ADHD in HIV/AIDS), services available for such clients and gaps in service provision for CA-HIV with behavioural/ emotional disorders. Participants were recruited over one month. Taped interviews were transcribed and preliminary coding categories generated based on the research questions. Broad categories of related codes were then generated to derive a coding framework. Thematic analyses were conducted to elicit common themes emerging from the transcripts.

Results: Explanations used by respondents to express their understanding related to ADHD among CA-HIV included; psychosocial stressors, biomedical manifestations, personal traits and supernaturalism, which affected health seeking behaviour.

Conclusion: In contexts similar to those in Uganda, treatment approaches for ADHD among HIV positive CA-HIV should consider the explanations provided by CA-HIV, caregivers to CA-HIV and HIV health workers

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Am J Drug Alcohol Abuse. 2018;44:653-59.

EXPLORING LONGITUDINAL COURSE AND TREATMENT-BASELINE SEVERITY INTERACTIONS IN SECONDARY OUTCOMES OF SMOKING CESSATION TREATMENT IN INDIVIDUALS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Luo SX, Wall M, Covey L, et al.

Background: A double blind, placebo-controlled randomized trial (NCT00253747) evaluating osmotic-release oral system methylphenidate (OROS-MPH) for smoking-cessation revealed a significant interaction effect in which participants with higher baseline ADHD severity had better abstinence outcomes with OROS-MPH while participants with lower baseline ADHD severity had worse outcomes.

Objectives: This current report examines secondary outcomes that might bear on the mechanism for this differential treatment effect.

Methods: Longitudinal analyses were conducted to evaluate the effect of OROS-MPH on three secondary outcomes (ADHD symptom severity, nicotine craving, and withdrawal) in the total sample (N-á=-á255, 56% Male), and in the high (N-á=-á134) and low (N-á=-á121) baseline ADHD severity groups.

Results: OROS-MPH significantly improved ADHD symptoms and nicotine withdrawal symptoms in the total sample, and exploratory analyses showed that in both higher and lower baseline severity groups, OROS-MPH statistically significantly improved these two outcomes. No effect on craving overall was detected, though exploratory analyses showed statistically significantly decreased craving in the high ADHD severity participants on OROS-MPH. No treatment by ADHD baseline severity interaction was detected for the outcomes.
Conclusions: Methylphenidate improved secondary outcomes during smoking cessation independent of baseline ADHD severity, with no evident treatment-baseline severity interaction. Our results suggest divergent responses to smoking cessation treatment in the higher and lower severity groups cannot be explained by concordant divergence in craving, withdrawal and ADHD symptom severity, and alternative hypotheses may need to be identified

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Am J Med Genet Part C Semin Med Genet. 2018.

A CLINICAL UPDATE ON TUBEROUS SCLEROSIS COMPLEX-ASSOCIATED NEUROPSYCHIATRIC DISORDERS (TAND).

De Vries PJ, Wilde L, de Vries MC, et al.

Tuberous sclerosis complex (TSC) is associated with a wide range of behavioral, psychiatric, intellectual, academic, neuropsychological, and psychosocial difficulties, which are often underdiagnosed and undertreated. Here, we present a clinical update on TSC-associated neuropsychiatric disorders, abbreviated as ΓÇ£TAND,ΓÇØ to guide screening, diagnosis, and treatment in practice. The review is aimed at clinical geneticists, genetic counselors, pediatricians, and all generalists involved in the assessment and treatment of children, adolescents and adults with TSC, and related disorders. The review starts with a summary of the construct and levels of TAND, before presenting up-to-date information about each level of investigation. The review concludes with a synopsis of current and future TAND research

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Annals of the Rheumatic Diseases. 2018;77:484.

ASSESSMENT OF BEHAVIOURAL DISORDERS IN CHILDREN WITH JUVENILE IDIOPATHIC ARTHRITIS.

Dop D, Niculescu CE.

Background: Juvenile Idiopathic Arthritis(JIA) is the most frequent paediatric rheumatologic disease which, because of its chronic, winding evolution, long-term treatment and dreadful complications, has a powerful impact on the somatic and psycho-social development of the children affected by it.
Methods: A number of 49 children with Juvenile Idiopathic Arthritis followed-up in the District Emergency University Hospital in Craiova and aged between 6 and 18, and a control group consisting in 49 healthy children of similar age and sex, were examined using the Child Behaviour Checklist (CBCL).
Results: Our results showed that 57.1% of the patients with JIA were classified as borderline and 6.12% as clinical behaviour, compared to the control group in which just 16.3% presented Internalising and Externalising problems. Thus, the majority of children with progressing forms of JIA presented social adjustment disorders, anxiety/depression, attention deficit, and 3 of them, males, presented verbal/ physical aggressiveness and Rule-Breaking Behaviour. While among the patients with JIA it was mostly the feminine gender that presented behavioural disorders, in the control group all children with Internalising and Externalising problems were males.
Conclusions: Children with JIA must be carefully kept under observation for an early detection and treatment of behavioural deviations. Further studies are necessary, on large groups of patients, in order to identify the manner in which Juvenile Arthritis affects the patient and his or her family

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Archives of Gynecology and Obstetrics. 2018.

PREDICTING ATTENTION DEFICIT HYPERACTIVITY DISORDER USING PREGNANCY AND BIRTH CHARACTERISTICS.

Schwenke E, Fasching PA, Faschingbauer F, et al.

Purpose: The aim of this study was to evaluate maternal, prenatal, perinatal, and postpartum parameters as risk factors for the later development of an attention deficit hyperactivity disorder (ADHD) in the child.

Methods: Women who had given birth at Erlangen University Hospital between 1996 and 1999 were sent a questionnaire in 2009. The results of the questionnaire were correlated with the prospectively collected data for the births in 1996-1999.

Results: A total of 573 mother and child pairs were analyzed. Forty-four of the mothers reported that their child had ADHD (7.7%). No significant associations were found for the following parameters: mother's age; mother's educational level; number of the pregnancy; maternal weight before and at the end of pregnancy; mother's height; alcohol consumption during pregnancy; mode of delivery; gestational week; birthweight; umbilical artery blood values; Apgar score at 5 and 10-ámin; or breastfeeding. The parameters of smoking in pregnancy and an Apgar score lower than 7 after 1-ámin were significantly associated with a risk for later development of ADHD.

Conclusions: This analysis of maternal, prenatal, perinatal, and postnatal parameters found that smoking in pregnancy and a low Apgar score 1-ámin after birth are associated with a significantly greater risk for the development of ADHD. Beyond the question of the causal mechanism involved, this is a relevant finding, since smoking during pregnancy is a preventable risk factor

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Autism Res. 2018.

EXECUTIVE FUNCTION PREDICTS THE VISUOSPATIAL WORKING MEMORY IN AUTISM SPECTRUM DISORDER AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Wang Z, Jing J, Igarashi K, et al.

Children with autism spectrum disorder (ASD) and those with attention deficit/hyperactivity disorder (ADHD) always show working memory deficits. However, research findings on the factors that affected the working memory in ASD and ADHD were inconsistent. Thus, we developed the present study to investigate the association of executive function (EF) with the visuospatial working memory (VSWM) in ASD and ADHD. Three groups of participants were examined: 21 children with ASD, 28 children with ADHD and 28 typically developing (TD) children as the controls. All participants completed two tests: the Wisconsin Card Sorting Test (WCST) and the Corsi Block Tapping Test for measuring EF and VSWM, respectively. The WCST included four domains: categories achieved (CA), perseverative errors (PE), failures to maintain set (FMS), and total errors (TE). The findings indicated that (1) the ASD group showed poorer performance in VSWM than the ADHD and TD groups; (2) for the ASD group, VSWM was positively correlated with CA, and was negatively correlated with PE and TE; (3) for the ADHD group, FMS showed a negative relationship with VSWM; and (4) TE predicted the performance of VSWM in ASD group, while FMS predicted VSWM in ADHD group. The study results suggested that VSWM was impaired in ASD but not in ADHD. Also, the EF domains were differently correlated with the VSWM performance in ASD and ADHD. Our study suggests that we should consider different intervention targets of working memory and EF contributions in improving the cognitive capacity of ASD and ADHD. Autism Res 2018., -® 2018 International Society for Autism Research, Wiley Periodicals, Inc. Lay summary: The present study compared the visuospatial working memory (VSWM) in three groups of children: autism (ASD), attention deficit/hyperactivity disorder (ADHD), and typically developed children (TD). The ASD group showed poorer VSWM than the ADHD and TD groups. The total error of executive function predicted the performance of VSWM in ASD, while failures to maintain set predicted VSWM in ADHD. These findings suggested that we should consider the different working memory and executive function training targets to increase cognitive capacity of ASD and ADHD

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Biomedical and Pharmacology Journal. 2018;11:1135-41.

COMPUTER AIDED DIAGNOSIS SYSTEM TO DISTINGUISH ADHD FROM SIMILAR BEHAVIORAL DISORDERS.

Beriha SS.

ADHD is one of the most prevalent psychiatric disorder of childhood, characterized by inattention and distractibility, with or without accompanying hyperactivity. The main aim of this research work is to develop a Computer Aided Diagnosis (CAD) technique with minimal steps that can differentiate the ADHD children from the other similar children behavioral disorders such as anxiety, depression and conduct disorder based on the Electroencephalogram (EEG) signal features and symptoms. The proposed technique is based on soft computing and bio inspired computing algorithms. Four non-linear features are extracted from the EEG such as Higuchi fractal dimension, Katz fractal dimension, Sevick fractal dimension and Lyapunov exponent and 14 symptoms which are most important in differentiation are extracted by experts in the field of psychiatry. Particle Swarm Optimization (PSO) tuned Back Propagation Neural Network (BPNN) and PSO tuned Radial Basis Function (RBF) employed as a classifier. By investigating these integrated features, we obtained good classification accuracy. Simulation results suggest that the proposed technique offer high potential in the diagnosis of ADHD and may be a good preliminary assistant for psychiatrists in diagnosing high risk behavioral disorders of children. Published by Oriental Scientific Publishing Company

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BMJ Case Rep. 2018;2018.

AUTISM AND TRICHOTILLOMANIA IN AN ADOLESCENT BOY.

Masiran R.

An adolescent with autism spectrum disorder and improperly treated attention deficit hyperactivity disorder presented with recurrent hair pulling. Treatment with selective serotonin reuptake inhibitor and stimulant improved these conditions

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BMJ Open. 2018;8.

PROTOCOL INVESTIGATING THE CLINICAL UTILITY OF AN OBJECTIVE MEASURE OF ATTENTION, IMPULSIVITY AND ACTIVITY (QBTEST) FOR OPTIMISING MEDICATION MANAGEMENT IN CHILDREN AND YOUNG PEOPLE WITH ADHD QBTEST UTILITY FOR OPTIMISING TREATMENT IN ADHD' (QUOTA): A FEASIBILITY RANDOMISED CONTROLLED TRIAL.

Hall CL, James M, Brown S, et al.

Attention-deficit hyperactivity disorder (ADHD) is characterised by symptoms of inattention, hyperactivity and impulsivity. To improve outcomes, the National Institute for Health and Care Excellence ADHD guidelines recommend regular monitoring of symptoms when children commence medication. However, research suggests that routine monitoring rarely happens, and clinicians often rely on subjective information such as reports from parents and teachers to ascertain improvement. These sources can be unreliable and difficult to obtain. The addition of an objective test of attention and activity (QbTest) may improve the objectivity, reliability and speed of clinical decision-making and so reduce the time to identify the optimal medication dose. This study aims to assess the feasibility and acceptability of a QbTest medication management protocol delivered in routine healthcare services for children with ADHD. Method and analysis This multisite feasibility randomised controlled trial (RCT) will recruit 60 young people (aged 6-17 years old), diagnosed with ADHD, and starting stimulant medication who are seen by Child and Adolescent Mental Health Services or Community Paediatric services. Participants will be randomised into one of two arms. In the experimental arm (QbTest protocol), the participant will complete a QbTest at baseline (prior to medication initiation), and two follow-up QbTests on medication (2-4 weeks and 8-10 weeks later). In the control arm, participants will receive treatment as usual, with at least two follow-up consultations. Measures of parent-, teacher- and clinician-rated symptoms and global functioning will be completed at each time point. Health economic measures will be completed. Clinicians will record treatment decision-making. Acceptability and feasibility of the protocol will be assessed alongside outcome measure completion rates. Qualitative interviews will be conducted. Ethics and dissemination The findings will be used to inform the development of a fully powered

RCT. The results will be submitted for publication in peer-reviewed journals. The study has ethical approval. Trial registration number NCT03368573; Pre-results

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Brain Lang. 2018;185:54-66.

GLOBAL GRAY MATTER MORPHOMETRY DIFFERENCES BETWEEN CHILDREN WITH READING DISABILITY, ADHD, AND COMORBID READING DISABILITY/ADHD.

Jagger-Rickels AC, Kibby MY, Constance JM.

Extensive, yet disparate, research exists elucidating structural anomalies in individuals with Reading Disability (RD) or ADHD. Despite ADHD and RD being highly comorbid, minimal research has attempted to determine shared patterns of morphometry between these disorders. In addition, there is no published research examining the morphometry of comorbid RD and ADHD (RD/ADHD). Hence, we conducted voxel-based morphometry on the MRI scans of 106 children, ages 8ΓÇô12 years, with RD, ADHD, or RD/ADHD, and typically developing controls. We found right caudate and superior frontal regions in both RD and ADHD, along with areas specific to RD and to ADHD that are consistent with current theories on these disorders. Perhaps most importantly, we found a potential neurobiological substrate for RD/ADHD. Further, our findings illustrate both shared and specific contributors to RD/ADHD, supporting two current theories on the comorbidity of RD and ADHD, thereby facilitating future work on potential etiologies of RD/ADHD

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Child Adolesc Ment Health. 2018.

REVIEW: TRANSITION FROM CHILDREN'S TO ADULT SERVICES: A REVIEW OF GUIDELINES AND PROTOCOLS FOR YOUNG PEOPLE WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN ENGLAND.

Eke H, Janssens A, Ford T.

Background: In recent years, the difficulty for young people with mental health issues who require a transition to adult services has been highlighted by several studies. In March 2018 the National Institute of Health and Care Excellence (NICE) produced detailed guidelines for the diagnosis and management of attention deficit hyperactivity disorder (ADHD), updated from previous versions in 2008 and 2016, which included general recommendations for transition to an adult service. Yet, there is limited research on transition specifically for those with ADHD. This review aims to systematically identify, review and compare guidelines, specifically focussed on transition for young adults with ADHD within England.

Methods: Following the general principles for systematic reviewing as published by the University of York, 10 electronic databases were searched. Further documents were identified through searches of grey literature and additional sources.

Results: Sixteen documents were included. Results indicate very limited publically accessible guidelines in England for transition of young people with ADHD. Nearly all identified documents based their recommendations for transition on the existing NICE guidelines. Neurodevelopmental conditions such as ADHD are often encompassed within one overarching health policy rather than an individual policy for each condition.

Conclusions: Guidelines should be available and accessible to the public in order to inform those experiencing transition; adjusting the guidelines to local service context could also be beneficial and would adhere to the NICE recommendations. Further review could examine transition guideline policies for mental health in general to help identify and improve current practice

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Child Adolesc Ment Health. 2018.

REVIEW: EXPERIENCES OF HEALTHCARE TRANSITIONS FOR YOUNG PEOPLE WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW OF QUALITATIVE RESEARCH.

Price A, Janssens A, Woodley AL, et al.

Background: Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterised by hyperactivity, inattention and impulsivity. Up to two thirds of young people with ADHD may experience symptoms into adulthood, yet the limited literature available suggests that many young people with ongoing needs do not transfer from child to adult healthcare services. Although worldwide and NICE guidelines recognise the importance of supported transition, evidence suggests for ADHD that this is poorly managed and variable. Little is known about how transition is experienced by those involved. We aimed to synthesise existing peer-reviewed literature to understand views and experiences of young people, carers and clinicians on transitioning between child and adult ADHD services.

Method: Five databases were searched and all articles published between 2000 and up until January 2017 considered. Four key search areas were targeted; ADHD, Transition, Age and Qualitative Research. Quality appraisal was conducted using Wallace criteria. Findings from included studies were synthesised using thematic analysis.

Results: Eight papers, six from the UK and one each from Hong Kong and Italy, were included. Emerging themes centred on difficulties transitioning; hurdles that had to be negotiated, limitations of adult mental health services, inadequate care and the impact of transition difficulties.

Conclusions: Healthcare transition for this group is difficult in the United Kingdom because of multiple challenges in service provision. In addition to recommendations in NICE guidelines, respondents identified a need for better provision of information to young people about adult services and what to expect, greater flexibility around age boundaries and the value of support from specialist adult ADHD services. More research is needed into ADHD healthcare transition experiences, especially in countries outside the United Kingdom, including accounts from carers and clinicians

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Child Adolesc Psychiatr Clin North Am. 2018.

TRANSCRANIAL MAGNETIC STIMULATION IN CONDITIONS OTHER THAN MAJOR DEPRESSIVE DISORDER.

Becker JE, Shultz E, Maley C.

Transcranial magnetic stimulation (TMS) is a treatment approved by the Food and Drug Administration for major depressive disorder (MDD). TMS is a neuromodulation technique that works by creating a focal magnetic field that induces a small electric current. Compared with other neuromodulation techniques, TMS is a noninvasive treatment modality that is generally well-tolerated. Because of the success of TMS in treating depression, there has been interest in applications for other neuropsychiatric diseases. The purpose of this article was to review potential uses for TMS for children and adolescents in conditions other than MDD

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Child Neuropsychol. 2018;24:1137-45.

POSITIVE EMOTIONAL ATTENTION BIAS IN YOUNG CHILDREN WITH SYMPTOMS OF ADHD.

Cremone A, Lugo-Candelas CI, Harvey EA, et al.

Children with attention-deficit/hyperactivity disorder (ADHD) often experience emotional dysregulation. Dysregulation can arise from heightened attention to emotional stimuli. Emotional attention biases are associated with a number of adverse socioemotional outcomes including reward sensitivity and externalizing behaviors. As reward sensitivity and externalizing behaviors are common in children with ADHD, the aim of the current study was to determine whether emotional attention biases are evident in young children with clinically significant ADHD symptoms. To test this, children with (n-á=-á18) and without (n-á=-á15) symptoms of ADHD were tested on a Dot Probe task. Provided recent evidence that emotional attention biases are attenuated by sleep, the task was performed before and after overnight sleep. Children with ADHD symptoms displayed positive, but not negative, attention biases at both time points, whereas typically developing children did not preferentially attend toward or away from positive or negative stimuli. Sleep did not alter

attention biases in either group. Collectively, these results indicate that children with ADHD symptoms have stable, positive attention biases

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Child Neuropsychol. 2018.

WORKING MEMORY AND BEHAVIORAL INHIBITION IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): AN EXAMINATION OF VARIED CENTRAL EXECUTIVE DEMANDS, CONSTRUCT OVERLAP, AND TASK IMPURITY.

Tarle SJ, Alderson RM, Patros CHG, et al.

The stop-signal paradigm is the premier metric of behavioral inhibition in contemporary attention-deficit/hyperactivity disorder (ADHD) research. The stop-signal paradigmΓÇÖs choice-reaction time component, however, arguably places greater demands on working memory processes (e.g., controlled-focused attention) relative to alternative inhibition metrics (i.e., go/no-go (GNG) tasks), and consequently obscures conclusions about inhibition and working memory deficits in affected children. The current study, therefore, aimed to determine whether shared variance between stop-signal behavioral inhibition and working memory performance in children with ADHD reflects overlap between the working memory and inhibition constructs or insufficient specificity of the stop-signal paradigm. Fifty-five children (8ΓÇô12 years) with and without ADHD were administered established phonological (PH) and visuospatial (VS) working memory measures, as well as stop-signal and GNG tasks that vary with respect to demands on controlled-focused attention. Although working memory and GNG performance each uniquely predicted childrenΓÇÖs inattention, stop-signal task performance was not a significant predictor of unique variance in inattention, above and beyond variance associated with working memory. Collectively, these findings suggest that performance on the stop-signal task, compared to the GNG task, is confounded by greater demands associated with working memory and consequently reflects an impure estimate of the inhibition construct

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Child Neuropsychol. 2018.

A PRELIMINARY INVESTIGATION OF REACTION TIME VARIABILITY IN RELATION TO SOCIAL FUNCTIONING IN CHILDREN EVALUATED FOR ADHD.

Tamm L, Epstein JN, Becker SP.

Reaction time variability (RTV) is a ubiquitous phenomenon in Attention-Deficit/Hyperactivity Disorder (ADHD). Few studies have examined RTV in relation to functional outcomes such as social impairment in children with ADHD. In this exploratory study, we investigated whether RTV is associated with social functioning in children at risk for ADHD. Specifically, we explored the association between RTV (tau derived from correct go trials of a Stop-Signal task) and social functioning in 198 children ages 7ΓÇô12-áyears referred for an ADHD evaluation. Social functioning measures included child and/or parent ratings of social competence, aggression, social problems, and impairment in relationships. In regression analyses that also included Oppositional Defiant Disorder symptoms and sex, higher RTV was significantly associated with lower ratings of social competence, and higher proactive/reactive aggression ratings on the child self-report measures. RTV was not significantly associated with parent report of social functioning or relationship impairment. This study provides preliminary evidence that RTV may be associated with social functioning in children at risk for ADHD. We propose that lapses of attention affecting cognitive control may also negatively impact social information processing thereby affecting social functioning. Replication is warranted and longitudinal studies are needed to investigate whether RTV predicts social dysfunction in ADHD

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Clinical Endocrinology. 2018;89:496-504.

CORRELATION BETWEEN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER, ITS PHARMACOTHERAPY AND THYROID DYSFUNCTION: A NATIONWIDE POPULATION-BASED STUDY IN TAIWAN.

Chen P-H, Shyu Y-C, Tsai M-Y, et al.

Objective: The aim of this study was to examine the comorbid rates of thyroid dysfunction among patients with attention-deficit/hyperactivity disorder (ADHD) and the general population. We further examined whether pharmacotherapy affects ADHD patients risk of developing thyroid dysfunction.

Design and Measurement: We recruited 75-á247 newly diagnosed ADHD patient and 75-á247 healthy controls between January 1999 and December 2011 from the National Health Insurance database in Taiwan. We compared hyperthyroidism, hypothyroidism and other common paediatric psychiatric diseases between ADHD patients and controls. We carried out logistic regression analysis to identify an independent factor for predicting thyroid dysfunction. Furthermore, we analysed the time sequence of the diagnosis and the risk of developing a thyroid disorder after receiving pharmacotherapy.

Results: Compared to the control group, the ADHD group had higher comorbidity rates of both hyperthyroidism (1.1% of ADHD vs 0.7% of controls, aOR: 1.72, P-á<-á0.001) and hypothyroidism (0.6% of ADHD vs 0.2% of controls, aOR: 2.23, P-á<-á0.001). Of the ADHD patients with comorbid thyroid dysfunction, about two-thirds and half of patients were diagnosed with ADHD prior to their diagnosis of hyperthyroidism and hypothyroidism, respectively. Furthermore, pharmacotherapy had no significant influence on the risk of developing hyperthyroidism (aHR: 1.09, P-á=-á0.363) or hypothyroidism (aHR: 0.95, P-á=-á0.719) among ADHD patients.

Conclusion: Patients with ADHD had greater comorbid rates with thyroid dysfunction than the control subjects, but pharmacotherapy for treating ADHD did not affect thyroid dysfunction later in life. However, these findings should be further verified using a clinical cohort with comprehensive laboratory assessment in future

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Clin Pharmacol Ther. 2018;104:592-94.

TREATING A CHILD WITH MENTAL ILLNESS.

Ito S.

Drug treatment of attention-deficit hyperactivity disorder (ADHD) with stimulants, such as methylphenidate, has been widespread across the developed countries and is also becoming common in adults. However, this seemingly effective treatment is not without controversy on the evidence that supports their use. In addition, disparities in the frequency of its use across the world are tremendous. Although stimulants are one of the standard therapies for ADHD, autism spectrum disorder (ASD) lacks such a drug treatment. Focusing on neurogenetic conditions with defined genetic abnormalities, which have ASD as a co-existing symptom, a search for a druggable target of ASD continues

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Cognitive Processing. 2018;19:S65.

THE EVALUATION OF ATTENTIONAL ORIENTING IN ITALIANS AND CHILEANS CHILDREN WITH ADHD: EFFECTS OF TWO DIFFERENT SCHOOL INTEGRATION STRATEGIES.

Martella D, Giovannoli J, Pitzianti MB, et al.

The Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common psychiatric disorders in childhood. Different formal education systems seem to be more or less effective in improving the attentional performance of the ADHD children. The aim of this study was to assess whether two different school integration strategies, Italian special education teacher and Chilean School Integration Program (PIE), can differently affect the attentional performance of children with ADHD. Forty Italian children (20 ADHD, 20 control) and 40 Chilean children (20 ADHD, 20 control) aged between 8 and 13 completed the ANTI-V, which allows to simultaneously evaluate the three attentional components (alerting, orienting, executive) and directly measure the vigilance. A Group (ADHD, Control) 9 Nationality (Italy, Chile) 9 Cue (Valid, Invalid, No-Cue) 9 Warning (Warning, No-Warning) 9 Congruency (Congruent, Incongruent) ANOVA on accuracy

showed a significant Group 9 Nationality 9 Cue interaction. Results have shown a significant difference within the Italian group between ADHD and control group children in the invalid trials. In the Italian ADHD group, there was also a difference between valid and invalid trials. These findings could suggest a higher difficulty for Italian children in reorienting their attention; specifically, this difficulty would be more accentuated in children with ADHD. To verify the effectiveness of these results, other analyses are needed. If these findings will be confirmed, the adoption of a similar program in Italy could allow proving the effectiveness of the PIE educational support in the ADHD treatment

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Current Bioinformatics. 2018;13:501-07.

IDENTIFICATION OF ATTENTION DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN USING MULTIPLE ERP FEATURES.

Li W, Zhou T, Zou L, et al.

Background and Objective: Attention deficit hyperactivity disorder (ADHD) is a typical neurodevelopmental disorder occurs in childrenΓÇÖs early school-age, which often results in serious executive dysfunction. Recent ADHD studies highlight the great potential of non-invasive event-related potential (ERP) technique. It is thus worth combining multiple features to form sensitive and robust biomarkers to distinguish ADHD from normal children.

Methods: In this paper, we collected the EEG signals of sixty-eight ADHD children and seventy-three age-match typically developing children during a classic Simon-spatial Stroop task. A channel optimization method was used to select the feature channel. Time-domain features and frequency-domain features were extracted from EEG data. Three classifiers were used to classify ADHD children from typically developing children by using multiple features as well as each single feature.

Results: ADHD children showed weaker N2 and P2 signals than typically developing children. Behavior response results showed that, children with ADHD exhibited lower correct response rates, longer average response time and higher data variance. In classification experiment, performance of three classifiers trained on multiple features was much better than that on single feature. Multiple features classification achieved the highest accuracy of 96.6%, while single time-domain and frequency-domain feature only achieved the highest accuracy of 88.10% and 92.85% respectively. All the highest accuracies were achieved on feature channel in inferior parietal cortex.

Conclusion: Feature channel generally performed better than empirical channel. The multiple ERP features classification method has a good recognition accuracy, being worth researching in ADHD's auxiliary diagnosis

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Dev Med Child Neurol. 2018 Sep;60:942-50.

DISENTANGLING TOURETTE SYNDROME HETEROGENEITY THROUGH HIERARCHICAL ASCENDANT CLUSTERING.

Cravedi E, Deniau E, Giannitelli M, et al.

AIM: To explore the heterogeneity of Tourette syndrome as part of a neurodevelopmental spectrum.

METHOD: Using hierarchical ascendant clustering based on tic symptoms, developmental milestones, and neurodevelopmental comorbidities, we analyzed the heterogeneity of Tourette syndrome phenotypes in a sample of 174 children and adolescents with Tourette syndrome referred to a tertiary university clinic.

RESULTS: The model yielded three distinct clusters characterized as follows. In cluster 1, we found many neurodevelopmental comorbidities (including intellectual disabilities, autism spectrum disorder, attention-deficit-hyperactivity disorder [ADHD], and learning disabilities) and academic impairments. In cluster 2, patients had no other neurodevelopmental comorbidities. In cluster 3, patients had higher intelligence, a high frequency of attentional impairment, school problems related to both ADHD and unspecific attention difficulties, and handwriting problems related to the tics themselves. Interestingly, clusters did not differ in terms of family history or anxious-depressive comorbidities. The only other differences that emerged were related to prenatal or perinatal risk factors (more represented in cluster 1) and treatment profiles (higher rates of stimulants in cluster 1).

INTERPRETATION: We conclude that from a phenotypical perspective, Tourette syndrome is a heterogeneous syndrome with at least three main clusters that may help in addressing the etiological basis of Tourette syndrome and specific rehabilitative and therapeutic approaches.
WHAT THIS PAPER ADDS: The clustering of Tourette syndrome based on comorbidity with other neurodevelopmental conditions reveals three clusters. A group of patients with Tourette syndrome show school difficulties related to non-specific attention and writing problems. Analysing only children and adolescents helps to distinguish between developmental comorbid conditions and coexistent disorders

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Dev Psychobiol. 2018 Sep;60:722-29.

LOW HAIR CORTISOL CONCENTRATION AND EMERGING ATTENTION-DEFICIT/HYPERACTIVITY SYMPTOMS IN PRESCHOOL AGE.

Schloß S, Ruhl I, Müller V, et al.

Previous research demonstrated hypoactivity of the HPA axis in children with attention-deficit/hyperactivity disorder (ADHD) or externalizing symptoms. We analyzed the predictive association between the long-term HPA axis activity and increasing symptoms of ADHD in the preschool period. The sample consisted of n = 125 4-year-old children and their families (including n = 64 children with elevated ADHD symptoms). ADHD symptoms were assessed by a structured clinical interview with the mother and by parent- and teacher-report questionnaires. The long-term HPA axis activity was assessed by the hair cortisol concentration (HCC) (over a 3-month period). After controlling for potential confounders, low HCC predicted an increase in ADHD symptoms between the age of 4 and 5 years. Exploration of gender effects revealed that cross-sectional and predictive associations were significant in boys but not in girls. Low HCC might thus be regarded as an early marker of a possibly gender-related developmental pathway to ADHD

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Drug Alcohol Depend. 2018;191:338-42.

INVESTIGATING POSSIBLE CAUSAL EFFECTS OF EXTERNALIZING BEHAVIORS ON TOBACCO INITIATION: A MENDELIAN RANDOMIZATION ANALYSIS.

Fluharty ME, Sallis H, Munaf+¦ MR.

Observational studies suggest childhood externalizing disorders are associated with increased smoking and earlier initiation. However, causality cannot be inferred from observational data alone. The current study uses two-sample MR to examine the causal relationship between externalizing behaviors and tobacco use. Single nucleotide polymorphisms (SNPs) associated with aggression were obtained from the Early Life Epidemiology Consortium (mean age 8), ADHD from the Integrative Psychiatric Research and Psychiatric Genomics Consortiums (age range 6ΓÇô18), and tobacco initiation and age of onset from the Tobacco and Genetics Consortium. SNPs were combined using the inverse variance weighted approach, weighted median approach, and MR-Egger regression. There was no clear evidence of an effect of aggression on tobacco initiation or age of onset for childhood aggression (initiation: +¦ ΓêÆ0.002, 95% CI ΓêÆ0.005, 0.001, P = 0.286; age: +¦ ΓêÆ0.001 95% CI ΓêÆ0.002, 0.000, P = 0.310) or adolescent aggression (initiation: +¦ ΓêÆ0.001, 95% CI ΓêÆ0.006, 0.003, P = 0.610; age: +¦ 0.000, 95% CI 0.000, 0.001, P = 0.183)]. However, there was some evidence of an association of ADHD on tobacco initiation (OR 1.23, 95% CI 1.10, 1.35, P = 0.016), although no clear evidence of an effect of ADHD on age of onset (OR = 1.022, 95% CI 0.992, 1.052, P = 0.215). Our results provide some evidence that genetic risk of childhood ADHD is causally related to increased risk of tobacco initiation; however, the causal estimate is relatively small. We found no clear evidence that genetic risk of childhood aggression is causally related to the risk of tobacco initiation or age of onset

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East Mediterr Health J. 2018;24:579-87.

QUALITY OF LIFE AND FAMILY FUNCTION OF PARENTS OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Azazy S, Nour-Eldein H, Salama H, et al.

Background: Attention deficit hyperactivity disorder (ADHD) is a common paediatric neurodevelopmental disorder, with serious impacts on individuals, families and communities. It is associated with cognitive, behavioural, emotional, social and developmental disturbances and impaired academic achievement.
Aims: To describe quality of life (QOL) of parents of ADHD children and family function. To determine the relationship between QOL, family function and sociodemographic characteristics.
Methods: This was a cross-sectional study of 125 parents of children with any type of ADHD who were selected by systematic random sampling. The study was conducted between May and December 2015 in the Outpatient Family Medicine Clinic at Suez Canal University Hospital. The World Health Organization Quality of Life-Brief (WHOQOL-BREF) and Adaptability, Participation, Growth, Affection, Resolution (APGAR) questionnaires were used for data collection.
Results: Median physical, psychological and social domain scores were 12, and mean environmental domain score was 11.9. The median scores of perception of health and QOL of the parents were 3.0. Most of the families (79.2%) were dysfunctional. Statistically significant relationships were found between all domains and education; physical scores of QOL and gender, employment and income; psychological scores of QOL and residence; environmental scores of QOL and age, income and marital status. Dysfunctional families were likely to be affected by age, gender, physical and psychological domain scores of QOL of parents.
Conclusions: Parents of children with ADHD had average QOL. Most parents had dysfunctional families. Future family intervention studies are recommended

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Epidemiol Psychiatr Sci. 2018.

QUALITY OF LIFE OF PARENTS OF MENTALLY-ILL CHILDREN: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Dey M, Paz CR, Haug S, et al.

Aims To examine the quality of life (QOL) of parents of children with a specific mental disorder (any age).
Methods Relevant articles were searched using different databases. Articles were included that compared the QOL of parents with mentally-ill children to parents of healthy controls or norm values or provided the required data for this comparison. A meta-analysis was conducted to obtain an overall mean effect size estimate. Additional analyses were performed to assess publication bias and moderation.
Results Twenty-six out of 10 548 articles met the pre-defined inclusion criteria. Most of these studies focused on attention-deficit/hyperactivity disorder or autism spectrum disorder, used clinical samples that mainly included males and young children and studied the QOL of mothers. The meta-analysis revealed that parents of mentally-ill children are experiencing a clinically relevant reduction in their QOL relative to parents of healthy children and norm values (g = -0.66).
Conclusions The compromised QOL of parents of mentally-ill children needs to be considered and addressed by health professionals who are in contact with them. The paper provides insights into existing research gaps and suggests improvements for subsequent work

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Epilepsia. 2018.

SYSTEMATIC REVIEW OF THE SCREENING, DIAGNOSIS, AND MANAGEMENT OF ADHD IN CHILDREN WITH EPILEPSY. CONSENSUS PAPER OF THE TASK FORCE ON COMORBIDITIES OF THE ILAE PEDIATRIC COMMISSION.

Auvin S, Wirrell E, Donald KA, et al.

Attention-deficit/hyperactivity disorder (ADHD) is a common and challenging comorbidity affecting many children with epilepsy. A working group under the International League Against Epilepsy (ILAE) Pediatric Commission identified key questions on the identification and management of ADHD in children with epilepsy. Systematic reviews of the evidence to support approaches to these questions were collated and

graded using criteria from the American Academy of Neurology Practice Parameter. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) requirements were followed, with PROSPERO registration (CRD42018094617). No increased risk of ADHD in boys with epilepsy compared to girls with epilepsy was found (Level A). Valproate use in pregnancy is associated with inattentiveness and hyperactivity in offspring (1 class I study), and children with intellectual and developmental disabilities are at increased risk of ADHD (Level A). Impact of early seizure onset on development of ADHD was unclear (Level U), but more evident with poor seizure control (Level B). ADHD screening should be performed from 6 years of age, or at diagnosis, and repeated annually (Level U) and reevaluated after change of antiepileptic drug (AED) (Level U). Diagnosis should involve health practitioners with expert training in ADHD (Level U). Use of the Strength and Difficulties Questionnaire screening tool is supported (Level B). Formal cognitive testing is strongly recommended in children with epilepsy who are struggling at school (Level U). Behavioral problems are more likely with polytherapy than monotherapy (Level C). Valproate can exacerbate attentional issues in children with childhood absence epilepsy (Level A). Methylphenidate is tolerated and effective in children with epilepsy (Level B). Limited evidence supports that atomoxetine is tolerated (Level C). Multidisciplinary involvement in transition and adult ADHD clinics is essential (Level U). In conclusion, although recommendations could be proposed for some of the study questions, this systematic review highlighted the need for more comprehensive and targeted large-population prospective studies

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Epilepsy Curr. 2018;18:220-21.

PAYING ATTENTION TO QUALITY OF LIFE: EPILEPSY AND ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Salpekar J.

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Eur Child Adolesc Psychiatry. 2018.

THE PREDICTIVE VALIDITY OF THE STRENGTHS AND DIFFICULTIES QUESTIONNAIRE FOR CHILD ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Overgaard KR, Madsen KB, Oerbeck B, et al.

We need accurate screening measures for attention-deficit/hyperactivity disorder (ADHD) to ensure that children with the disorder are referred for assessment without raising concern for children with normal behaviour. The Strengths and Difficulties Questionnaire (SDQ) provides hyperactivityΓÇôinattention (HI), conduct, emotional and peer problem subscales and impact scores that may be used for screening. The aim of the study was to investigate the predictive validity of the Danish version of the parent SDQ HI subscale at the child age of 7-áyears for subsequent clinically diagnosed ADHD (age 8ΓÇô15-áyears). Participants were part of the Danish National Birth Cohort (N = 51,096), and children with ADHD were identified through the Danish National Health registries (n = 943). Receiver operating characteristic analysis showed that the screening accuracy for the HI scores was good (area under the curve =.84). With Cox multivariate regression analysis, we found that SDQ HI subscale scores ΓëÑ 7 with impact gave a nearly 14-fold [hazard ratio (HR) = 13.59] increased risk for ADHD, while conduct and emotional problems indicated low risk (HRs of 1.62 and 1.67, respectively). For the HI subscale to be a sensitive measure for ADHD, a low cutoff (4) was needed, but gave many false screening positives (PPV =.02). Although the diagnostic accuracy of the parent version of the SDQ HI subscale for predicting ADHD was good, our results question the feasibility of screening the general child population for ADHD with only the parent SDQ HI subscale

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Eur Child Adolesc Psychiatry. 2018.

DEFICITS IN AUDITORY SENSORY DISCRIMINATION AMONG CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Tien Y-M, Chen VCH, Lo T-S, et al.

Research into children with attention-deficit/hyperactivity disorder (ADHD) has focused on complex cognitive dysfunction, but less attention has been paid to sensory perception processes underlying the symptoms of ADHD. Based on signal detection theory, the present study compared the sensory discrimination ability and decision bias of children with and without ADHD. It also investigated the differences between ADHD with predominantly inattentive (ADHDi) and combined presentations (ADHDc). The sample of 75 children and adolescents with ADHD (24 ADHDi, 51 ADHDc) (16 females and 59 males) and 22 typical developing controls (TD) (8 females and 14 males) completed an auditory signal detection task. Participants were asked to detect signals against levels of transient background noise (35, 45, 55, and 65-ádB). The results showed that with the increase of noise levels, both the ADHD and TD groups demonstrated decreased sensory discrimination. Although both groups successfully detected signal against noise levels from 35 to 55-ádB, the ADHD group showed lower discrimination ability than that of the TD group. For decision bias, no group difference was found. Further comparisons regarding the predominant symptom presentation of ADHD sub-groups showed no differences. Current research has suggested that the deficit in ADHD peopleΓÇÖs signal detection performance can be attributed to sensory discrimination rather than decision bias. We suggest that background noise should be taken into account when using auditory stimuli to investigate cognitive functions in people with ADHD

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Eur Child Adolesc Psychiatry. 2018.

PREDICTIVE UTILITY OF CHILDHOOD DIAGNOSIS OF ICD-10 HYPERKINETIC DISORDER: ADULT OUTCOMES IN THE MTA AND EFFECT OF COMORBIDITY.

Arnold LE, Roy A, Taylor E, et al.

Diagnostic guidelines differ between DSM attention-deficit/hyperactivity disorder (ADHD) and ICD hyperkinetic disorder (HKD). Only 145 of 579 children age 7ΓÇô9 in the Multimodal Treatment Study of ADHD (the MTA) with combined-type DSM-IV ADHD met criteria for ICD-10 HKD, because major internalizing comorbidities and more stringent symptom count/pervasiveness requirements excluded most. The 145 HKD had significantly better 14-month medication response than the rest. We explored whether HKD had greater adult symptom persistence and/or impairment than other ADHD. Multi-informant assessments were done for 16 years. We used the 12/14/16-year assessments, in young adulthood. The post-attrition 109 with baseline HKD had no greater adult persistence of ADHD symptoms/impairment than 367 without HKD, but had more cumulative stimulant use, more job losses, lower emotional lability, and fewer car crashes. However, those excluded for internalizing comorbidity but otherwise meeting HKD criteria had significantly more persistence. Only 6 of the 109 (5.5%) with baseline HKD met ICD-10 criteria for HKD in adulthood, compared to 25 of 367 (6.8%) without a childhood HKD diagnosis. Despite greater initial symptom severity, HKD had no worse 16-year young adult outcome than others, except for job losses, balanced by less emotional lability and fewer crashes. Comorbid internalizing disorder seems to have worse prognosis than initial severity/pervasiveness of ADHD symptoms

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Eur J Psychiatry. 2018.

PARENTING BEHAVIORS ASSOCIATED WITH YOUTH AD DIAGNOSIS VS. YOUTH ADHD DIAGNOSIS.

Maric M, Bàgels SM.

Background and objectives: Extensive research investigated maternal parenting behaviors of children with anxiety disorders (ADs). No research has compared parenting behaviors of children with anxiety disorders (ADs) and ADHD, which is important to understand the common or specific role of parenting in both disorders, and also to inform interventions including parents.

Methods: We compared the presence of paternal and maternal behaviors of autonomy granting, control, and rejection in youths with AD (n = 16; Mage = 11.63, SD = 2.96) to the presence of these behaviors in youth with ADHD (n = 14; Mage = 10.64, SD = 2.65) and in community sample (CS) youths (n = 24; Mage = 11.4, SD = 2.64) using aggregated child, parent-about-self, and parent-about-partner report. Parental anxiety was also assessed.
Results: Fathers of youths with ADs were less controlling than fathers of youths with ADHD and CS fathers. Fathers of youths with ADHD were more rejecting of their children than fathers of children with ADs and CS fathers. With respect to maternal behaviors, no differences between the three groups occurred. No group differences were found in parental anxiety.
Conclusion: Results provide little evidence for the assumed controlling and lack of autonomy encouragement style of parents of children with ADs. This study points to the importance of involving fathers in the treatment of youth ADHD. Irrespective of whether paternal dysfunctional behaviors are involved in the development of ADHD or are a consequence of ADHD, it is likely that such behaviors negatively contribute to the therapy course and pace and should be targeted during treatment

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Eur Neuropsychopharmacol. 2018;28:1059-88.

LIVE FAST, DIE YOUNG? A REVIEW ON THE DEVELOPMENTAL TRAJECTORIES OF ADHD ACROSS THE LIFESPAN.

Franke B, Michelini G, Asherson P, et al.

Attention-deficit/hyperactivity disorder (ADHD) is highly heritable and the most common neurodevelopmental disorder in childhood. In recent decades, it has been appreciated that in a substantial number of cases the disorder does not remit in puberty, but persists into adulthood. Both in childhood and adulthood, ADHD is characterised by substantial comorbidity including substance use, depression, anxiety, and accidents. However, course and symptoms of the disorder and the comorbidities may fluctuate and change over time, and even age of onset in childhood has recently been questioned. Available evidence to date is poor and largely inconsistent with regard to the predictors of persistence versus remittance. Likewise, the development of comorbid disorders cannot be foreseen early on, hampering preventive measures. These facts call for a lifespan perspective on ADHD from childhood to old age. In this selective review, we summarise current knowledge of the long-term course of ADHD, with an emphasis on clinical symptom and cognitive trajectories, treatment effects over the lifespan, and the development of comorbidities. Also, we summarise current knowledge and important unresolved issues on biological factors underlying different ADHD trajectories. We conclude that a severe lack of knowledge on lifespan aspects in ADHD still exists for nearly every aspect reviewed. We encourage large-scale research efforts to overcome those knowledge gaps through appropriately granular longitudinal studies

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Expert Opin Pharmacother. 2018 Sep;19:1475-88.

USING ANTIPSYCHOTICS FOR BEHAVIORAL PROBLEMS IN CHILDREN.

Shafiq S, Pringsheim T.

INTRODUCTION: Antipsychotic use in children has increased over the past two decades. Randomized controlled trials have evaluated the efficacy of antipsychotics in autism spectrum disorder (ASD) and disruptive behavior disorders (DBD).
Areas covered: The authors systematically analyze the results of randomized controlled trials of second and third generation antipsychotics for irritability in ASD and aggressive and disruptive behavior in DBD with or without low IQ and ADHD. The aim of the review is to assist healthcare professionals to optimize therapy in this population.
Expert opinion: There is evidence to support the short-term efficacy of risperidone and aripiprazole for irritability in ASD, and short-term efficacy of risperidone for aggressive and disruptive behavior in DBD, although the benefits are closely balanced with an increased risk of metabolic, hormonal and extrapyramidal adverse effects. The use of antipsychotics in children with these disorders should be reserved for those refractory to first and second-line therapies, and in whom there is a persistent and serious risk of harm to self

or others. Antipsychotics should be considered a short-term strategy while psychosocial and behavioral therapies are continuously employed

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Int J Dev Neurosci. 2018;71:61-67.

INTERACTIONS BETWEEN EYE MOVEMENTS AND POSTURE IN CHILDREN WITH NEURODEVELOPMENTAL DISORDERS.

Bucci MP, Goulme N, Dehouck D, et al.

In everyday life, our activities frequently involve the simultaneous performance of two or more tasks. Sharing attention between two concurrent tasks may result in a decrease in performance specifically among children with neurodevelopmental disorders. The objective of the study was to determine whether the influence of postural conditions (sitting condition, single task; standing condition, dual task) on eye movement performances on three visual tasks with high attentional load (visually-guided saccade task, memory-guided saccade task and fixation task) was different in children with neurodevelopmental disorders (attention deficit and hyperactive disorder, dyslexia, and high functioning autism spectrum disorder) when compared to typically developing children. One hundred and four children (26 per group, sex-age- and IQ-matched groups) were evaluated. We found that for the fixation task only, the three groups of children with neurodevelopmental disorders had poorer eye movements performances in the standing condition compared to the sitting condition while no such difference was found for typically developing children. We suggest that children with neurodevelopmental disorders have fewer attentional resources available for performing correctly oculomotor tasks with high attentional load leading to impairment of these tasks for maintaining a good level of postural stability

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Int J Drug Policy. 2018 Aug;58:104-12.

PHARMACOLOGICAL COGNITIVE ENHANCEMENT AMONG NON-ADHD INDIVIDUALS—A CROSS-SECTIONAL STUDY IN 15 COUNTRIES.

Maier LJ, Ferris JA, Winstock AR.

Background: Psychoactive substance use aiming at increased performance at work or while studying, usually referred to as pharmacological cognitive enhancement (PCE), has been extensively researched in recent years. While large scale national studies have tried to assess the prevalence of PCE among the general population, cross-cultural comparisons have been hampered by the different definitions and designs included. In addition, the non-medical use of prescription drugs indicated to treat the symptoms of the Attention Deficit Hyperactivity Disorder (ADHD) has been the focus of discussion, yet no study has addressed the association between ADHD rates, prescribing behaviour and PCE yet.

Methods: The Global Drug Survey is an annually conducted anonymous web survey on substance use. Two data sets from male and female Global Drug Survey (GDS) participants aged 16 to 65 years with no previous ADHD diagnosis were analysed to assess12-month PCE in 15 countries. GDS2015 (n = 79,640) examined the patterns of and motives for stimulant PCE, while GDS2017 (n = 29,758) focused on both the use of stimulant and sedative drugs for PCE

Results: When comparing the study samples 2015 and 2017, PCE with prescription and illegal stimulants and modafinil increased across all countries. People who used stimulant drugs and modafinil for PCE rated the perceived effect on cognitive performance most beneficial, while alcohol was the substance with the most adverse effect.

Conclusion: The analysis of data on stimulant use for PCE in the largest global sample highlights relatively low-risk PCE use patterns except for participants with illegal stimulant use for PCE. The globalisation of ADHD, physicians' prescribing behaviour and changes in drug policy are likely to influence the country-specific rate of PCE among non-ADHD individuals what calls for further investigation

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Int J Pediatr Otorhinolaryngol. 2018;114:138-42.

COMPARISON OF AURAL REHABILITATION OUTCOMES IN PRESENCE AND ABSENCE OF BACK GROUND NOISE IN HEARING IMPAIRED CHILDREN WITH AND WITHOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD).

Noori F, Farahani S, Mokrian H, et al.

Objective: We sought to understand the extend of improvement in seven major skills to determine the best rehabilitation approach in hearing impaired young children with and without attention deficit and hyperactivity disorder (ADHD).

Methods: Newsha developmental scale was assessed in 40 hearing impaired children with and without ADHD in two conditions, in which seven major skills (hearing, speech, receptive language, expressive language, cognition, social communication, and motor skills) were evaluated. Two separate analyses were conducted, each after six months of rehabilitation. The first six months rehabilitation was done by controlling background noise level, while the other six months rehabilitation was performed with background multi talker babble noise, and ADHD and non ADHD children performance were compared.

Results: After the first six months of rehabilitation there were no significant difference in improvement in any of the major skills except for motor and cognition skills between hearing impaired ADHD and non ADHD children. After the second six months of rehabilitation the extend of improvement was equal in both groups.

Conclusion: The equal improvement of hearing impaired ADHD and non- Children with ADHD support the benefits of rehabilitation program in both groups. In addition, it seems background multi talker babble noise can facilitate the process of rehabilitation in ADHD group. As a result, it is important to understand the specific needs of hearing impaired children with ADHD in rehabilitation program to provide the best services and increase the chance for success

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Int J Pediatr Otorhinolaryngol. 2018;114:51-60.

AUDITORY PROCESSING AND NEUROPSYCHOLOGICAL PROFILES OF CHILDREN WITH FUNCTIONAL HEARING LOSS.

Rashid SMU, Mukherjee D, Ahmmed AU.

Objectives: This paper compares structured history, auditory processing abilities and neuropsychological findings of children with functional hearing loss (FHL) to those with suspected auditory processing disorder without FHL (control). The main aim was to evaluate the value of a holistic assessment protocol for FHL used in a routine pediatric audiology clinic. The protocol incorporated a commercially available test battery for auditory processing disorder (APD), non-verbal intelligence (NVIQ) and tools to screen for common co-existing neurodevelopmental conditions such as attention deficit hyperactivity disorder (ADHD), language impairment (LI) and developmental coordination disorder (DCD). The outcome of such holistic assessment was expected to help in understanding the nature of FHL and to provide individualized support to mitigate their difficulties.

Methods: This retrospective study compared two groups, 40 children (M = 17, F = 23) in each group between seven and sixteen years of age, one group with a history of FHL and the other with suspected APD without FHL (control). The groups were matched against age, gender, hand use, diagnosis of APD or non-APD (31 with APD and 9 without APD in each group) and non-verbal intelligence. All the children were healthy English speaking children attending mainstream schools with no middle or inner ear abnormalities. Structured history was obtained from parents regarding different nonacademic and academic concerns. The SCAN-3:C and SCAN-3:A test batteries were used to assess auditory processing abilities; Lucid Ability test for NVIQ; Children's Communication Checklist-2 (CCC-2) for language ability; Swanson Nolan and Pelham-IV Rating Scale (SNAP-IV) for ADHD; and the manual dexterity components of the Movement Assessment Battery for Children-2 (MABC-2) as a screening tool for DCD.

Results: About 60% of children in both the groups had concerns regarding listening in noisy background. In the history, poor attention was reported in 45% of children in the FHL group compared to 82.5% in the control group ($p < 0.01$). Hyperacusis was present in 35% of children in the FHL group and in 62% of children in the control group ($p < 0.05$). Concerns about overall academic abilities were present in 59% of children in the FHL group and 75% of the controls ($p > 0.05$). Only 15% of children in the FHL group had concerns with numeracy skills in contrast to 41% of the controls ($p < 0.05$). Significantly fewer ($p < 0.01$) children in the FHL group (41%) received additional support at school than the controls (75%). Fewer children performed poorly in Filtered Words (FW) test of the SCAN-3 batteries, 30% in the FHL group and 17.5% in the control group,

in contrast to Auditory Figure Ground 0 (AFG0), 85% in FHL and 80% in the control group. The number of children performing poorly in AFG0 was significantly higher compared to all the other SCAN-3 tests in FHL ($P < 0.05$), in contrast to FW and Competing Sentences (CS) only in the control group ($p < 0.05$). The control group had higher prevalence of atypical ear advantage (AEA) in left directed Competing Words (CW) (32.5%) and Time Compressed Sentences (TCS) (32.5%) compared to FW (7.5%). In contrast, FHL group had higher prevalence of AEA in AFG0 (48.7%) compared to CS (21%). High proportions of children in both the groups had LI (80% in FHL and 82.5% in the control group), with significantly lower ($p < 0.05$) levels of ADHD symptoms in the FHL group (39.5%) compared to the control group (72.5%). Impaired manual dexterity was present in 30.7% of children in FHL group and 47.5% in the controls.
Conclusions: The prevalences of APD and language impairment are high compared to ADHD symptoms in children with FHL, and holistic assessment is recommended. Despite some similarities in the auditory and neuropsychological profiles between children with FHL and those with suspected APD without FHL some differences were noted. The results suggest that children with FHL have genuine difficulties that need to be identified and addressed. Future research is required to identify the neural pathways which could explain the similarities and dissimilarities between the two groups

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Iran J Pediatr. 2018;28.

DAT1 GENE POLYMORPHISM IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Tabatabaei S-M, Amiri S, Forghani N, et al.

Background: Attention deficit hyperactivity disorder (ADHD) as a commonneuro-developmental disorder is associated with inattention, excessive activity, impulsive behavior or a combination of these symptoms. Environmental and genetic factors are involved in this disorder; Dopamine Active Transporter 1 gene (DAT1) is one of these genetic factors. In this study the association between the 10 or 9-repeat allele of a variable number tandem repeat (VNTR) polymorphism in the 3ΓÇÖ-untranslated region (UTR) of the DAT1 gene and ADHD, is examined.
Methods: A total of 124 children with ADHD and 129 healthy children, ranging from 5 to 14 years old were selected from the north-western area of Iran as the case group and the control group, respectively. DAT1 gene polymorphism was investigated using the PCR-VNTR technique.
Results: Using the Hardy-Weinberg law and chi-square test for analyzing the results of the DAT1 gene, it was observed that the genotypes 9/10 and 10/10 of DAT1 gene were significantly higher among children with ADHD than that in control group ($P = 0.002$).
Conclusions: Based on these finding, it can be concluded that a significant relationship exists between DAT1 gene repeats and ADHD in North-west Iran and this can be used as a diagnostic biomarker in the prognosis of this disorder

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J Abnorm Child Psychol. 2018 Aug;46:1217-28.

DO GENETIC FACTORS EXPLAIN THE LINKS BETWEEN CALLOUS-UNEMOTIONAL, ATTENTION HYPERACTIVITY AND OPPOSITIONAL DEFIANT PROBLEMS IN TODDLERS?

Flom M, Saudino KJ.

Research demonstrates that callous-unemotional (CU) behaviors, Attention Deficit Hyperactivity Disorder (ADHD) and Oppositional Defiant Problems (ODD) are related, but little is known about the sources of covariation among the three externalizing behaviors. The present study looked at genetic and environmental links between all three behavioral domains in twins at ages 2 and 3 years (MZ = 145, DZ = 169), a time when CU behaviors are beginning to emerge. CU, ADHD, and ODD behaviors as assessed using the Child Behavior Checklist 1.5–5 (Achenbach and Rescorla 2000) were strongly interrelated at both ages. Genetic factors primarily explained the covariation among the three behavioral domains via a common externalizing factor; however, there were also genetic factors unique to each behavior. Furthermore, the majority of nonshared environmental influences on each externalizing behavior were behavior-specific. The heritable externalizing factor was highly stable across age, largely due to genetic factors shared across ages 2 and 3

years. Despite their extensive phenotypic and genetic overlap, CU, ADHD, and ODD behaviors have unique genetic and nonshared environmental influences as early as toddlerhood. This supports phenotypic research showing that the three are related but distinct constructs in very young children

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J Abnorm Child Psychol. 2018 Aug;46:1171-85.

ARE EPISODIC BUFFER PROCESSES INTACT IN ADHD? EXPERIMENTAL EVIDENCE AND LINKAGE WITH HYPERACTIVE BEHAVIOR.

Kofler MJ, Spiegel JA, Austin KE, et al.

Working memory deficits are present in a substantial proportion of children with ADHD, and converging evidence links these deficits with ADHD-related behavioral and functional impairments. At the same time, working memory is not a unitary construct, and evidence is lacking regarding the role of several components of this system in ADHD. Preclinical behavioral studies are needed to fractionate the multicomponent working memory system, determine which specific subcomponent(s) are impaired in ADHD, and more importantly link these subcomponent(s) with specific ADHD-related behavioral symptoms/functional impairments. The current study reflects one piece of that puzzle, and focuses on the episodic buffer component of working memory. Across multiple testing days, a well-characterized sample of 86 children ages 8–13 (M = 10.52, SD = 1.54; 34 girls; 64% Caucasian/Non-Hispanic) with ADHD (n = 49) and without ADHD (n = 37) completed three counterbalanced working memory tests that were identical in all aspects except the key subcomponent process (phonological, visuospatial, episodic buffer). Gross motor movement during these and control tasks were measured using 4 high-precision actigraphs. There was no evidence of group differences in gender, age, SES, or IQ. Bayesian mixed-model ANOVAs indicated that the ADHD group performed significantly worse on all three working memory tests (d = 1.17–1.44) and was significantly more hyperactive than controls (d = 0.66–1.05) during the visuospatial and episodic buffer tests. In contrast, the ADHD and Non-ADHD groups were equivalent with regard to effects of episodic buffer demands on performance and hyperactive behavior. The most parsimonious conclusion is that the episodic buffer is likely intact in ADHD, and unrelated to ADHD hyperactivity symptoms

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J Abnorm Child Psychol. 2018 Aug;46:1187-200.

REDUCED VALUE-DRIVEN ATTENTIONAL CAPTURE AMONG CHILDREN WITH ADHD COMPARED TO TYPICALLY DEVELOPING CONTROLS.

Sali AW, Anderson BA, Yantis S, et al.

[Correction Notice: An Erratum for this article was reported in Vol 46(6) of Journal of Abnormal Child Psychology (see record [rid]2018-15808-001[/rid]). In the erratum, the authors describe several minor errors in their article, none of which changes the conclusions or interpretations presented. In addition, the original article has been corrected.] The current study examined whether children with ADHD were more distracted by a stimulus previously associated with reward, but currently goal-irrelevant, than their typically-developing peers. In addition, we also probed the associated cognitive and motivational mechanisms by examining correlations with other behavioral tasks. Participants included 8–12 year-old children with ADHD (n = 30) and typically developing controls (n = 26). Children were instructed to visually search for color-defined targets and received monetary rewards for accurate responses. In a subsequent search task in which color was explicitly irrelevant, we manipulated whether a distractor item appeared in a previously reward-associated color. We examined whether children responded more slowly on trials with the previously-rewarded distractor present compared to trials without this distractor, a phenomenon referred to as value-driven attentional capture (VDAC), and whether children with and without ADHD differed in the extent to which they displayed VDAC. Correlations among working memory performance, immediate reward preference (delay discounting) and attentional capture were also examined. Children with ADHD were significantly less affected by the presence of the previously rewarded distractor than were control participants. Within the ADHD group, greater value-driven attentional capture was associated with poorer working memory. Although both ADHD

and control participants were initially distracted by previously reward-associated stimuli, the magnitude of distraction was larger and persisted longer among control participants

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J Abnorm Psychol. 2018 Sep.

CLINICAL DIFFERENTIATION OF SLUGGISH COGNITIVE TEMPO AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN.

Servera M, Sáez B, Burns GL, et al.

This study (a) determined whether clinical elevations of sluggish cognitive tempo (SCT) and attention-deficit/hyperactivity disorder (ADHD) symptom distributions in a large community sample of children would allow for identifying SCT-only, ADHD-only, and SCT + ADHD clinical groups; (b) examined co-occurrence of clinically elevated SCT and ADHD; (c) evaluated whether these clinical groups differed in their gender distribution, co-occurring mental health symptoms, or impairment in academic and social functioning; and (d) explored patterns of independence and overlap when clinically elevated depressive symptoms were considered in tandem with SCT and ADHD. Participants were mothers, fathers, and teachers of 2,142 children (50.51% boys, ages 8–13 years) from 32 schools in Spain. All three groups of informants completed measures of SCT, ADHD, oppositional defiant disorder (ODD), anxiety, depression, shyness, social impairment, and academic impairment. Cut-off scores for the top 5% of the sample were used to create SCT-only, ADHD-only, SCT + ADHD, and comparison groups. Across informants, 4.97%–5.53% met criteria for clinically elevated ADHD-only, and 2.30%–2.80% met criteria for clinically elevated SCT-only; 27%–35% of the ADHD group also met the criteria for the SCT group, whereas 44%–54% of the SCT group met the criteria for the ADHD group (primarily based on inattentive symptoms). The ADHD-only group had higher ODD scores than the SCT-only group, whereas the SCT-only group generally had higher shyness and internalizing scores (particularly depression) than the ADHD-only group. Additional analyses that also included clinically elevated depression revealed that 28–46% of the children with elevated SCT had elevations in neither ADHD nor depression. This study moves the field toward examining both the empirical and clinical differentiation of SCT and ADHD. Findings are discussed regarding how SCT may fit in diagnostic nosologies and models of psychopathology. (PsycINFO Database Record (c) 2018 APA, all rights reserved)

General Scientific Summary: There is ongoing interest in whether sluggish cognitive tempo (SCT), characterized by excessive daydreaming, mental fogginess or confusion, slowed behavior/thinking, losing one's train of thought, and drowsiness/sleepiness, can or should be differentiated from attention-deficit/hyperactivity disorder (ADHD). The present study indicates that children with elevated SCT have both co-occurrence with and independence from children with ADHD or depression, coupled with distinct patterns of functioning

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J Affective Disord. 2019;242:96-104.

ATTENTION-DEFICIT HYPERACTIVITY DISORDER AND SUICIDALITY: THE MEDIATING EFFECTS OF PSYCHIATRIC COMORBIDITIES AND FAMILY FUNCTION.

Chen Y-Y, Chen Y-L, Gau SSF.

Objective: To explore the association between Attention-Deficit Hyperactivity Disorder (ADHD) and suicidality in children. Mediating effects of family function and psychiatric co-morbidities were also explored.

Methods: This is a national representative cross-sectional survey of school-based sample of 4739 children aged 7-15. Logistic regression was used to assess the excess risks of suicidality (i.e., suicidal ideation, suicide plan, and suicide attempts) in 412 children with ADHD. Serial multiple mediator models were conducted to assess the mediating effects of family function and psychiatric comorbidities.

Results: The prevalence of suicidality in children with ADHD was approximately 20% in Taiwan. After adjusting for potential confounders, the risk of suicidality among children with ADHD was approximately four times higher than among non-ADHD children [(adjusted Odds Ratio [OR] = 3.82, 95% Confidence Interval (CI) (2.73, 5.34)] for suicidal ideation, adjusted OR = 4.18, 95% CI (2.57, 6.80) for suicide plan and adjusted OR = 4.45, 95% CI (1.99, 9.93) for suicide attempts. The mediating effects of anxiety/depression and conduct

problems were about 20% and 8%, respectively, across all suicide outcomes. The mediating effects of family function were around 6-7% for suicidal ideation and 16ΓÇô18% for suicide plan and suicide attempts. The effects of ADHD on suicidality, in general, remained after considering the mediating roles of family function and psychiatric comorbid conditions.
Conclusions: Children with ADHD are at a high risk of suicide. Although the family function and psychiatric co-morbidities partially mediate this association, ADHD in itself is a potent suicide risk factor and should be an important target for suicide prevention

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J Autism Dev Disord. 2018;48:3330-43.
AUTISM AND THE UNIVERSITY EXPERIENCE: NARRATIVES FROM STUDENTS WITH NEURODEVELOPMENTAL DISORDERS.
Bolourian Y, Zeedyk SM, Blacher J.
Relatively limited research has been devoted to understanding the postsecondary experience from the studentsΓÇÖ perspectives. In the current study, individual interviews were conducted with university students with autism spectrum disorder (n = 13) and students with Attention Deficit/Hyperactivity Disorder (n = 18) to investigate likely factors impeding meaningful postsecondary experiences. Through an iterative coding process, nine themes were identified, and direct narratives exemplifying each are included. Overall, both diagnostic groups reported significant social, emotional, and academic challenges within the university setting, although there were distinctions. Findings have direct applications to higher education initiatives, such as the development of programs to increase faculty awareness and to target the efforts of university disability centers in meeting the needs of students with neurodevelopmental disorders

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J Autism Dev Disord. 2018 Sep;48:3244-52.
2D:4D RATIO IN NEURODEVELOPMENTAL DISORDERS: A TWIN STUDY.
Myers L, Westeinde A, Kuja-Halkola R, et al.
The second to fourth digit (2D:4D) ratio is of interest in autism spectrum disorder (ASD). Studies on the relationship of this ratio with other neurodevelopmental disorders (NDDs) are lacking. Investigating the association between the ratio and NDDs in twins can provide insight into genetic and/or environmental factors driving the ratio. Hand images were collected in N = 238 twins with NDDs or typical development from 70 monozygotic and 49 dizygotic pairs to examine ratios and their associations to DSM-5 defined categorical NDDs, autistic traits, zygosity, and sex. There were small associations for males between the ratios and any NDD and ADHD diagnoses. Males had lower ratios than females. Future studies exploring the ratio alongside physical anomalies could provide etiological insight into NDDs

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J Child Psychol Psychiatry. 2018 Sep;59:966-72.
THE ROLE OF GENERAL ANESTHESIA ON TRAITS OF NEURODEVELOPMENTAL DISORDERS IN A SWEDISH COHORT OF TWINS.
Castellheim A, Lundström S, Molin M, et al.
Background: The role of general anesthetics as a risk factor for possible neurodevelopmental disorders (NDDs) in humans is unresolved. The investigation of the role of anesthetics in the development of postgeneral anesthesia (anesthesia onward) NDDs has proven to be complicated, partly because of the inherent confounding in clinical cohort studies, and partly by the fact that anesthetics are only one part in the complex process of anesthesia-surgery.
Methods: Utilizing the Swedish databases Child and Adolescent Twins Study in Sweden (CATSS) and National Patient Register (NPR), we investigated twins discordant for anesthesia, born between 1997 and 2004 for traits of NDDs. We identified 68 twin pairs discordant for anesthesia and explored traits of Attention-Deficit/Hyperactivity Disorder (ADHD), Learning Disability (LD), and Autism Spectrum Disorder (ASD) in them

while simultaneously taking congenital abnormalities and systemic disorders (CSDs) into account. We analyzed the possible effect of anesthesia on neurodevelopmental problems, and we analyzed the within-pair differences using conditional linear regression.
Results: Twins with a recorded episode of anesthesia had higher traits of NDDs than twins without; similarly twins with CSDs had higher mean scores on all traits than twins without CSDs. The within-pair analyses suggested that exposure to anesthesia was associated with higher scores of ADHD (regression coefficient 1.02 and 95% confidence intervals: 0.27–1.78) in monozygotic (MZ) twins discordant for anesthesia. This effect remained when adjusting for congenital abnormalities.
Discussion: Our finding that traits of ADHD were slightly associated with anesthesia in a genetically sensitive design is in need of replication and warrants further investigation. Future studies should aim to elucidate mechanisms behind this possible association (e.g. anesthetics doses, age at exposure, exposure duration)

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J Child Psychol Psychiatry. 2018 Aug;59:863-71.

HAS THE ATTENTION DEFICIT HYPERACTIVITY DISORDER PHENOTYPE BECOME MORE COMMON IN CHILDREN BETWEEN 2004 AND 2014? TRENDS OVER 10 YEARS FROM A SWEDISH GENERAL POPULATION SAMPLE.

Rydell M, Lundström S, Gillberg C, et al.

Background: Studies have reported increases in clinically diagnosed and treated attention deficit hyperactivity disorder (ADHD) during the last decade, but it is unclear if this reflects an increase in the underlying ADHD phenotype. We aimed to clarify if there has been an increase in the prevalence of ADHD-like traits in the general population from 2004 to 2014.
Method: Data were collected from 9-year-old twins (19,271), participating in the population-based Child and Adolescent Twin Study in Sweden between 2004 and 2014. We assessed lifetime ADHD symptoms using the Autism-Tics, ADHD and other Comorbidities inventory. Research proxies for diagnostic-levelADHD and subthreshold ADHD were derived from this scale. We modeled the lifetime prevalence of diagnostic-level and subthreshold ADHD with logistic regression, and assessed mean ADHD scores each year with linear regression. Lifetime prevalence of clinically diagnosed ADHD was retrieved from the National Patient Register and modeled with logistic regression.
Results: The prevalence of diagnostic-level ADHD based on parent ratings did not differ significantly over time from 2004 to 2014 (OR 1.37; 95% CI: 0.77–2.45; p-value .233). Both subthreshold ADHD and mean ADHD scores increased significantly over time (both p-values <.001). Clinically diagnosed ADHD increased more than fivefold from 2004 to 2014 (OR 5.27, 95% CI: 1.85–14.96).
Conclusions: We found no evidence of an increase in ADHD-like traits at the extreme end of the distribution from 2004 to 2014, but small increases in normal and subthreshold variations of ADHD-like traits were observed. This suggests that the increased rates of clinically diagnosed ADHD might reflect changes in diagnostic and treatment practices of ADHD, administrative changes in reporting diagnoses, greater awareness of ADHD, better access to healthcare, or current overdiagnosis, rather than an increase in the ADHD phenotype

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J Child Psychol Psychiatry. 2018 Aug;59:908-16.

SEX-SPECIFIC MANIFESTATION OF GENETIC RISK FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER IN THE GENERAL POPULATION.

Martin J, Taylor MJ, Rydell M, et al.

Background: Attention deficit hyperactivity disorder (ADHD) is more commonly diagnosed in males than in females. A growing body of research suggests that females with ADHD might be underdiagnosed or receive alternative diagnoses, such as anxiety or depression. Other lines of reasoning suggest that females might be protected from developing ADHD, requiring a higher burden of genetic risk to manifest the disorder.
Methods: We tested these two hypotheses, using common variant genetic data from two population-based cohorts. First, we tested whether females and males diagnosed with anxiety or depression differ in terms of their genetic risk for ADHD, assessed as polygenic risk scores (PRS). Second, we tested whether females

and males with ADHD differed in ADHD genetic risk burden. We used three different diagnostic definitions: registry-based clinical diagnoses, screening-based research diagnoses and algorithm-based research diagnoses, to investigate possible referral biases.
Results: In individuals with a registry-based clinical diagnosis of anxiety or depression, females had higher ADHD PRS than males [OR(CI) = 1.39 (1.12–1.73)] but there was no sex difference for screening-based [OR(CI) = 1.15 (0.94–1.42)] or algorithm-based [OR (CI) = 1.04 (0.89–1.21)] diagnoses. There was also no sex difference in ADHD PRS in individuals with ADHD diagnoses that were registry-based [OR(CI) = 1.04 (0.84–1.30)], screening-based [OR(CI) = 0.96 (0.85–1.08)] or algorithm-based [OR(CI) = 1.15 (0.78–1.68)].
Conclusions: This study provides genetic evidence that ADHD risk may be more likely to manifest or be diagnosed as anxiety or depression in females than in males. Contrary to some earlier studies, the results do not support increased ADHD genetic risk in females with ADHD as compared to affected males

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J Child Psychol Psychiatry. 2018 Sep;59:932-47.
PRACTITIONER REVIEW: CURRENT BEST PRACTICE IN THE USE OF PARENT TRAINING AND OTHER BEHAVIOURAL INTERVENTIONS IN THE TREATMENT OF CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.
Daley D, van der Oord S, Ferrin M, et al.
Background: Behavioural interventions are recommended for use with children and young people with attention deficit hyperactivity disorder (ADHD); however, specific guidance for their implementation based on the best available evidence is currently lacking.
Methods: This review used an explicit question and answer format to address issues of clinical concern, based on expert interpretation of the evidence with precedence given to meta-analyses of randomised controlled trials.
Results: On the basis of current evidence that takes into account whether outcomes are blinded, behavioural intervention cannot be supported as a front-line treatment for core ADHD symptoms. There is, however, evidence from measures that are probably blinded that these interventions benefit parenting practices and improve conduct problems which commonly co-occur with ADHD, and are often the main reason for referral. Initial positive results have also been found in relation to parental knowledge, children's emotional, social and academic functioning—although most studies have not used blinded outcomes. Generic and specialised ADHD parent training approaches—delivered either individually or in groups—have reported beneficial effects. High-quality training, supervision of therapists and practice with the child, may improve outcomes but further evidence is required. Evidence for who benefits the most from behavioural interventions is scant. There is no evidence to limit behavioural treatments to parents with parenting difficulties or children with conduct problems. There are positive effects of additive school-based intervention for the inattentive subtype. Targeting parental depression may enhance the effects of behavioural interventions.
Conclusions: Parent training is an important part of the multimodal treatment of children with ADHD, which improves parenting, reduces levels of oppositional and noncompliant behaviours and may improve other aspects of functioning. However, blinded evidence does not support it as a specific treatment for core ADHD symptoms. More research is required to understand how to optimise treatment effectiveness

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J Child Psychol Psychiatry. 2018 Aug;59:888-99.
DELAY AVERSION IN ATTENTION DEFICIT/HYPERACTIVITY DISORDER IS MEDIATED BY AMYGDALA AND PREFRONTAL CORTEX HYPER-ACTIVATION.
Van Dessel J, Sonuga-Barke E, Mies G, et al.
Background: Experimental research supports delay aversion as a motivational feature of attention deficit/ hyperactivity disorder (ADHD). To investigate the neurobiology of delay aversion in ADHD, this study examined whether adolescents with ADHD display an unusually strong activation in affective brain regions in response to cues predicting forthcoming delay and whether these effects are (a) delay-dose dependent and (b) statistically mediate the association between ADHD and self-reported delay aversion.

Methods: Twenty-nine right-handed male adolescents with combined type ADHD and 32 typically developing controls (ages 10–18 years) performed a reaction time task in an MRI scanner. Pretarget cues indicated delay-related response consequences. One indicated that delay would follow the response irrespective of response speed (CERTAIN DELAY), a second that delay would only follow if the response was too slow (CONDITIONAL DELAY), and a third that no delay would follow the response whatever its speed (NO DELAY). Delay levels were 2, 6, or 14 s. Participants also rated their own delay aversion in everyday life.
Results: Individuals with ADHD rated themselves as more delay averse than controls. Significantly greater activation to CERTAIN DELAY cues relative to NO DELAY cues was found in participants with ADHD compared to controls (bilaterally) in amygdala, anterior insula, temporal pole, dorsolateral prefrontal cortex (DLPFC), and ventromedial prefrontal cortex. Amygdala and DLPFC activation strength were strongly and delay-dose dependently correlated with delay aversion ratings, and statistically mediated the relationship between ADHD status and delay aversion.
Conclusions: When presented with cues predicting impending delay, adolescents with ADHD, relative to controls, displayed a delay-related increase in activation in amygdala and DLPFC, regions known to be implicated in the processing of aversive events. Future studies should examine the specificity of these effects to delay aversion compared to aversive events in general

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J Clin Exp Neuropsychol. 2018 Sep;40:633-49.

DIFFERENT CORTICAL SOURCE ACTIVATION PATTERNS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER DURING A TIME REPRODUCTION TASK.

Khoshnoud S, Shamsi M, Nazari MA, et al.

Several neurocognitive studies have indicated that children with attention-deficit/hyperactivity disorder (ADHD) exhibit cognitive deficits in perceptual timing functions; however, only a few electroencephalographic studies have investigated their time reproduction abilities. In the present research, 15 children with ADHD were studied along with 19 age-matched control subjects (aged 7–11 years) as they attempted to reproduce shorter (1000 ms) and longer (2200 ms) time intervals. Trial-mean event-related potential (ERP) and event-related spectral perturbation measures were used to compare the electroencephalography (EEG) source-level activity patterns of the ADHD and control subjects during the time-encoding and reproduction phases. For both short and long intervals, the performance of subjects with ADHD was significantly less accurate and more variable than that of the age-matched controls. During the encoding phase, the ADHD and control ERPs differed significantly for the midfrontal source cluster. The midfrontal P300 amplitude evoked by the onset of the encoding phase was significantly higher for the ADHD group. Similarly, the amplitude of contingent negative variation for the ADHD group was lower for the midfrontal independent component (IC) cluster during long-interval encoding. Theta event-related synchronization in the right occipital cluster also differed between groups during both the encoding and reproduction phases. Moreover, children with ADHD failed to show a frontal selection positivity component in the reproduction phase. Significant differences were found in the mean alpha power for the prefrontal source cluster during the time reproduction phase. These results suggest electrophysiological evidence for time perception deficiencies, selective visual processing disturbances, and working memory impairment in children with ADHD

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J Clin Child Adolesc Psychol. 2018 Sep;47:808-20.

EVIDENCE-BASED ASSESSMENT OF ADHD IN YOUTH USING A RECEIVER OPERATING CHARACTERISTIC APPROACH.

Jarrett MA, Van Meter A, Youngstrom EA, et al.

Guidelines exist for the assessment of attention deficit/hyperactivity disorder (ADHD), but they are often unclear as to how a clinician should consider multiple informants, methods, and co-occurring symptoms to reach an overall diagnostic probability for an individual patient. The current study used receiver operating characteristic analyses and evidence-based medicine methods to evaluate the Achenbach System of Empirically Based Assessment measures and the Conners' Continuous Performance Test for ADHD diagnosis in youth. Children (n = 379) and their parent(s) presented at an outpatient clinic for a

psychoeducational assessment. Analyses examined the diagnostic efficiency and utility of study measures for predicting a best-estimate ADHD diagnosis. The Child Behavior Checklist Attention Problems construct, Teacher Report Form Attention Problems construct, and Hit Reaction Time Standard Error showed adequate diagnostic efficiency and unique contributions to the prediction of ADHD, Combined Type diagnosis. None of these measures showed good diagnostic efficiency or utility for the prediction of ADHD, Predominantly Inattentive Type. Child anxiety did not moderate the relations between predictors and ADHD diagnosis. Both the Child Behavior Checklist and Teacher Report Form Attention Problems constructs can discriminate youth with ADHD, Combined Type from other clinic-referred youth. Although Hit Reaction Time Standard Error also showed diagnostic utility, the decision to include a computerized measure should consider time and expense and be utilized in cases where diagnostic probability is unclear. Finally, anxiety may be associated with elevated attention problems, but it does not appear that anxiety affects diagnostic cutoffs for ADHD

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J Clin Child Adolesc Psychol. 2018 Sep;47:713-26.

THE PROTECTIVE EFFECTS OF SOCIAL FACTORS ON THE ACADEMIC FUNCTIONING OF ADOLESCENTS WITH ADHD.

Dvorsky MR, Langberg JM, Evans SW, et al.

There is considerable evidence that externalizing disorders such as attention deficit/hyperactivity disorder (ADHD) put youth at risk for a range of adverse academic outcomes. It is importantly to note that some youth avoid these negative outcomes, yet there is a gap in our understanding of these resilient youth. The purpose of this study was to longitudinally evaluate social acceptance and social skills as potential protective factors of the associations between inattentive, hyperactive/impulsive, and oppositional defiant behaviors with academic outcomes. Participants included a sample of 93 middle school students comprehensively diagnosed with ADHD. Parents and adolescents completed ratings of social skills and perceived social acceptance. School grades and teacher-rated academic impairment were assessed 18 months later as longitudinal academic functioning outcomes. Inattention and social acceptance were associated with academic outcomes 18 months later. Regression analyses revealed that parent- and adolescent-rated social acceptance demonstrated promotive effects for grades and against teacher-rated academic impairment. Further, social acceptance significantly interacted with inattention in predicting school grades, such that high parent- and adolescent-rated social acceptance significantly attenuated the relationship between inattention and poor grades, even after controlling for baseline grades and intelligence. The presence of social acceptance was especially critical for adolescents with high levels of inattention. Specifically, adolescents with high inattention and high social acceptance had a mean grade point average of 2.5, and adolescents with high inattention and low social acceptance had a mean grade point average of 1.5. These findings demonstrate that social acceptance may be an important intervention target for improving academic outcomes among adolescents with ADHD

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J Clin Child Adolesc Psychol. 2018 Sep;47:699-712.

TRAIT AND STATE VARIANCE IN MULTI-INFORMANT ASSESSMENTS OF ADHD AND ACADEMIC IMPAIRMENT IN SPANISH FIRST-GRADE CHILDREN.

Litson K, Geiser C, Burns GL, et al.

Objective: We examined the stable trait and variable state components of ADHD-inattention (IN), ADHD-hyperactivity/impulsivity (HI), and academic impairment (AI) dimensions using mothers', fathers', primary and secondary teachers' ratings of children's behavior at home and school. We also examined between-informant agreement with regard to trait and state components.

Method. Mothers, fathers, primary and secondary teachers rated HI, IN, and AI in N = 758 Spanish first grade children (55% boys) over three measurement occasions across 12 months.

Results: Latent state-trait analyses revealed that mothers', fathers', and primary teachers' (but not secondary teachers') ratings reflected more trait variance for ADHD-HI (M = 73%), ADHD-IN (M = 74%), and AI (M = 76%) than occasion-specific variance (M = 27%, M = 26%, and M = 24%, respectively). Fathers' ratings shared a meaningful level of trait variance with mothers' ratings of ADHD-HI and ADHD-IN (range 78% to

82%), whereas primary and secondary teachers' ratings shared lower levels of trait variance with mothers' ratings (range 41% to 63%). The trait components of fathers', primary teachers', and secondary teachers' ratings of AI showed high levels of convergence with mothers' ratings (88%, 70%, and 59% respectively).
Conclusions: ADHD symptom reports reflect both trait (48 to 86%) and state (14 to 53%) variance components. The lower amount of shared variability between home and school suggests the setting-specificity of trait and state components of ADHD symptoms. Our findings indicate that ADHD symptom reports may reflect context-specific traits, suggesting the importance of differentiating and targeting ADHD behaviors across different settings

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J Clin Child Adolesc Psychol. 2018 Sep;47:727-36.

NEUROCOGNITIVE FUNCTIONING MEDIATES THE PROSPECTIVE ASSOCIATION OF BIRTH WEIGHT WITH YOUTH ADHD SYMPTOMS.

Morgan JE, Loo SK, Lee SS.

Although birth weight is a potential causal risk factor for attention-deficit/hyperactivity disorder (ADHD) symptoms, both the specificity of this association and its mediating pathways are largely unknown. We carefully assessed youth with and without ADHD (i.e., Wave 1), and followed them prospectively for 2 years (i.e., Wave 2). We (a) tested the association of birth weight with Wave 2 ADHD symptoms, and (b) evaluated biologically plausible neurocognitive functions from Wave 1 as temporally ordered mediators of birth weight and Wave 2 ADHD symptoms in a multiple mediation framework. At Wave 1, 222 ethnically diverse youth (30% female; ages 5–10) completed the Digit Span, Vocabulary, Symbol Search, and Arithmetic subtests of the Wechsler Intelligence Scale for Children–IV. At both Wave 1 and Wave 2 (ages 7–13), multiple informants (i.e., parents, teachers) rated youth ADHD symptoms and co-occurring psychopathology using multiple methods (i.e., structured interview, rating scale). Controlling for demographic factors, gestational age, and co-occurring externalizing and internalizing psychopathology, birth weight inversely predicted Wave 2 ADHD symptoms across multiple methods and informants. Additionally, controlling for Wave 1 ADHD symptoms and relevant covariates, Wave 1 Arithmetic uniquely mediated the association of birth weight with multi-method/informant Wave 2 ADHD symptoms. These findings suggest that birth weight is a relatively specific risk factor for youth ADHD symptoms and they implicate individual differences in fluid reasoning as a preliminary causal mediator of this association. We discuss implications for future research evaluating causal mechanisms underlying risk factors for ADHD

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J Clin Child Adolesc Psychol. 2018 Sep;47:737-44.

EARLY DETECTION OF ADHD: INSIGHTS FROM INFANT SIBLINGS OF CHILDREN WITH AUTISM.

Miller M, Iosif AM, Young GS, et al.

Converging evidence suggests shared genetic underpinnings of attention deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). Studies of infants at risk for ASD have proliferated over the past decade; the few studies that have followed these infants beyond age 3 report a range of difficulties facing a subset of these infants as they reach school age, including elevated levels of attention problems and externalizing behavior. Given this, we aimed to identify early predictors of school-age ADHD outcomes in a sample of infant siblings at risk for ASD. This study reports on a sample of 59 infants at high and low risk for ASD who had been followed for more than a decade, collecting data at regular intervals from 3 to 36 months and then determining diagnostic outcome at 8–10 years of age. Seventeen participants were diagnosed with Diagnostic and Statistical Manual of Mental Disorders (5th ed.) ADHD at school age (n = 14 high risk, 3 low risk). As infants, the ADHD outcome group demonstrated atypical longitudinal patterns of sustained visual attention. A significantly larger proportion of their parents reported behavior/temperament problems at 36 months of age, and examiners noted the presence of inattentive, hyperactive, and/or

impulsive behaviors in this group by 18 months of age. These data suggest that behavioral indicators of risk for later ADHD may be present early in development, which may improve earlier detection and treatment of the disorder

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J Neural Transm. 2018 Sep;125:1395-400.

INVESTIGATION INTO THE PLASMA CONCENTRATION OF ?3 POLYUNSATURATED FATTY ACIDS IN JAPANESE ATTENTION-DEFICIT HYPERACTIVITY DISORDER PATIENTS.

Yonezawa K, Nonaka S, Iwakura Y, et al.

Several studies report that patients with attention-deficit hyperactivity disorder (ADHD) have a low plasma concentration of polyunsaturated fatty acids (PUFAs). Since fish intake varies among countries and is high in Japan, those results may not apply to Japanese patients with ADHD. However, there is currently not enough evidence to support this. We compared the plasma PUFAs levels of patients with ADHD with the standard reference levels for healthy subjects, and examined the relationship between those PUFAs levels and the subject's psychological evaluation. The subjects were 24 patients (age < 20 years) previously diagnosed with ADHD (according to the DSM-IV-TR criteria) at the psychiatric department of the Nagasaki University Hospital, between November 2010 and November 2015. The plasma concentrations of docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), and arachidonic acid (AA) were measured using gas chromatography. Data pertaining to global assessment of functioning (GAF), clinical global impressions, ADHD Rating Scale-IV, and the drug used for treatment (atomoxetine or methylphenidate) were obtained from the medical records. The plasma concentrations of DHA, EPA, and EPA/AA were significantly lower than the normal reference range, indicating that ADHD patients present an imbalance in PUFAs levels. This trend is similar to ADHD patients in other countries and replacement therapy in Japanese ADHD patients may be useful

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Journal of Neurotrauma. 2018;35:A262.

TRAUMATIC BRAIN INJURY, ABUSE, AND IMPAIRED ATTENTION IN VULNERABLE PERSONS WHO EXPERIENCED FOSTER CARE OR HOMELESSNESS.

Cusimano MD, Mei XY, Kennedy D, et al.

Background: Youths and young adults who experienced foster care or homelessness are prone to negative life events such as physical injury (including traumatic brain injury, TBI) and substance abuse, for which the predisposing factors are unknown.

Objective: The present study was to identify the incidence rate of TBI in the studied population and the association of TBI with adverse child experience as well as impaired attention.

Methods: This study used standardized questionnaires and neuropsychological tests to analyze the prevalence of traumatic brain injury (TBI), adverse childhood experiences, and attention deficits, as well as associations between these events, in 46 youths and young adults who experienced foster care or homelessness and 21 healthy controls.

Results: Analyses from Chi-squared test and ANOVA indicated that participants with experiences in foster care reported markedly higher rates of TBI and adverse childhood experiences than healthy controls. In addition, foster participants also showed positive associations between TBI history, sexual abuse, and attention deficits.

Conclusion: These preliminary findings suggest that interactions between TBI, sexual abuse, and attention deficits may contribute to the poor health outcomes seen in the studied population. Knowledge of risk factors predisposing vulnerable youths and young adults to negative outcomes can inform customized support and targeted prevention programs

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J Psychopathol Behav Assess. 2018.

IDENTIFICATION OF OPPOSITIONAL DEFIANT DISORDER IN YOUNG ADULT COLLEGE STUDENTS.

Johnston OG, Derella OJ, Burke JD.

Long-considered a disorder restricted to children and adolescents, more research is needed to understand how oppositional defiant disorder (ODD) affects adults. Recent research suggests that symptoms of ODD persist into adulthood and are associated with specific negative functional outcomes. This current study seeks to investigate the prevalence and associated impairments of ODD symptoms in young adults. Two large samples of college students between the ages of 18ΓÇô24-áyears old (N-á= 1792; N-á= 1497) completed self-report measures of ODD symptoms, ADHD symptoms, psychiatric diagnoses, and functional impairments. Rates and internal consistency of ODD symptoms were calculated, and multiple regression was used to estimate the association between high levels of ODD severity scores and social and authority-related impairments, as well as online antagonistic behavior. In the two samples, the proportion of individuals reporting four or more symptoms of ODD was estimated to be 3.39 and 4.12% respectively, and did not vary significantly by gender. Higher ODD severity was associated with social impairment, online antagonistic behavior, and greater conflict with authority figures, even after controlling for ADHD symptoms and self-reported depression or anxiety diagnoses. ODD symptoms measured in college students demonstrate acceptable reliability and are uniquely associated with specific impairments. The findings from this study support greater consideration of ODD symptoms in adult populations

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J Sleep Res. 2018;27:329-30.

POLYSOMNOGRAPHIC STUDY IN PRIMARYSCHOOL CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Carcangiu R, Staner L, Sellal F, et al.

Objectives/Introduction: 10% of children with Attention Deficit Hyperactivity Disorder (ADHD) present persistent sleep disorders. Sleep has a role in cerebral plasticity. Poor sleep may worsen the attentional dysfunction in ADHD. Comorbidity diagnosis (ADHD + sleep disorder) is complex. This retrospective study investigates subjective and objective sleep quality in a group of 22 ADHD children.

Methods: Aged from 6 to 10 years (mean age 7.5), 18 boys and 4 girls, they were referred to our Sleep Unit for poor sleep and poor attention. They had not yet a conclusive diagnosis of ADHD and they were all stimulant drug-na+»ve. They underwent a sleep-expert interview and one-night PSG. After PSG, diagnosis of ADHD was made by an expert in this field: clinical features of all children met the DSM-V diagnostic criteria for ADHD (14 combined and 8 inattentive presentation). A neurocognitive evaluation (Kitap battery) confirmed attention deficit.

Results: The children's families reported: snoring (77%), tiredness (68%), insomnia (41%) and parasomnia (41%). No one complained about clear Restless Legs Syndrome, but 14% reported restless sleep. 86% complained about at least two sleep symptoms. 50% of families considered sleep problems more important than attention deficit and consulted first for sleep problems. PSG showed a mean sleep latency of 21 min -¦ 22; a mean sleep efficiency of 89% -¦ 8 and total sleep time of 553 min -¦ 61. 23% of children had a bad night at Sleep Unit with sleep latency >30 min or sleep efficiency <80%, with total sleep time <420 min. PSG showed periodic limb movement disorder during wakefulness in 23% of children and an Apnea-Hypopnea Index (AHI) between 3-4.9/hr in 36%. No one had a AHI 5/hR. Parasomnia episodes were not recorded.

Conclusions: The present results show that 50% of school-aged drug-na+»ve ADHD children arriving at our sleep consultation had a priority complaint of poor sleep rather than attention. PSG showed comorbid sleep disorders: parasomnia in 41%, mild OSAS in 36%, restless legs syndrome in 23%, insomnia in 23%. These results reinforce the idea that ADHD children complaining about sleep disorders may consult first sleep-expert. They should undergo a cognitive and PSG analysis

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J Sleep Res. 2018;27:320.

IMPACT OF SLEEP RESTRICTION ON MOOD AND EMOTION REGULATION IN ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Becker S.

Objectives/Instruction: Adolescents with attention-deficit/hyperactivity disorder (ADHD) frequently experience emotion dysregulation and co-occurring internalizing symptoms (anxiety/depression). This study used an experimental sleep restriction/extension protocol to examine whether shortened sleep duration is causally linked to affect, emotion dysregulation, and internalizing symptoms in adolescents diagnosed with ADHD.

Methods: Forty-eight adolescents with ADHD (ages 14-17 years; 75% male) successfully completed a 3-week summer sleep manipulation protocol using a cross-over experimental design. The protocol included a phase stabilization week, followed in counterbalanced order by a sleep restriction week and a sleep extension week. Throughout the protocol, adolescents and parents completed a brief measure of negative and positive affect. At the end of each week, parents and adolescents completed measures of positive and negative affect, emotion regulation, and internalizing symptoms.

Results: Compared to the restricted sleep week, parents reported more positive affect ($p = 0.001$, $d = 0.52$), less negative affect ($p = 0.02$, $d = 0.35$), less emotion dysregulation ($p < 0.001$, $d = 0.56$), and fewer depressive symptoms ($p < 0.001$, $d = 0.82$) during the extended sleep week. Effects were not found for adolescentreported internalizing symptoms, emotion regulation, or mood with the exceptions of significantly greater depressed mood on one measure of internalizing difficulties ($p < 0.001$, $d = 0.33$) and marginally less positive affect reported during the restricted sleep week compared to the extended sleep week ($p = 0.09$, $d = 0.25$).

Conclusions: This study provides the first evidence that sleep duration causally contributes to mood difficulties and internalizing symptoms in adolescents with ADHD, though effects were clearer parent report than adolescent self report measures. This study provides initial evidence that sleep contributes to emotion difficulties in adolescents with ADHD, though more studies are needed to understand specificity of effects and reasons for apparent informant differences

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J Sleep Res. 2018;27:130.

ADHD SYMPTOMS ARE ASSOCIATED WITH DECREASED ACTIVITY OF FAST SLEEP SPINDLES AND POORER PROCEDURAL OVERNIGHT LEARNING DURING ADOLESCENCE.

Merikanto I.

Objectives/Instruction: ADHD and its subclinical symptoms have been associated with both disturbed sleep and weakened memory consolidation. As sleep spindle activity during NREM sleep plays a key role in both sleep maintenance and memory consolidation, we examined the association between ADHD characteristics and sleep spindle activity. Furthermore, we hypothesized that sleep spindle activity would mediate the effect of subclinical ADHD characteristics on overnight learning in a procedural memory task.

Methods: We studied these questions in a community-based cohort of 170 adolescents (58% girls, mean age = 16.9, SD = 0.1 years), who filled in the Adult ADHD Self-Report Scale (ASRS-v1.1), and underwent an overnight sleep EEG coupled with a mirror tracing task before and after sleep.

Results: Elevated ADHD symptoms were associated with lower fast spindle amplitude at frontal derivation ($p = 0.04$), shorter fast spindle duration at both frontal ($p = 0.005$) and central ($p = 0.04$) derivations, as well as weaker fast spindle intensity at both frontal ($p = 0.01$) and central ($p = 0.03$) derivations. Elevated ADHD symptoms ($p = 0.04$) as well as lower sleep spindle amplitude ($p = 0.03$ at central derivation and $p = 0.04$ at frontal derivation) and intensity ($p = 0.04$ at both central and frontal derivations) were associated with poorer overnight learning in the procedural memory test. However, sleep spindles, contrary to the hypothesis, did not mediate the association between ADHD symptoms and overnight learning.

Conclusions: Our results show that a higher level of ADHD symptoms in adolescence is associated with similar alterations in sleep spindle activity at frontal areas as observed in many neuropsychiatric conditions

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Sleep Res. 2018;27:83.

SLEEP IN INFANCY AND ITS RELATION TO THE SYMPTOMS OF ATTENTION-DEFICIT AND HYPERACTIVITY DISORDER AT AGE 5 YEARS: A LONGITUDINAL STUDY.

Huhdanp+ñ+ñ H, Morales Mo, I, Kylli+ñinen A, et al.

Objectives/Introduction: There are cross-sectional populationbased studies and meta-analysis indicating that sleep difficulties are associated with cognitive and behavioral problems. It is not well studied, however, how the early sleep in infancy is related to later development. The aim of this study was to identify whether parent reported short sleep duration, night awakenings and sleeping difficulties during the first years are associated with ADHD-related symptoms at age 5.

Methods: The study is based on a longitudinal CHILD-SLEEP birth cohort comprising altogether >1,600 families from the Pirkanmaa area, Finland, with several measurement points. For this study, we used the information regarding maternal questionnaires during pregnancy and two sleep questionnaires, the Brief Infant Sleep Questionnaire (BISQ) and the Infant Sleep Questionnaire (ISQ) filled out by the parents when the child aged 3, 8, 24 months and 5 years. ADHD-related symptoms at age 5 were assessed using the Strengths and Difficulties Questionnaire (SDQ) and Five-to-Fifteen (Viivi) questionnaires. The final sample included 605 children with measurements at all time points.

Results: In order to examine the effects of sleep problems on ADHD-related symptoms, logistic regression analysis was conducted. Infant's age, gender, mother's educational level and number of children were included as covariates. Our main results showed that short sleep at 3 months of age predicted inattentiveness at age 5 ($p < 0.01$). Further, short sleep and sleep difficulties at age of 24 months increased the risk for having inattentive symptoms at age 5 ($p < 0.05$; and $p < 0.001$, respectively). Moreover, 5-year-old children with current sleep difficulties had increased risk for hyperactivity ($p < 0.001$) and inattentiveness ($p < 0.001$). Number of night awakenings were also associated with hyperactivity ($p < 0.01$) and inattentiveness ($p < 0.01$) at that age.

Conclusions: Sleep problems at early childhood were associated with later occurring ADHD-related problems. More specifically, short sleep at age 3 months was associated with inattentiveness at 5 years old. Short sleep and sleep difficulties at 24 months increased the risk for having inattentive symptoms at age 5 years. Our findings indicated that altered developmental pathway of sleep quality occurs early in infancy among the children who would later have ADHDrelated difficulties

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J Sleep Res. 2018;27:104.

DREAMS OF CHILDREN WITH NEURODEVELOPMENTAL DISORDERS: AUTISM SPECTRUM AND ATTENTION DEFICIT/HYPERACTIVITY.

Nguyen K, Soucy-Savard +, Chicoine M, et al.

Objectives/Introduction: The Autism Spectrum disorder (ASD) and the Attention Deficit/Hyperactivity (ADHD) disorder are two highly comorbid neurodevelopmental disorders (NDDs) with atypical cognitive functioning, including emotional processing. The study of dreams in these two groups of children could constitute an opportunity to better understand the physiopathology of NDDs.

Methods: 18 children diagnosed with ASD (11.7 -¦ 3.7 years) and 18 children diagnosed with ADHD (11.8 -¦ 3.3 years) filled a dream content self-report. Groups were compared on easiness to recall content (1 = never, 5 = easy), cloudiness of recall (1 = vivid, 5 = very cloudy) and the frequency of four emotions in their dreams (joy, fear, sadness and anger; 1 = never, 5 = always). Results were compared with t-tests. We expected that recall, clarity and emotions would be decreased in the ASD group.

Results: The ASD group recalled less their dreams than the ADD group (means -¦ s.d.: 2.0 -¦ 1.0 vs. 2.7 -¦ 0.9; $t(29)=2.04$, $p < 0.05$), the content was more cloudy (3,9 -¦ 1,1 vs. 3.0 -¦ 1.4; $t(29)=2.02$, $p < 0.05$) but there were no differences on the frequency of emotional items, both groups reporting rarely or seldom joy, fear, sadness or anger.

Conclusions: Dream recall is less easy and less clear in children with an ASD compared to ADHD but groups did not differ on the frequency of emotional items. Comparable results on recall were published in ASD adults compared to a group of neurotypical individuals (Daoust et al., 2008). The two groups of children do not differ on the frequency of emotional items, both displaying low scores. This possibly reflects an altered processing of emotional load in dreams of children with NDDs

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J Sleep Res. 2018;27:303-04.

INSOMNIA, NIGHTMARES AND DAYTIME SLEEPINESS IN UNIVERSITY STUDENTS WITH ADHD.

Schlarb A, Gr++nwald J.

Objectives/Introduction: This study examined associations between ADHD in university students and sleep disturbances, namely insomnia, daytime sleepiness and nightmares as well as diurnal preference.

Methods: 70 university students took part in the study. All participants completed standardized questionnaires with regard to ADHD, sleep disturbances and diurnal preference. Furthermore, they took part in certain attention related subtests of the Testbatterie zur Aufmerksamkeitspr fung (TAP).

Results: 32.9% of all participants exhibited symptoms of ADHD. Furthermore, on average, insomnia symptomology was clinically significant elevated ($p = 0.007$). Associations between ADHD, insomnia and nightmares were significant based on questionnaires (all $p < 0.001$). Beyond, students showed significant rates of impaired attention ($p = 0.045$).

Conclusions: Insomnia and nightmares as well as daytime sleepiness were enhanced in participants with ADHD symptomatology. This association was strong in students suffering from ADHD symptomatology in childhood and nowadays. Further investigations should deepen insight in this field of research and introduce the findings into treatment and therapy

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J Am Acad Child Adolesc Psychiatry. 2018 Aug;57:561-70.

FACIAL EMOTION RECOGNITION AND EYE GAZE IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER WITH AND WITHOUT COMORBID CONDUCT DISORDER.

Airdrie JN, Langley K, Thapar A, et al.

Objective: Conduct disorder (CD) is associated with impairments in facial emotion recognition. However, CD commonly co-occurs with attention-deficit/hyperactivity disorder (ADHD); thus, it is unclear whether these impairments are explained by ADHD or by one of its core features—inattention. We explored whether emotion recognition impairments are specific to individuals with ADHD and comorbid CD while also examining the mechanisms that might explain such deficits.

Method: A total of 63 male and female adolescents with ADHD (mean age = 14.2 years, age range = 11–18 years) and with (ADHD + CD) or without (ADHD) comorbid CD, and 41 typically developing controls (healthy controls [HC]; mean age = 15.5, age range = 11–18 years) performed an emotion recognition task with concurrent eye-tracking.

Results: Participants with ADHD + CD were less accurate at recognizing fear and neutral faces, and more likely to confuse fear with anger than participants with ADHD alone and HC. Both ADHD subgroups fixated the eye region less than HC. Although there was a negative correlation between ADHD symptom severity and eye fixation duration, only CD severity was inversely related to emotion recognition accuracy.

Conclusion: Only ADHD participants with comorbid CD showed impairments in emotion recognition, suggesting that these deficits are specific to individuals with conduct problems. However, lack of attention to the eye region of faces appears to be a characteristic of ADHD. These findings suggest that emotion recognition impairments in those with ADHD + CD are related to misinterpretation rather than poor attention, offering interesting opportunities for intervention

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J Am Acad Child Adolesc Psychiatry. 2018 Aug;57:540-41.

HYPERACTIVE BOYS GROWN UP.

Charach A.

Comments on an article by M. A. Ramos Olazagasti et al. (see record [rid]2018-38177-011[/rid]). Ramos-Olazagasti et al. provide details regarding early predictors of adult functioning for children with attention-deficit/hyperactivity disorder (ADHD). Ramos-Olazagasti et al. examine childhood and adolescent predictors of educational, occupational, and social functioning during adulthood in this cohort, originally recruited at ages 6 to 12 years.The recent study by Ramos-Olazagasti et al. investigates outcomes for the boys with ADHD and documents that low family socioeconomic status, low IQ, reading difficulties, and disruptive behavior problems in childhood predicted poor educational attainment. Ramos-Olazagasti et al. add prognostic depth to earlier reports from the same group documenting lower educational, occupational, and economic attainment, as well as worse occupational and social functioning, marital, and health and mental health outcomes, in boys with ADHD relative to comparison boys. As the work by Ramos-Olazagasti et al. began so long ago, it is easy for current readers to identify gaps in the current research such as the lack of girls and nonwhite children with ADHD, those with inattentive subtype, and young people initially identified in adolescence

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J Formos Med Assoc. 2018.

MULTIPLE SUBEPENDYMAL PSEUDOCYSTS IN NEONATES PLAY A ROLE IN LATER ATTENTION DEFICIT HYPERACTIVITY AND AUTISTIC SPECTRUM DISORDER.

Chang H, Tsai C-M, Hou C-Y, et al.

Background/purpose: To assess the long-term neurodevelopmental outcome of normal-term neonates who were accidentally found to exhibit subependymal pseudocysts (SEPCs), frontal horn cysts, or choroid plexus cysts through cranial ultrasound (CUS) examination in a neonatal health examination.

Methods: In total, 5569 neonates received CUS examination as an item in a health examination during the first week of birth between 2002 and 2012. Among them, 5147 infants fulfilled the inclusion criteria. The participants were aged between 5 and 15 years at the time when the data were collected. We retrospectively collected these data and interpreted their statistical significance by using one-way analysis of variance, Chi-square test with Yate's correction and odds ratios.

Results: The presence of SEPCs was significantly correlated with developmental delay and developmental disability, particularly with attention deficit hyperactivity disorder (ADHD) and autistic spectrum disorder (ASD). The risk of ADHD or ASD was significantly higher in participants with multiple SEPCs, among whom the odds ratios for ADHD and ASD were 6.50 (95% confidence interval [CI] = 2.27-18.64) and 28.54 (95% CI = 5.98-136.36), respectively, higher than those for the total study population.

Conclusions: Our data revealed multiple SEPCs in normal-term neonates as a risk factor for neurobehavioral outcome, particularly in ADHD and ASD. Simultaneously, the utility of CUS examination as a health examination item for neonates was confirmed

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J Int Neuropsychol Soc. 2018 Jul;24:531-39.

ANOMALOUS BRAIN DEVELOPMENT IS EVIDENT IN PRESCHOOLERS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Jacobson LA, Crocetti D, Dirlikov B, et al.

Objectives: Attention-deficit/hyperactivity disorder (ADHD) is a common neurological disorder with symptom onset early in childhood. Growing evidence suggests anomalous brain development across multiple brain regions is evident in school-aged children; however, few studies have examined whether such differences are notable in the preschool years when symptom onset typically occurs.

Methods: High resolution anatomical (MPRAGE) images and cognitive and behavioral measures were analyzed in a total of 90 medication-naïve preschoolers, ages 4–5 years (52 with ADHD, 38 controls; 64.4% boys).

Results: Results revealed reductions in bilateral frontal, parietal, and temporal lobe gray matter volumes in children with ADHD relative to typically developing children, with largest effect sizes noted for right frontal and left temporal lobe volumes. Examining frontal lobe sub-regions, the largest between group effect sizes were evident for left orbitofrontal cortex, left primary motor cortex (M1), and left supplementary motor complex (SMC). ADHD-related reductions in specific sub-regions (left prefrontal, left premotor, left frontal eye field, left M1, and right SMC) were significantly correlated with symptom severity, such that higher ratings of hyperactive/impulsive symptoms were associated with reduced cortical volumes.
Conclusions: These findings represent the first comprehensive examination of cortical volume in preschool children with ADHD, providing evidence that anomalous brain structure in ADHD is evident very early in development. Furthermore, findings set the stage for developing our understanding of the way in which developmental trajectories of anomalous brain development are associated with the unfolding of symptoms in childhood ADHD

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J Int Neuropsychol Soc. 2018 Aug;24:653-61.

CONTRIBUTION OF FAMILY RELATEDNESS TO NEUROBEHAVIORAL COMORBIDITIES IN IDIOPATHIC CHILDHOOD EPILEPSIES.

Almane DN, Zhao Q, Rathouz PJ, et al.

Objectives: Rates of cognitive, academic and behavioral comorbidities are elevated in children with epilepsy. The contribution of environmental and genetic influences to comorbidity risk is not fully understood. This study investigated children with epilepsy, their unaffected siblings, and controls to determine the presence and extent of risk associated with family relatedness across a range of epilepsy comorbidities.
Methods: Participants were 346 children (8–18 years), n = 180 with recent-onset epilepsy, their unaffected siblings (n = 67), and healthy first-degree cousin controls (n = 99).
Assessments included: (1) Child Behavior Checklist/6-18 (CBCL), (2) Behavior Rating Inventory of Executive Function (BRIEF), (3) history of education and academic services, and (4) lifetime attention deficit hyperactivity disorder (ADHD) diagnosis. Analyses consisted of linear mixed effect models for continuous variables, and logistic mixed models for binary variables.
Results: Differences were detected between the three groups of children across all measures ($p < .001$). For ADHD, academic problems, and executive dysfunction, children with epilepsy exhibited significantly more problems than unaffected siblings and controls; siblings and controls did not differ statistically significantly from each other. For social competence, children with epilepsy and their unaffected siblings displayed more abnormality compared with controls, with no statistically significant difference between children with epilepsy and unaffected siblings. For behavioral problems, children with epilepsy had more abnormality than siblings and controls, but unaffected siblings also exhibited more abnormalities than controls.
Conclusions: The contribution of epilepsy and family relatedness varies across specific neurobehavioral comorbidities. Family relatedness was not significantly associated with rates of ADHD, academic problems and executive dysfunction, but was associated with competence and behavioral problems

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Mol Psychiatry. 2018.

DISTINCT BRAIN STRUCTURE AND BEHAVIOR RELATED TO ADHD AND CONDUCT DISORDER TRAITS.

Bayard F, Nymberg TC, Ab+® C, et al.

Attention-Deficit/Hyperactivity Disorder (ADHD) and conduct disorder (CD) exemplify top-down dysregulation conditions that show a large comorbidity and shared genetics. At the same time, they entail two different types of symptomology involving mainly non-emotional or emotional dysregulation. Few studies have tried to separate the specific biology underlying these two dimensions. It has also been suggested that both types of conditions consist of extreme cases in the general population where the symptoms are widely distributed. Here we test whether brain structure is specifically associated to ADHD or CD symptoms in a general population of adolescents (n = 1093) being part of the IMAGEN project. Both ADHD symptoms and CD symptoms were related to similar and overlapping MRI findings of a smaller structure in prefrontal and

anterior cingulate cortex. However, our regions of interest (ROI) approach indicated that gray matter volume (GMV) and surface area (SA) in dorsolateral/dorsomedial prefrontal cortex and caudal anterior cingulate cortex were negatively associated to ADHD symptoms when controlling for CD symptoms while rostral anterior cingulate cortex GMV was negatively associated to CD symptoms when controlling for ADHD symptoms. The structural findings were mirrored in performance of neuropsychological tests dependent on prefrontal and anterior cingulate regions, showing that while performance on the Stop Signal test was specifically related to the ADHD trait, delayed discounting and working memory were related to both ADHD and CD traits. These results point towards a partially domain specific and dimensional capacity in different top-down regulatory systems associated with ADHD and CD symptoms

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Neurol Sci. 2018.

THE EFFICACY OF RITALIN IN ADHD CHILDREN UNDER NEUROFEEDBACK TRAINING.

Pakdaman F, Irani F, Tajikzadeh F, et al.

Current research has shown that neurofeedback (NF) is a viable treatment for attention deficit hyperactivity disorder (ADHD), however having pharmacological approach alongside such stimulants is still inevitable. Therefore, the purpose of this study is the comparison of neurofeedback with Ritalin and without Ritalin in treating children with ADHD. This study was causal-comparative in design. Participants were children aged 5ΓÇô10-áyears with ADHD; seven participants were in neurofeedback group with Ritalin and seven in neurofeedback without Ritalin group according to random split and parentΓÇÖs conformation. Clinical Q, ConnerΓÇÖs continuous performance test (CPT), and WISC-R were used before and after treatment. For analyzing data, we used descriptive statistical and Mann Whitney U tests. Results showed that even if the two groups were modified in all components, modifications of commission and reaction time of the CPT and F4 theta/alpha of the clinical Q were more accurate in NF with Ritalin treatment rather than the other group. These findings suggest that neurofeedback is efficient in improving some of the behavioral concomitants of ADHD in children whose parents favored non-pharmacological treatment, but Ritalin and neurofeedback combination is more efficient. So, multimodal approach is strongly recommended for ADHD treatment

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No To Hattatsu. 2018;50:S286.

DECEASE IN THE FREQUENCY OF EACH ANGLE OF MEMORY GUIDED SACCADE IN TOURETTE SYNDROME AND ADHD.

Hoshino K, Fukuda H, Sugiyama Y, et al.

Background We previously reported abnormal saccade in Tourette syndrome(TS), however, those analyses were based on averaging of the angles of saccades. This study investigated the frequency of memory guided saccade(MGS)and saccade to cue (SC;impaired suppression of undesired saccades)for each angle in males with TS and attention-deficit/hyperactivity disorder(ADHD)and compared the findings to those of age-matched normal controls.

Methods Twenty-nine males with TS(age 6.2-16.2 years;10.6-¦2.8)and 20 males with ADHD(6.6-14.3;9.9-¦2.2)were studied. The controls comprised 29 males(6.1-15.9;10.0-¦2.8). Saccade recording was evaluated by Eyelink 1000 using the Hikosaka method for angles of 5-¦&, 10-¦&, and 20-¦ &.

Results The frequency of MGS(MGS)in TS was 58.9-¦27.6%, 67.2-¦25.3%, and 64.1-¦26.8% for 5-¦ &, 10-¦ &, and 20-¦ &, respectively;61.6-¦25.9%, 61.4-¦23.6%, and 62.0-¦24.7% in ADHD;and 75.7-¦17.8%, 82.5-¦17.1%, and 87.3-¦15.6% in the controls. The values for TS were significantly lower than controls, but not in SC. We analyzed the correlation between MGS and SC. There was no correlation for any angle in the controls;however, there was a weak negative correlation for 20-¦ & in ADHD and a significant negative correlation for all angles in TS.

Conclusions Dopamine activity in basal ganglia controls MGS is disordered in TS. MGS and SC were negatively correlated in TS. SC reflects impulsiveness controlled by prefrontal function and was related to MGS only in TS

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No To Hattatsu. 2018;50:S285.

MPH-INDUCED HEMODYNAMIC RESPONSES IN MEDICATION-NAIVE ADHD WITH AND WITHOUT ASD: AN FNIRS STUDY.

Ikeda T, Monden Y, Tokuda T, et al.

Introduction The DSM-5 recognizes the frequency of the occurrence of ADHD with ASD and allows, for the first time, a co-morbid diagnosis of ADHD with ASD. A core question is whether ADHD with and without ASD may have different neuropharmacological effect or not.

Methods and results We compared age and sex matched medication naive-children with non-comorbid ADHD(n=21)and comorbid ADHD and ASD(n=11), using fNIRS measurement during go/no-go task. We examined cortical activation in the ROI at the right IFG/MFG, where we have consistently found significant activation during go/no-go task in the control subjects. In ADHD without ASD group, MPH medication led to upregulation the right IFG/MFG activation. On the other hands, ADHD with ASD group, MPH medication resulted in downregulation in the right IFG/MFG activation.

Discussion These results suggested that ADHD with ASD would not simply be mixed with two pure disorders but a distinct different neuropathology. To our knowledge, this is the first comparative neuroimaging study between patients with ADHD with ASD and without ASD

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No To Hattatsu. 2018;50:S285.

CLINICAL FUTURES OF SLUGGISH COGNITIVE TEMPO, AN ANOTHER ATTENTION DISORDER.

Suzuki S, Kondo T, Oka Y.

Background Sluggish Cognitive Tempo(SCT)is a new attention disorder first proposed by Lahey, et al(1984)and the academic arguments on SCT have been growing rapidly. SCT is described as having daydreams, slow pace, being reluctant in positive socialization, and often associated by anxiety or depressive mood. However, there are only a few reports on this unique disorder so far in japan. Therefore, we present here the cases of SCT experienced at our clinic.

Case A 10-year-old girl was referred to our clinic for her inattentive attitudes. She was intellectually normal. The teachers and parents report she has never been hyperactive or impulsive, but rather slow in daily activities and school tasks. She often looses in thinking and explaining, and stares into space a lot. She avoids taking a leadership in socialization, while she is empathic enough and never autistic. She tends to be pessimistic and cries easily by trivial troubles. She sleeps longer than the children of her age. Her gymnastic ability and hand skills seem below the average.

Discussion If you would adopt the DSM-IV criteria, she may be diagnosed as ADHD, or ADHD+DCD, or a mild form of ASD. But, it seems clear her basic future is not a simple inattention, but slow pace in mental processing.

Conclusion SCT, as proposed in the literatures, does exist as a distinct clinical entity in our children as well. We will summarize our cases and review the published information

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Occup Environ Med. 2018;75:A34-A35.

EARLY-LIFE EXPOSURE TO PERSISTENT ORGANIC POLLUTANTS AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A MULTI-POLLUTANT ASSESSMENT OF A NORWEGIAN BIRTH COHORT.

Lenters V, Cechov+í E, Kocan A, et al.

Background/aim Numerous ubiquitous environmental chemicalsare established or suspected neurotoxicants, and infants areexposed to a mixture of these during the critical period ofbrain maturation. Evidence for associations with the risk ofattention-deficit/hyperactivity disorder (ADHD) is sparse. Weinvestigated measured perinatal and estimated postnatal chemical exposure levels in relation to ADHD.

Methods We used a birth cohort of Norwegian mother-childpairs enrolled 2005-2009 (HUMIS-NoMIC). In a subset of1199 oversampled for neurodevelopmental outcomes, 27 persistent organic pollutants were measured in maternal breastmilk samples (14 PCBs, 5 organochlorine pesticides, 6brominated flame retardants, and 2 perfluoroalkyl substances). We modelled pre-and postnatal exposures using a

pharmacokinetic model. ADHD (n=40) was identified based on anICD-10 diagnosis of hyperkinetic disorder in the nationalpatient registry by 2014 (median age of 10.3 years). To identify associations and adjust for co-exposure confounding, weused elastic net penalised logistic regression models, and thenused multivariable logistic regression models to obtain effectestimates for the selected exposures.
Results Perfluorooctane sulfonate (PFOS) and b-hexachlorocyclohexane (b-HCH) were associated with increased odds andhexachlorobenzene (HCB) with decreased odds of ADHDdiagnosis [confounder-adjusted odds ratio (OR) per interquartile range increase in breastmilk levels: 2.04 for PFOS;OR=1.64 for b-HCH; OR=0.36 for HCB]. Postnatal exposures showed similar results, whereas effect estimates for otherchemicals were imprecise.
Conclusion In a multi-pollutant analysis of four classes ofchemicals, early-life exposure to several persistent organic pollutants was associated with ADHD

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Pediatric Obesity. 2018;13:567-75.
ADHD SYMPTOMS AND BODY COMPOSITION CHANGES IN CHILDHOOD: A LONGITUDINAL STUDY EVALUATING DIRECTIONALITY OF ASSOCIATIONS.
Bowling AB, Tiemeier HW, Jaddoe VWV, et al.
Background: Attention-deficit/hyperactivity disorder (ADHD) is linked to increased risk of overweight/obesity among children and adults. Studies have also implicated obesity as a risk factor for ADHD. However, no studies have evaluated bidirectional, longitudinal associations between childhood fat mass and ADHD symptom severity.
Objectives: We investigate bidirectional associations between ADHD symptoms and measures of body composition between ages 1.5 and 9. We further examine effects of specific eating patterns linked to ADHD on associations between symptom severity and body composition.
Methods: The study utilized data from children (N-á=-á3903) participating in the Generation R cohort (Netherlands). Children were enrolled at birth and retained regardless of ADHD symptoms over time. Cross-lagged and change models examined bidirectional associations between body composition (body mass index/dual-energy X-ray absorptiometry) and ADHD symptoms at four time points in childhood. Results: A child with a clinically concerning ADHD symptom z-score two standard deviations above the mean at age 6 would be expected to experience about 0.22-ákg greater fat mass gain measured via dual-energy x-ray absorptiometry between ages 6 and 9, even if they displayed healthy eating patterns (95% CI: 0.11 - 0.28, p-á<-á0.001). Conversely, fat mass at any age did not predict worse ADHD symptoms later.
Conclusions: Beginning in early childhood, more ADHD symptoms predict higher fat mass at later ages. We did not find evidence of a reverse association. Based on these and prior findings, lifestyle counselling during treatment for children with a diagnosis of ADHD should be considered, even if they are diagnosed in early childhood and do not yet have a body mass index of clinical concern

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Pediatr Int. 2018.
EFFECTIVENESS OF NEUROFEEDBACK VERSUS MEDICATION FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.
Sudnawa KK, Chirdkiatgumchai V, Ruangdaraganon N, et al.
Background: Neurofeedback (NF) is an operant conditioning procedure that trains participants to self-regulate brain activity. NF is a promising treatment for attention-deficit/hyperactivity disorder (ADHD), but there have been only a few randomized controlled trials comparing the effectiveness of NF with medication with various NF protocols. The aim of this study was therefore to evaluate the effectiveness of unipolar electrode NF using theta/beta protocol compared with methylphenidate (MPH) for ADHD.
Methods: Children with newly diagnosed ADHD were randomly organized into NF and MPH groups. The NF group received 30 sessions of NF. Children in the MPH group were prescribed MPH for 12 weeks. Vanderbilt ADHD rating scales were completed by parents and teachers to evaluate ADHD symptoms before and after treatment. Student's t-test and Cohen's d were used to compare symptoms between groups and evaluate the effect size (ES) of each treatment, respectively.

Results: Forty children participated in the study. No differences in ADHD baseline symptoms were found between groups. After treatment, teachers reported significantly lower ADHD symptoms in the MPH group (P = 0.01), but there were no differences between groups on parent report (P = 0.55). MPH had a large ES (Cohen's d, 1.30ΓÇô1.69), while NF had a moderate ES (Cohen's d, 0.49ΓÇô0.68) for treatment of ADHD symptoms.
Conclusion: Neurofeedback is a promising alternative treatment for ADHD in children who do not respond to or experience significant adverse effects from ADHD medication

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Pharmacoepidemiol Drug Saf. 2018;27:99-100.

REAL-WORLD EFFECTIVENESS OF METHYLPHENIDATE IN IMPROVING ACADEMIC ACHIEVEMENT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) STUDENTS-A SYSTEMATIC REVIEW.

Faria JCM, Ferreira LA, Duarte LJR, et al.

Background: Methylphenidate is the most commonly prescribed drug for treatment of attention deficit hyperactivity disorder (ADHD). Impaired school performance is one of the main reasons for starting ADHD medication, but the evidence of improvement due to methylphenidate is not well established.
Objectives: To evaluate the evidence of the real-world effectiveness of methylphenidate in improving academic achievement of ADHD students. Methods: We have conducted a systematic review of observational studies. Electronic searches were performed in five databases, besides manual and gray literature searches. Observational studies evaluating academic outcomes with methylphenidate compared with no treatment, or other pharmacological/nonpharmacological alternatives used in ADHD were included. These studies were all conducted in scholarly settings, and the participants were students at any level with an ADHD diagnosis. We have assessed the bias risk of selected studies using adapted versions of the Newcastle-Ottawa scale.
Results: Three cohort, two before-and-after design, and two crosssectional studies were included in the review. They involved 366 children aged 6 to 18 years. The methylphenidate dosages ranged from 10 to 72 mg/day, and the treatment duration from 2.6 months to 4.25 years. In five out of seven studies, the authors concluded that methylphenidate leads to improvement in academic performance. However, among the four lowest bias risk studies, three reached conclusions that the drug is ineffective for this purpose. Four studies assessed the long-term use of methylphenidate (more than one year), and only one concluded methylphenidate is effective, but it had the highest bias risk among these four. The studies have considerable methodological limitations and great heterogeneity regarding academic performance measurement criteria.
Conclusions: Although there are studies indicating that short-term use of methylphenidate may improve academic outcomes, the evidence is weak. The available scientific literature does not conclusively support the real-world effectiveness of methylphenidate

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Pharmacoepidemiol Drug Saf. 2018;27:165.

MATERNAL ADHD MEDICATION USE DURING PREGNANCY AND THE RISK OF ADHD IN CHILDREN.

Lemelin M, Sheehy O, Brard A.

Background: The association between maternal attention deficit with or without hyperactivity disorder (ADHD) medication use during pregnancy and the risk of ADHD in offspring is controversial. The etiology of ADHD remains unclear, but genetic trends and environmental risk factors are likely involved in offspring and adult onset of ADHD.
Objectives: We sought to evaluate the risk of ADHD in offspring associated with overall and class-specific intrauterine exposure to ADHD medication.
Methods: We performed a cohort study in the Quebec Pregnancy Cohort (QPC), an ongoing population-based cohort, which includes data on all pregnancies of mothers covered by the provincial prescription drug insurance in Quebec and their children from January 1, 1998, to December 31, 2015. Singleton full-term liveborns and mothers with continuous prescription drug coverage for at least 12 months before and during pregnancy were included. ADHD medication exposure during pregnancy was defined according to trimester

of use and class-specific medication (ADHD-specific stimulant and non-stimulant). ADHD in children was defined as having at least 1 diagnosis of ADHD or 1 prescription filled for ADHD medications between birth and the end of the follow-up. Cox proportional hazards regression models were used to calculate crude and adjusted hazard ratios (aHR) with 95% confidence intervals (CIs).
Results: A total of 166 047 full-term singleton live births were considered for analyses. During follow-up, 25 454 infants (15.3%) were identified with ADHD boys outnumbered girls by a ratio of 2:1. The mean age (-¦standard deviation [SD]) at first ADHD diagnosis was 8.19 -¦ 3.11 years. Adjusting for potential confounders, including maternal history of ADHD, which is a risk factor for childhood ADHD, and other psychiatric conditions, maternal exposure to ADHD medication was associated with an increased risk of ADHD in the offspring (aHR = 2.04 95% CI 1.27-3.27 133 exposed cases). More specifically, use of ADHD medication during the 1st trimester was associated with an increased risk of ADHD in the offspring (aHR = 3.70 95% CI 2.36-5.79 130 exposed cases) 2nd and 3rd trimester use did not significantly increase the risk. Methylphenidate was associated with an increased ADHD risk in the offspring.
Conclusions: Our findings suggest that maternal exposure to ADHD medication increases the risk of ADHD in the offspring, specifically following 1st trimester exposure. Additionally, methylphenidate was associated with an increased ADHD risk in the offspring

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Pharmacoepidemiol Drug Saf. 2018;27:447.

USE OF ADHD MEDICATION, ANTIPSYCHOTICS, ANTIDEPRESSANTS, AND MELATONIN IN CHILDREN AND ADOLESCENTS WITH AUTISM SPECTRUM DISORDER: A DANISH DRUG UTILIZATION STUDY.

Rasmussen L, Bilenberg N, Pottegard A.

Background: Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by impaired social communication and interaction, and unusually restricted, repetitive behavior and interests. There is no evidence based pharmacological treatment of ASD core symptoms. Nevertheless, children with ASD have a substantial use of psychotropic drugs.
Objectives: To describe the use of ADHD medication, antipsychotics, antidepressants, and melatonin in children and adolescents diagnosed with ASD in Denmark during the period 2010-2016.
Methods: Based on data from the Danish Psychiatric Central Research Register, we defined a cohort of children born between 1992 and 2010 with a recorded diagnosis of ASD after the age of three. From the Danish National Prescription Registry, we extracted data on all prescriptions of ADHD medication, antipsychotics, and antidepressants to our cohort between 2010 and 2016. We extracted data on melatonin prescriptions from 2012 to 2016. For each calendar year, we reported the 1-year prevalence proportion for the use of these drug classes (ΓëÑ2 prescription per year) according to age group (3-5 years, 6-11 years, and 12-17 years).
Results: We identified 19 096 children born between 1992 and 2010 with a recorded ASD diagnosis. Of these children, 76% were male, 30% had comorbid ADHD, 16% had comorbid mental retardation, and 57% had other comorbid psychiatric disorders. The use of ADHD medication, antipsychotics, and antidepressants varied between age groups, with negligible use in the youngest age group. In 2016, the prevalence of use of ADHD medication, antipsychotics, antidepressants, and melatonin was 16%, 3%, 1%, and 13% for children aged 6-11 years and 18%, 8%, 7%, and 13% for children aged 12-17 years. The use of ADHD medication, antipsychotics, and antidepressant was generally stable during the study period for all age groups, while the use of melatonin increased (from around 7 to 13% for children aged 6-17 years).
Conclusions: The use of ADHD medication, antipsychotics, and antidepressants in Danish children and adolescents with ASD was stable from 2010 to 2016, while melatonin use increased. Except for ADHD medication use, the reported prevalences were generally low compared with what was reported in a recent systematic review, most likely due to our conservative criteria of requiring at least two prescriptions filled within a given year

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Pharmacoepidemiol Drug Saf. 2018;27:390.

PREDICTORS FOR PHARMACOLOGICAL AND PSYCHOTHERAPEUTIC TREATMENT IN CHILDREN NEWLY DIAGNOSED WITH ADHD.

Scholle O, Fegert JM, Kollhorst B, et al.

Background: Predictors for the use of evidence-based treatments in routine care of children newly diagnosed with attention-deficit/hyperactivity disorder (ADHD) over several years are unknown. Objectives: To investigate predictors for use of medication and psychotherapy within five years after a first ADHD diagnosis in Germany.

Methods: This cohort study was based on the German Pharmacoepidemiological Research Database and included 12 250 treatment-na+»ve children aged 5-12 years with an incident ADHD diagnosis in 2010 and a minimum follow-up of five years. Children were categorized into treatment groups based upon dispensations of ADHD drugs and billed codes for psychotherapy within five years following the first ADHD diagnosis. Multivariable logistic regression was used to estimate associations between children's characteristics at the first diagnosis and the chosen treatment approach.

Results: Within 5 years after the incident ADHD diagnosis, 37% of the children received medication; 11% only psychotherapy; 52% no treatment. Of those receiving medication, 27% had additional psychotherapy. Boys (adjusted odds ratio [aOR] 1.41, 95% CI 1.28-1.55), children with an ADHD diagnosis with hyperactivity (aOR 5.64, 95% CI 4.94-6.44), and those with comorbid conduct disorders (aOR 1.35, 95% CI 1.21-1.51) were more likely to receive medication than no treatment. Male sex (aOR 1.18, 95% CI 1.02-1.35) and comorbid neurotic and somatoform (aOR 1.38, 95% CI 1.12-1.70), conduct (aOR 1.45, 95% CI 1.23-1.71), and emotional disorders (aOR 1.60, 95% CI 1.33-1.92) were associated with only psychotherapy. Comorbid depression (aOR 1.41, 95% CI 1.13-1.77), neurotic and somatoform (aOR 1.31, 95% CI 1.02-1.68), conduct (aOR 1.52, 95% CI 1.29-1.78), and emotional disorders (aOR 1.48, 95% CI 1.21-1.81) increased the odds of receiving both treatments than medication only; conversely, higher age (aOR 0.73, 95% CI 0.59-0.90) and mental retardation (aOR 0.48, 95% CI 0.28-0.83) decreased the odds. Children who were initially diagnosed by a non-specialist were more likely to receive no treatment than medication, whereas diagnosis by a psychotherapist increased the odds of receiving medication, only psychotherapy, or both.

Conclusions: This study is the first to show patterns of two main ADHD treatment approaches in newly diagnosed children and to identify several patient characteristics as predictors

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PLoS ONE. 2018;13.

ANALYSIS OF COGNITIVE AND ATTENTIONAL PROFILES IN CHILDREN WITH AND WITHOUT ADHD USING AN INNOVATIVE VIRTUAL REALITY TOOL.

Areces D, Dockrell J, Garc+¡a T, et al.

In previous studies, children with Attention-Deficit Hyperactivity Disorder (ADHD) have been found to have more difficulties with processing speed, working memory, and attentional tasks. The present study aimed to compare the cognitive variables (working memory and processing speed) and the attentional profiles of a sample of students with and without ADHD, using scales from the WISC-IV, and the virtual reality-based attentional test known as 'Aula Nesplora'; and determine the extent to which the aforementioned variables may predict student group membership. A total of 88 students took part in this study (66 males and 22 females), aged from 6 to 16 years (M = 10.20; SD = 2.79). The sample was divided into two groups: an ADHD group (n = 50) and a Control group (n = 38). Students in the ADHD group obtained lower scores in working memory and in processing speed, as well as demonstrating poorer performance in Aula Nesplora than did their peers. Working memory, and the number of omissions, were both shown to be reliable predictors of group membership. This study revealed the importance of obtaining data from attentional variables differentiated by modality when considering cognitive variables, in order to better characterize the difficulties experienced by individuals diagnosed with ADHD

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PLoS ONE. 2018;13:DUMMY.

THE BLESSING OF DIMENSIONALITY: FEATURE SELECTION OUTPERFORMS FUNCTIONAL CONNECTIVITY-BASED FEATURE TRANSFORMATION TO CLASSIFY ADHD SUBJECTS FROM EEG PATTERNS OF PHASE SYNCHRONISATION.

Pereda E, Garc+¡a-Torres M, Meli+ín-Batista B, et al.

Functional connectivity (FC) characterizes brain activity from a multivariate set of N brain signals by means of an NxN matrix A, whose elements estimate the dependence within each possible pair of signals. Such matrix can be used as a feature vector for (un)supervised subject classification. Yet if N is large, A is highly dimensional. Little is known on the effect that different strategies to reduce its dimensionality may have on its classification ability. Here, we apply different machine learning algorithms to classify 33 children (age [6-14 years]) into two groups (healthy controls and Attention Deficit Hyperactivity Disorder patients) using EEG FC patterns obtained from two phase synchronisation indices. We found that the classification is highly successful (around 95%) if the whole matrix A is taken into account, and the relevant features are selected using machine learning methods. However, if FC algorithms are applied instead to transform A into a lower dimensionality matrix, the classification rate drops to less than 80%. We conclude that, for the purpose of pattern classification, the relevant features should be selected among the elements of A by using appropriate machine learning algorithms

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Prog Neuro-Psychopharmacol Biol Psychiatry. 2019;89:181-92.

CAN WE PREDICT TREATMENT RESPONSE IN CHILDREN WITH ADHD TO A VITAMIN-MINERAL SUPPLEMENT? AN INVESTIGATION INTO PRE-TREATMENT NUTRIENT SERUM LEVELS, MTHFR STATUS, CLINICAL CORRELATES AND DEMOGRAPHIC VARIABLES.

Rucklidge JJ, Eggleston MJF, Darling KA, et al.

Background: Intent-to-treat analyses from a randomized controlled trial showed significant between-group differences favouring micronutrient treatment on the Clinical Global Impression-Improvement, but no group differences on clinician, parent and teacher ratings of overall ADHD symptoms. There was an advantage of micronutrients over placebo in improving overall function, emotional regulation, aggression, and reducing impairment as well as improving inattention based on clinician but not parent observation. No group differences were observed on hyperactive-impulsive symptoms. We investigated predictors of response defined by pre-treatment variables.

Method: We conducted analyses of data from a clinical trial of children (7–12 years) with ADHD, whereby participants were randomized to receive micronutrients or placebo for 10 weeks followed by a 10 week open-label (OL) phase. We included only children who had been exposed to micronutrients for a full 10 week period and demonstrated satisfactory adherence, either in RCT phase (n = 40) or OL phase (those who received placebo during RCT phase; n = 31). Seven outcomes were examined: change in ADHD symptoms (clinician/parent), ADHD responder, overall responder, change in mood, change in functioning, and change in aggression. Demographic, developmental variables, current clinical and physical characteristics, MTHFR genotype at two common variants, and pre-treatment serum/plasma levels (vitamin D, B12, folate, zinc, copper, iron, ferritin, potassium, calcium, magnesium, and homocysteine) were all considered as putative predictors.

Results: Substantial nutrient deficiencies pre-treatment were observed only for vitamin D (13%) and copper (15%), otherwise most children entered the trial with nutrient levels falling within expected ranges. Regression analyses showed varying predictors across outcomes with no one predictor being consistently identified across different variables. Lower pre-treatment folate and B12 levels, being female, greater severity of symptoms and co-occurring disorders pre-treatment, more pregnancy complications and fewer birth problems were identified as possible predictors of greater improvement for some but not all outcome measures although predictive values were weak. Lower IQ and higher BMI predicted greater improvement in aggression.

Conclusions: This study replicates Rucklidge et al. (2014b) showing the limited value of using serum nutrient levels to predict treatment response although we cannot rule out that other non-assayed nutrient levels may be more valuable. Additionally, no specific demographic or clinical characteristics, including MTHFR genetic status, were identified that would preclude children with ADHD from trying this treatment approach

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Psychiatry and Clinical Psychopharmacology. 2017;27:256-62.

BRIEF REPORT OF EFFICACY AND SIDE EFFECT PROFILE OF CROSSING OVER TO MODIFIED-RELEASE CAPSULES OF METHYLPHENIDATE IN ADHD PATIENTS RECEIVING OTHER TREATMENTS: CASE SERIES.

Özbaran B, K+Âse S, Ocako-ƒlu FT, et al.

OBJECTIVES: Stimulants are recommended as the first-line pharmacotherapy in attention deficit/hyperactivity disorder (ADHD). Methylphenidate (MPH) is the most used stimulant. Medikinet Retard has modified-release capsules of MPH (MRC-MPH). In this study, we aimed to report observations on a sample of outpatients, who had been previously treated with other agents, but switched to MRC-MPH treatment. These observations focus on the treatment course, efficacy, side effects, and switching reasons.

METHODS: We included 20 out of the 163 patients with ADHD, who were previously treated with other medications, and switched to MRC-MPH. Turgay DSM-IV Based Child and Adolescent Behavior Disorders Screening as diagnosing tool and Rating Scale, Barkley's Stimulants Side Effects Rating Scale for screening side effects and Clinical Global Impression Scale-Severity and-Improvement were administered.

RESULTS: Patients ages ranged between 9 and 17 years. Mean Clinical Global Impression Scale-Severity (CGI-S) score before the MRC-MPH treatment was 3.2, whereas after treatment it was 3.15. CGI-S scores were not significantly different (p = .593). Loss of appetite (n = 4, 20%) and drowsiness (n = 4, 20%) were the most common adverse events during the MRC-MPH treatment.

CONCLUSIONS: We did not observe significant difference between other treatment options and MRC-MPH with respect to efficacy. In terms of side effect profile, Osmotic Release Oral System-MPH was observed to be more problematic than immediate-release MPH and MRC-MPH formulations, while these two regimens did not differ significantly

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Psychiatry and Clinical Psychopharmacology. 2017;27:283-90.

GENDER DYSPHORIA AND ATTENTION PROBLEMS: POSSIBLE CLUE FOR BIOLOGICAL UNDERPINNINGS.

Yildirim B, Fis NP, Akgul GY, et al.

OBJECTIVES: Development of gender identity is a complicated process. Several biological, familial, environmental, and cognitive factors thought to play role during this process. When a person has a persistent discomfort with his/her assigned gender and exhibits cross-gender identification, gender dysphoria is to be considered. In this study, we aimed to determine the rates of psychiatric diagnoses in youth presenting with gender dysphoria and compare them with a control group in terms of family functioning, emotional, and behavioural problems.

METHODS: The study sample consisted of 20 cases with gender dysphoria and 40 controls (5ΓÇô 17 years of age). The instruments included were Sociodemographic Form, Family Assessment Device (FAD), Child Behavior Checklist, and Schedule for Affective Disorders and Schizophrenia for School Aged Children Present-Lifetime Version.

RESULTS: Ninety per cent of the cases with gender dysphoria had at least one psychiatric diagnosis. Attention-deficit/hyperactivity disorder (ADHD) (75%) was the leading comorbidity, followed by major depressive disorder (25%). Gender dysphoria group had significantly higher scores in communication, roles, affective involvement, and general family functioning subscales of FAD and in all Child Behavior Checklist subscales. High Child Behavior Checklist attention subscale score was significantly associated with the diagnosis of gender dysphoria in binary logistic regression analysis (odds ratio: 0.82; p < .001).

CONCLUSIONS: Our results pointed out a possible biological background for gender dysphoria, along with psychosocial/psychodynamic explanations. The individuals with gender dysphoria will benefit from an integrative approach where all possible contributing factors are considered. Therefore, in addition to

psychosocial and psychodynamic evaluation, assessment and interventions regarding ADHD will help to improve well-being and quality of life of these individuals

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Psychiatry and Clinical Psychopharmacology. 2017;27:99-100.

EFFECTIVENESS AND ADVERSE EFFECTS OF METHYLPHENIDATE TREATMENT IN CHILDREN DIAGNOSED WITH DISRUPTIVE MOOD DYSREGULATION DISORDER AND ATTENTION-DEFICIT HYPERACTIVITY DISORDER: A PRELIMINARY REPORT.

Ozyurt G, Emiroglu N, Baykara B, et al.

Objective: Comorbidity with attention deficit hyperactivity disorder (ADHD) and disruptive mood dysregulation disorders (DMDD) is very common in children and adolescents In this study, we aimed to present a retrospective study of methylphenidate (MPH) treatment in 12 cases who were diagnosed with DMDD and ADHD.

Method: All patients were followed-up in our outpatient clinic and the effectiveness and side effects of MPH were explored. Mood Symptom Questionnaire (MSQ-7) and Clinical Global Impression-Severity (CGI-S) were used for assessing the mood symptoms and their severity.

Results: The differences between initiation time and the end-point time in CGI-S and MSQ-7 scores were statistically significant.

Conclusion: In this present study, the usage of MPH was found to lead to an increase in irritability in children with ADHD and DMDD evidently

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Psychiatry and Clinical Psychopharmacology. 2018.

ATTENTION DEFICIT HYPERACTIVITY DISORDER AND ANTI-PURKINJE AUTOANTIBODIES: NO LINK?

Cetin FH, Cetin F, Isik Y, et al.

OBJECTIVES: Attention Deficit Hyperactivity Disorder (ADHD) is a neurobehavioral disorder that begins in early childhood, and many factors play role in its etiology. Many studies have been conducted to identify the causes of ADHD, but the exact factors are still unknown. Although cerebellar dysfunction in the etiology of ADHD was shown in different studies, the possible causes of dysfunction and the role of neuroinflammation among these causes has not been clarified yet. Anti-Yo is an antibody against the antigens in the cytoplasm of purkinje cells and indicates cerebellar degeneration, and Anti-Hu and Anti-Ri are antibodies against cellular nuclear antigens of purkinje cells. This study aimed to evaluate the role of neuroinflammation that is a potential cause of cerebellar dysfunction, which is thought to be an important factor in the development of ADHD.

METHODS: This is a cross-sectional and descriptive study that aimed to evaluate the potential association between ADHD and cerebellar neuroinflammation by comparing the serum anti-purkinje cell antibody measurements between case and control groups. The cases were recruited at the Gazi University Child Psychiatry Department, and laboratory analyses were performed at the Ankara Numune Research and Training Hospital Medical Microbiology Department. Sixty children and adolescents with ADHD, and 60 healthy controls were planned to be included in the study. Cases that admitted with ADHD symptoms were given Conners teacher forms according to routine procedure; then the cases with scores over the cut-off of Conners teacher form were evaluated clinically for a diagnosis of ADHD, and after clinical evaluations they were asked to participate the study if they met the eligibility criteria. If they accept to participate the study, informed consents were given to cases and parents, and meanwhile, Turkish version of Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version (K-SADS-PL) was also applied to cases. A 5-ml serum was spared from the blood samples that obtained for routine test during diagnosis. Control group was planned to be formed from the blood samples of 60 healthy children that admitted to child psychiatry clinic for counselling. At the time of analyses, diluted according to the directions of manufacturers, incubated with fluorescent staining including antibodies (Anti-Hu, Anti-Yo, and Anti-Ri), and evaluated under immunofluorescent microscope by three specialists.

RESULTS: Sixty healthy volunteers and 60 cases with ADHD were included in the study. Some of the samples were excluded from the study due to the damage to laboratory tubes during transport. Assessments were conducted with 52 ADHD and 52 healthy control samples. The male/female ratio was 41/11(78.8%/21.2%) in the patient group and 35/17 (67.3%/32.7%) in the control group (p = 0.185). Average age was 9.81 -¦ 2.41 in the patient group and 9.46 -¦ 2.14 in the control group (p = 0.442). No positive results were obtained for anti-Purkinje antibody in ADHD or control groups.
CONCLUSIONS: No evidence regarding the potential role of cerebellar neuroinflammation in the etiology of ADHD was determined in this study. But these results need replication in larger samples and different methods

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Psychiatry and Clinical Psychopharmacology. 2018.

CHILDHOOD PHYSICAL NEGLECT MAY IMPAIR PROCESSING SPEED IN ADULTS WITH ADHD: A CROSS-SECTIONAL, CASE-CONTROL STUDY.

Baran TZ, Cans-¦z A.

AIM: Higher rates of childhood trauma have been reported in both children and adults with adult attention deficit hyperactivity disorder (ADHD) than in healthy individuals. The association between childhood trauma and deficiency in cognitive functions in adults has been reported. One of the aims of our study was to compare childhood trauma reporting between adults with ADHD and healthy individuals. The second aim was to assess the difference in the cognitive function performance between traumatized and non-traumatized individuals in ADHD group as well as in the control group. Finally, the association between childhood trauma exposure and cognitive function in adults with ADHD was assessed.
METHODS: Fifty adults with ADHD and age, sex and years of education matched 50 healthy controls were administered a sociodemographic data form, Wender Utah rating scale (WURS), adult attention deficit hyperactivity disorder self-report scale (ASRS), childhood trauma questionnaire (CTQ), the structured clinical interview form for DSM-IV-TR Axis I Disorders (SCID-I). Both groups were also assessed by neuropsychological tests.
RESULTS: On the CTQ, patients with ADHD had a higher mean overall score than the control subjects, t(98) = 4.977, p <.001). Furthermore, ADHD patients reported significantly higher levels of childhood emotional abuse (t(98) = ΓêÆ4.986, p <.001), emotional neglect (t(98) = 5.105, p <.001) and physical neglect (t(98) = 2.663, p <.001) compared to controls. ADHD patients with a history of physical neglect performed worse in TMT-A than ADHD patients without a history of physical neglect. Based on correlation analysis, TMT Part A time had a significant positive relationship with emotional abuse and physical neglect (r =.382, p <.01; r =.281, p =.048) in ADHD group.
CONCLUSION: Adults with ADHD report higher rates of childhood trauma than healthy control individuals. Processing speed was slower only in the adults with ADHD who suffered from physical neglect than those who did not. A significant association was found between physical neglect and emotional abuse with processing speed in ADHD group. These findings could reflect the idea that both physical neglect and ADHD are related with processing speed weakness, with those who have both of these conditions having significantly greater problems on such measure than those with ADHD alone

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Psychiatry and Clinical Psychopharmacology. 2018;28:142-48.

PSYCHIATRIC DISORDERS, DEVELOPMENTAL, AND ACADEMIC DIFFICULTIES AMONG CHILDREN AND ADOLESCENTS AT-RISK FOR SCHIZOPHRENIA: A CONTROLLED STUDY.

Gumustas F, Kutuk EK, Yulaf Y, et al.

OBJECTIVE: The aim of this study was to determine whether there are differences in the presence of developmental delays, academic difficulties, and current mental disorders between offspring of parents with schizophrenia (High risk: HR) and offspring of parents with no mental illness (control group) up to the age of 16 years. The relationship of existing differences with psychosocial difficulties of having a parent with schizophrenia was evaluated.

METHOD: The sample of the study consisted of 35 HR and 30 control offspring aged 7ΓÇô16 years. All parents were assessed using the SCID-I by a psychiatrist and offspring using the K-SADS-PL by a child psychiatrist. Information about the early developmental stages and academic difficulties of children were obtained through interviews with healthy parents. Emotional and behavioural problem levels of children were determined by the Strengths and Difficulties Questionnaire (SDQ), Swanson, Nolan, and Pelham-IV Questionnaire (SNAP-IV), the Screen for Child Anxiety Related Emotional Disorders (SCARED), and the Child Depression Inventory (CDI). All assessments were adjusted for socio-demographic variables.
RESULTS: The rates of generalized anxiety disorders, delayed walking, delayed speech and reading difficulties, the levels of conduct problems (CP), depression, and school phobia were significantly higher in HR offspring than in control. When adjusted for socio-demographic variables, the presence of delayed speech and reading difficulties and only CP levels continued to be significantly higher in HR group ($p < .05$). These differences were not associated with gender of ill parent, duration of parental illness, and hospitalization in affected group ($p > .05$).
CONCLUSION: Internalizing problems such as anxiety and depression are considered as a psychosocial result of having a schizophrenic parent. The higher rates of speech delay, reading difficulties, and CP level might be genetically associated with schizophrenia

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Psychiatry and Clinical Psychopharmacology. 2018;28:332-34.
IMIPRAMINE-INDUCED MANIA IN A CHILD DIAGNOSED WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): A CASE REPORT.
Yektaş Ç, Tufan AE.
Children and adolescents treated with antidepressants (ADs) are at higher risk for developing hypomania and mania compared with adults. It was suggested that AD-induced mania represent a predisposition to bipolar disorder (BD) so it may accelerate the course of BD in this risky population. According to the literature, susceptibility to manic conversion with the use of ADs is higher in BD patients treated with tricyclic ADs compared with selective serotonin reuptake inhibitors (SSRIs) and placebo. Here, we report a six-year-old girl who was diagnosed with attention-deficit/hyperactivity disorder (ADHD) and primary nocturnal enuresis who developed manic symptoms after imipramine treatment. While using tricyclic antidepressants or SSRIs for different indications in the paediatric population, clinicians should be alert for the manic switch or behavioural activation symptoms, which may show a bipolar predisposition

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Psychiatry Res. 2018;269:652-57.
DISSECTING GENETIC CROSS-TALK BETWEEN ADHD AND OTHER NEURODEVELOPMENTAL DISORDERS: EVIDENCE FROM BEHAVIOURAL, PHARMACOLOGICAL AND BRAIN IMAGING INVESTIGATIONS.
Sengupta SM, Fotopoulos N, Devenyi GA, et al.
Several epidemiological and genetic studies have provided evidence of an overlap between neurodevelopmental disorders. However, the details of the etiological pathways remain to be elucidated. In this study, we garnered the findings of previous GWAS, conducted with schizophrenia and bipolar disorder. We conducted an exploratory study to examine the association between these SNPs and quantitative clinical/ behavioural/ cognitive/ structural brain parameters, as well as response to treatment with a fixed dose of methylphenidate, in a relatively large sample of children with ADHD. Family-based association tests were conducted with nine tag SNPs with 602 nuclear families. In addition, structural magnetic resonance imaging (sMRI) was conducted in a subset of children with ADHD (n = 76). Of the 9 tag SNPs examined, rs1602565 showed a significant association with ADHD, several dimensional measures and response to treatment. An association was also observed between rs1006737 (CACNA1C) and performance IQ. In addition, significant reductions in cortical thickness measurements were observed with the risk allele in rs1006737. These results

provide preliminary evidence for putative shared genetic vulnerability between childhood ADHD and other neurodevelopmental disorders

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Res Dev Disabil. 2018;83:142-52.

METACOGNITIVE KNOWLEDGE OF ATTENTION IN CHILDREN WITH AND WITHOUT ADHD SYMPTOMS.

Pezzica S, Vezzani C, Pinto G.

Children with ADHD (Attention Deficit Hyperactivity Disorder) experience difficulty in managing attention in school, but it is not sufficiently clear what their attentional beliefs are. Drawing is a means of expression that is habitually used to access knowledge or ideas of children regarding their classroom experience. The aim of this study is to verify whether children with ADHD use pictorial indicators analogous to children without ADHD (N-ADHD). 92 primary school students participated in this study, half of whom diagnosed with ADHD. Children were asked to produce two specific thematic drawings on attention vs. inattention; their pictorial representations were analyzed using the Children's Awareness of Attention through Drawing (CAAD). The analysis showed principally that children with ADHD have a metacognitive awareness of attention similar to N-ADHD except for a delay in acquisition of the correct posture, for less maturation in the management of school materials and greater expression of negative feelings over time. Children with ADHD are aware of what is required in the school context but they are not able to pursue it. Behavioral intervention and structured learning are two targets of intervention that can help children with ADHD to adapt and to stay at school

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Sch Psychol Q. 2018 Sep;33:390-98.

FACTOR STRUCTURE AND PREDICTIVE VALIDITY OF A HOMEWORK MOTIVATION MEASURE FOR USE WITH MIDDLE SCHOOL STUDENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD).

Langberg JM, Smith ZR, Dvorsky MR, et al.

Many students with attention-deficit/hyperactivity disorder (ADHD) exhibit deficits in motivation to pursue long-term goals. Students with ADHD have particular difficulty with motivation to complete homework-related tasks and often fail to complete assignments. Although these problems are common and may impact academic performance, no homework-motivation measures have been validated for use with students with ADHD. The primary goal of the present study was to evaluate the factor structure and predictive validity of a homework-motivation measure based upon the expectancy–value theory of achievement motivation. A sample of 285 middle school students with ADHD completed the measure, and confirmatory factor analysis was used to evaluate the proposed factor structure and associations with parent and teacher ratings of homework performance. A 2-factor structure emerged, and model fit was excellent. Further, student-rated ability–expectancy beliefs demonstrated significant associations with parent-rated homework problems and performance and with teacher-rated homework performance and percentage of assignments turned in above and beyond ADHD symptoms. Future directions for studying the importance of motivation in students with ADHD are provided, with particular attention to the role that reward sensitivity may play in motivation.

Impact and Implications—Deficits in motivation are thought to be a core underlying feature of attention-deficit/hyperactivity disorder (ADHD), and students with ADHD often struggle with motivation to complete homework. This study validated the expectancy–value measure of motivation for use with middle school students with ADHD as applied to homework completion. Students' beliefs about their homework abilities significantly predicted homework problems and performance from both the parent and teacher perspective

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Sleep Med. 2018;51:171-78.

NIGHTTIME MEDIA USE IN ADOLESCENTS WITH ADHD: LINKS TO SLEEP PROBLEMS AND INTERNALIZING SYMPTOMS.

Becker SP, Lienesch JA.

Objective: This study examined nighttime media use in relation to sleep problems and anxiety/depression symptoms in adolescents with attention-deficit/hyperactivity disorder (ADHD).

Methods: Participants were 81 adolescents (69% male) ages 13ΓÇô17 with ADHD. Adolescents completed measures assessing pubertal development, nighttime media use, circadian preference, and daytime sleepiness. Both adolescents and parents completed measures of sleep duration, sleep problems, and internalizing symptoms.
Results: When summing across media uses (eg, social networking, playing video games, watching television), the average nighttime media use (after 9:00PM) was 5.31 h. Overall, 63% of adolescents reported obtaining less than 8 h of sleep on school nights, and this percentage rose to 77% for parent-reported sleep duration. Moreover, adolescents obtaining less sleep than recommended had more nighttime media use than those obtaining ΓëÑ8 h of nightly sleep. Controlling for age, sex, pubertal development, stimulant medication use, and ADHD symptom severity; nighttime media use was associated with shorter sleep duration and increased sleep problems across both adolescent and parent report. Media use was also associated with greater adolescent-reported anxiety and depression, and marginally associated with eveningness circadian preference and greater daytime sleepiness. In considering specific anxiety dimensions, media use was associated with greater adolescent-reported panic symptoms and parent-reported generalized anxiety disorder symptoms.
Conclusions: Our findings suggest that nighttime media use may contribute to sleep problems and comorbid internalizing symptoms in adolescents with ADHD, although additional studies are needed to determine causality, potential bidirectional associations, and underlying mechanisms such as using media to (mis)manage negative emotions. Media use is important to assess and monitor and may be a significant intervention target when addressing sleep and internalizing problems, and possible underlying cognitive-emotional processes in adolescents with ADHD

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Translational Neuroscience. 2018;9:106-16.

EVALUATION OF TWO TYPES OF DRUG TREATMENT WITH QEEG IN CHILDREN WITH ADHD .

Aldemir R, Demirci E, Bayram AK, et al.

The aim of this study is to evalute the effects of methylphenidate and atomoxetine treatments on electroencephalography (EEG) signals in volunteer children diagnosed with Attention Deficit and Hyperactivity Disorder(ADHD). The study contained 40 children all of whom were between the ages of 7 and 17. The participants were classified into two groups as ADHD (n=20), which was in itself divided into two groups as ADHD-MPH (ADHD-Metylphenidate treatment) (n=10) and as ADHD-ATX (ADHD-Atomoxetin treatment) (n=10), and one control group (n=20). Following the first EEG recordings of the ADHD group, long-acting methylphenidate dose was applied to one ADHD group and atomoxetine dose was applied to the other ADHD group. The effect of optimal dosage is about for 4-6 weeks in general. Therefore, the response or lack of response to the treatment was evaluated three months after the beginning of the treatment. After methylphenidate and atomoxetine drug treatment, in order to obtain mean and maximum power values for delta, theta, alpha and beta band, the EEG data were analyzed. The EEG power spectrum densities in all the bands yielded similar findings in both methylphenidate and atomoxetine. Although statistically significant frequency values of the electrodes were amplitude and maximally varied, in general, they appeared mostly at both frontal and temporal regions for methylphenidate and atomoxetine. Especially, after atomoxetine treatment, Quantitative Electroencephalography (QEEG) rates at frontal area electrodes were found statistically more significant than methylphenidate QEEG rates. What has been researched in this study is not only whether QEEG is likely to support the diagnosis, but whether changes on QEEG by treatment may be related to the severity of ADHD as well

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Metacognitive knowledge of attention in children with and without ADHD symptoms

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ABSTRACT

Children with ADHD (Attention Deficit Hyperactivity Disorder) experience difficulty in managing attention in school, but it is not sufficiently clear what their attentional beliefs are. Drawing is a means of expression that is habitually used to access knowledge or ideas of children regarding their classroom experience.

The aim of this study is to verify whether children with ADHD use pictorial indicators analogous to children without ADHD (N-ADHD). 92 primary school students participated in this study, half of whom diagnosed with ADHD.

Children were asked to produce two specific thematic drawings on attention vs. inattention; their pictorial representations were analyzed using the Children's Awareness of Attention through Drawing (CAAD).

The analysis showed principally that children with ADHD have a metacognitive awareness of attention similar to N-ADHD except for a delay in acquisition of the correct posture, for less maturation in the management of school materials and greater expression of negative feelings over time.

Children with ADHD are aware of what is required in the school context but they are not able to pursue it. Behavioral intervention and structured learning are two targets of intervention that can help children with ADHD to adapt and to stay at school.

What this paper adds?

This research is one of the few studies that tries to identify knowledge of the concept of attention in ADHD participants compared to a matched control group of typically developing children, both attending the first and second cycle of primary school. Furthermore, this study explored the metacognitive awareness of inattention with children who have this specific deficit. To investigate attention and inattention awareness, the coding followed a new multicomponent model of metacognitive knowledge on attention/inattention i.e., the Children's Awareness of Attention through Drawing (CAAD) (Pezzica, Pinto, Bigozzi, & Vezzani, 2015), based on drawing performances of children.

1. Introduction

The importance of attention has been documented since the early stages of schooling (Rhoades, Warren, Domitrovich, & Greenberg, 2011). The ability to directly control attention influences the efficiency in information processing and improves learning.

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The invitation to assume an attentive attitude is one of the most common communications between teachers and students (Kannass, Colombo, & Wyss, 2010), mainly where performance is deficient. This is especially true in those cases in which attention is particularly disturbed as in the case of children with Attention Deficit Hyperactivity Disorder (ADHD). The school experience can be challenging for students with ADHD, as most of them perform poorer than expected (Rogers, Hwang, Toplak, Weiss, & Tannock, 2011; Taanila et al., 2014). and are at greater risk of dropping out (Kuriyan et al., 2013). School interventions such as behavioral class management have been found to effectively treat children with ADHD (Chronis, Jones, & Raggi, 2006; Pelham & Fabiano, 2008). Behavioral interventions include token reinforcement and response cost systems, both of which have been found to increase on-task behavior and work productivity in classroom settings (Power, Tresco, & Cassano, 2009). Some of the limits identified with behavioral approaches are that the effects appear to be limited to the treatment period and not all children respond positively to treatment. These limitations suggest the need to consider additional strategies and approaches.

Educational interventions have been found to positively affect academic skills (Purdie, Hattie, & Carroll, 2002). The metacognitive approach focuses on one's ability to recognize one's own cognitive functions and to monitor and self-regulate an on-going learning process. This approach has been seen to positively impact academic performance (Krebs & Roebers, 2010) and motivation (Efklides, 2011) in primary school as well as in secondary school (Dignath & Büttner, 2008). Studies have demonstrated that good students use metacognitive strategies while underachieving students do not (Cheng, 1993).

Metacognitive training has been found to improve academic performance such as mathematics reasoning (Kramarski & Mevarech, 2003) or comprehension in reading (Carretti, Caldarola, Tencati, & Cornoldi, 2014) and it has been successfully used with children with learning disabilities (Reid, 1996).

Regarding attention, metacognitive knowledge can be described as the knowledge people have about their attentional abilities (e.g., "I can concentrate for almost 15 min"), about cognitive strategies (e.g., "To concentrate I have to focus on the task and ignore the rest"), about tasks (e.g., "This task is long but I can divide it into a few steps"). Metacognitive control of attention refers both to the ability to monitor the direction of actions and thoughts as well as to control information processing through inhibitory control and resource allocation (Nelson & Narens, 1990).

Although metacognitive interventions on attention have shown encouraging results with children with ADHD (Harris, Danoff Friedlander, Saddler, Frizzelle, & Graham, 2005), research is still limited. Compared to behavioral interventions that are primarily focused on organizing an adaptive environment and responding properly to a child's behavior, the metacognitive approach includes capacities that enable the child to engage in independent, self-serving behavior (Tamm, Nakonezny, & Hughes, 2014). Self-monitoring procedures, for instance, are effective tools in improving academic behavior (Dunlap & Dunlap, 1989), and students trained in using cues to concentrate show a greater accuracy in sustained attention performance (O'Connell, Bellgrove, Dockree, & Robertson, 2006). Thus, metacognition can be a valuable tool in improving attention in children with ADHD (Alvarado, Puente, Jiménez, & Arrebillaga, 2011) but more research is needed to investigate their knowledge on the features of their attentional functioning in the school.

Every metacognitive intervention, in order to be meaningful and produce an improvement, should be grounded on the system of knowledge and beliefs of the participant. Children's drawings have gained renewed interest in the search for methods that align with the current conceptualization of children as strong social agents and effective cultural producers and have been used to access young children's views and experiences (Cox, 2005). Drawing is a way of expression that is habitually used by school children and has been found to be a valuable tool to access knowledge or ideas of children regarding their classroom experience (Maxwell, 2006; Tarchi & Pinto, 2015). In some recent research, pictorial representation was used in order to assess typically developing children's representation of attention in the classroom (Pezzica et al., 2015). Children were asked to produce two specific thematic drawings on attention vs. inattention, and their pictorial representations were analyzed using the Children's Awareness of Attention through Drawing (CAAD). This research revealed that primary school children are aware of what behaviors facilitate attention. For instance, they recognize that, contrary to what happens in the inattentive condition, in the attentive condition, the eyes are oriented to the task, and the children perform actions functional to their schoolwork. Moreover, children are able to recognize and use artefacts typical of the school environment (school equipment and school supplies) as a component of attention. Starting from the second cycle of primary school, children represent attention as a cognitive process linked to their inner speech. The study confirmed the pictorial representation as an useful tool which does not require language mediation and enables to collect data directly from the personal experience of the children in the classroom (Pezzica et al., 2015). Therefore, it would be interesting to use the same tool in order to explore metacognitive awareness on attention in children with ADHD.

1.1. Objectives

First aim of this study is to verify whether children with ADHD can use CAAD. Children with ADHD can be less accurate in their drawing performance due to motor impairment (Demers, McNevin, & Azar, 2013; Pitcher, Piek, & Hay, 2003) and impulsivity (Patros et al., 2015). Since the coding system of CAAD is not based so much on drawing abilities but on accessing concepts, we do not expect differences in the accessibility of the instrument between children with ADHD and typically developing children of the same age.

The second goal of this research is to verify whether, when asked to draw themselves doing a task attentively, children with ADHD use pictorial indicators (i.e., specific signs of attention – gaze, posture, etc.) analogous to children without ADHD in the same period of development (first and second cycle of primary school).

Previous studies on metacognition have shown that children with ADHD do not differ from typically developing children in the knowledge of memory and its strategic use, but such knowledge is not used properly because of executive dysfunction (Cornoldi, Barbieri, Gaiani, & Zocchi, 1999). In line with this research, we assume that children with ADHD exhibit sufficient knowledge of the

concrete features of concentration in the class. We expect children with ADHD to recognize their behavioral disposition to the task (pragmatic awareness). The attentive student should be represented with his eyes and actions oriented towards the task, in a proper posture using the specific elements of the school context (e.g., school supplies and school equipment).

We expect children with ADHD to be less aware of the more abstract features of attention and specifically in the ability to access to their self-talk (Günter, 2014) and emotions (Graziano & Garcia, 2016). According to previous studies (Pezzica et al., 2015), in the second cycle of primary school, children use speech balloons to express the contents of their minds during the attentive task. Children with ADHD are less able in organizing self-instructions for the on-going activity (Winsler, 1998), we therefore expect children with ADHD, compared to N-ADHD, to use fewer speech balloons.

With reference to the emotional features of attention, children aged 8–11 use well-being expression to characterize the attentive condition. Considering that children with ADHD are more likely to perceive and express their anger (Barkley & Fischer, 2010), we expect to find negative emotional expression both in the attentive then in the inattentive condition.

Regarding the social features of attention, children should be able to recognize the way in which a child's interaction with the teacher or schoolmate can be functional to attention but, for children with ADHD, we hypothesize that the teacher will be much more likely to be used as a scaffold for the attentive condition (Wiener & Daniels, 2015).

2. Material and methods

2.1. Participants

92 primary school students participated in this study, half of whom had been diagnosed with ADHD. Children with ADHD were compared to a matched control group of typically developing children. Primary school in Italy has a duration of 5 years, the first cycle is considered the first two years (the age of the children is between 5 and 8 years) and the second cycle the next three (the age of the children is between 8 and 11 years). The sample consisted of 78 males, 39 N-ADHD (14 in the first and 25 in the second cycle) and 39 ADHD (14 in the first and 25 in the second cycle), and in 14 females, 7 N-ADHD (2 in the first and 5 in the second cycle) and 7 ADHD (2 in the first and 5 in the second cycle).

The age of the participants was balanced, both for N-ADHD (males: 6.91 ± 0.89 for the first and 9.53 ± 0.78 for the second cycle; females: 6.73 ± 0.47 for the first and 9.77 ± 0.59 for the second cycle) and for ADHD (males: 6.83 ± 0.81 for the first and 9.74 ± 0.68 for the second cycle; females: 7.02 ± 0.65 for the first and 9.18 ± 0.77 for the second cycle).

All children from the clinical group had received a diagnosis of ADHD combined type by national health system clinics according to the DSM V criteria (APA, 2013). Participants were recruited from 10 public schools in urban areas of Tuscany. The study was approved by the Departmental Ethics Committee, Department of Psychology and followed the latest ethical standards for research i.e., the Declaration of Helsinki by the World Medical Association.

Table 1
The CAAD coding system: scales, definitions and nominal categories (Pezzica et al., 2015).

Scale	Definition	Nominal categories
Behavioural awareness	Pictorial indices that describe posture and action of the drawn subject.	Gaze Is the gaze direction of the drawn subject functional to the school task? Action Are the actions targeted to the task? Posture The drawn subject's position is it functional to the school task?
Pragmatic awareness	Pictorial indices relating to the description of the environment and materials related to the task.	School equipment (School desk and Blackboard) Is the school context used in a functional way? School supplies (pens, notebooks, books) Are specific tools for school used in a functional way? Inappropriate elements (games, balls, playing cards) In the field of action of the drawn subject are present tools that don't belong to the school context?
Cognitive awareness	Pictorial indices that describe the cognitive status of the drawn subject (thoughts)	State of mind (Speech Balloons expressing verbal communication, self speech or iconic thinking). Are the thoughts of the drawn subject functional to the attentive activity?
Social Awareness	Pictorial indices used to represent an interaction with another person	Interaction with the teacher Is the presence of the teacher represented in a way that is functionally attentive? Interaction with a classmate Are classmates represented in a way that is functional to attention?
Emotional awareness	Pictorial indices that describe the emotional feeling of the drawn subject	Facial expression Does the facial expression of the child expresses: Well-being? Negative emotions?

2.2. Coding system

Coding followed a multicomponent model of metacognitive knowledge on attention i.e., the Children's Awareness of Attention through Drawing (CAAD) (Pezzica et al., 2015). The CAAD consists of five scales, each composed of nominal categories (Table 1).

These categories were considered "functional" to describing a feature of the drawn figure that shows an attentive disposition, and "not-functional" when the drawn figure showed an inattentive disposition. For example, for gaze the code was functional where gaze is directed towards schoolwork, and not functional when it was directed elsewhere. Only for the "Inappropriate elements" nominal category, the coding system with the labelling "functional" of "not-functional" was not used but "present" when these pictorial elements were present in the drawing, and "not-present" when these elements were completely absent.

When CAAD categories were not applicable i.e., when the drawing could not be clearly labeled as "functional" or "not functional", it was coded as "unclear". For example, for gaze the code was unclear where the character is represented with the back turned or sitting up with the eyes hidden by details such as glasses.

2.3. Procedure

Participants performed two consecutive drawings on a standard size sheet of paper (21 x 29.7 cm) in about 60 min. Participants were allowed to use pencils, pens and markers. Participants were asked to draw on personal experience to a) draw themselves while they were doing a task in class attentively, and b) draw themselves while they were doing a task in class inattentively. The order in which the drawing tasks were proposed was alternated.

A trained psychologist, who was also one of the co-authors, before data collection started, briefly described the task to the participants, following the procedure laid out by (Pinto & Bombi, 2008).

2.4. Statistical analyses

In a first step, several 2 × 2 chi-square tests were carried out to analyze differences between the usage of several pictorial indicators between the two participant groups (*N_ADHD* vs. *ADHD*). In a second step, several 2 × 2 chi-square tests were used to analyze the statistical association between the membership at two school cycles (*first* vs. *second*) and the two participant groups (*N_ADHD* vs. *ADHD*) regard frequency of usage of the different pictorial indicators, considering together the frequencies of the two experimental conditions (*attentive* vs. *inattentive*).

In a third step, others 2 × 2 chi-square tests were carried out to check the association between different ways of usage (*functional* vs. *not functional*) of the several pictorial indicators and membership at the two participant groups (*N_ADHD* vs. *ADHD*), separately for each experimental condition (*attentive* vs. *inattentive*) and for each school cycle.

Adjusted standardized residuals were carried out to evaluate the presence of significant associations between observed frequencies in the two samples (*N_ADHD* vs. *ADHD*) and the respective theoretical frequencies, computed considering true the null hypothesis of absence of a significant relation between the different scales of pictorial categories and the sample membership. *W* coefficient was used for effect size (Cohen, 1988).

3. Results

3.1. Frequency of usage of the different pictorial indicators for N_ADHD and ADHD participants in the two different school cycles

Crosstabs were created to list frequencies for each CAAD pictorial indicator. Frequencies were organized by group (*N_ADHD* and *ADHD*) and scholastic cycle (*first* vs. *second*). Only two pictorial indicators were found to be significant. The *State of mind* pictorial indicator for the N_ADHD group was more likely to be present for the second cycle (std. residual = 3.5) than younger participants in the first cycle [χ^2 (1) = 12.48, p < .001, effect size w = .52]. Furthermore, the *School supplies* pictorial indicator for the ADHD group were more likely to be present for the second cycle (std. residual = 2.7) than younger participants in the first cycle [χ^2 (1) = 4.92, p < .05, effect size w = .39].

No difference was found between first and second cycle: Gaze, Action, Posture, School equipment Inappropriate elements, Interaction with the teacher, Interaction with a classmate and Facial expression are indicators that were used by all or almost all the participants, irrespective of school cycle, or experimental/control group.

The different percentage of use (functional + not functional) of the CAAD nominal categories is summarized in Table 2.

3.2. CAAD - behavioral awareness

The only significant difference between the N-ADHD and ADHD was, for the participants in the first cycle in the attentive condition, regarding *Posture* indicator [χ^2 (1) = 9.31, p < .01, effect size w = .54, $1\text{-}\beta$ = .86]. The analysis of the standardized residuals showed a greater functional usage of *Posture* in the N_ADHD (std. residual = 3.1) than in the ADHD group (Table 3). A coherent result was obtained for the first cycle sub-sample in the inattention condition [χ^2 (1) = 6.15, p < .05, effect size w = .44, $1\text{-}\beta$ = .70], in which more N_ADHD than ADHD participants used the *Posture* indicator in a not functional manner (std. residual = 2.5). No significant differences were obtained in the second cycle sub-group for all the behavioral awareness indicators.

Table 2
The frequency of the labels 'use' (functional + not functional), 'not present' and 'unclear' of several nominal categories for each scale of CAAD.

Nominal categories	First cycle						Second cycle					
	N-ADHD			ADHD			N-ADHD			ADHD		
	Use	Not Present	Unclear	Use	Not Present	Unclear	Use	Not Present	Unclear	Use	Not Present	Unclear
Gaze	96.9%	0%	3.1%	84.4%	13.6%	2%	100%	0%	0%	90.0%	8.8%	1.2%
Action	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Posture	100%	0%	0%	100%	0%	0%	100%	0%	0%	96.7%	3.3%	0%
School supplies	100%	0%	0%	65.6%	28.6%	5.8%	100%	0%	0%	95%	5%	0%
Inappropriate elements	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
State of mind	31.2%	68.8%	0%	31.2%	68.8%	0%	83.3%	16.7%	0%	46.7%	53.3%	0%
Interaction with the teacher	68.8%	30.1%	1.1%	37.5%	61.1%	1.4%	46.7%	49.8%	3.5%	46.7%	49.2%	4.1%
Interaction with a classmate	18.8%	79.7%	1.5%	31.2%	67.7%	1.1%	33.3%	64.2%	2.5%	36.7%	61.1%	2.2%
Facial expression	91.1%	8.9%	0%	87.5%	9.7%	2.8%	93.4%	6.6%	0%	88.4%	11.6%	0%

Note. ADHD = children with ADHD symptoms; N-ADHD: children without ADHD symptoms.

Table 3
Crosstabs between the behavioral awareness measures (*Gaze*, *Action* and *Posture*) and group membership (*N_ADHD* vs *ADHD*), both in the attention than in inattention condition, for the participants of the first school cycle: Chi-square test or Fisher Exact Test.

Condition						
	Attention			Inattention		
	N-ADHD	ADHD	p	N-ADHD	ADHD	p
Gaze						
Functional	14 (.1)	12 (-.1)	n.s.	3 (.3)	2 (-.3)	n.s.
Not functional	1 (-.1)	1 (.1)		13 (-.3)	12 (.3)	
Action						
Functional	16 (1.0)	15 (-1.0)	n.s.	1 (-1.1)	3 (1.1)	n.s.
Not functional	0 (-1.0)	1 (1.0)		15 (1.1)	13 (-1.1)	
Posture						
Functional	15 (3.1)	7 (-3.1)	.002	4 (-2.5)	11 (2.5)	.013
Not functional	1 (-3.1)	9 (3.1)		12 (2.5)	5 (-2.5)	

Note. ADHD = children with ADHD symptoms; N-ADHD: children without ADHD symptoms.

3.3. CAAD - pragmatic awareness

Regarding pragmatic awareness, for the first school cycle in the attention condition, *School equipment*, *School supplies* and *Inappropriate elements* indicators measured by the CAAD, no significant differences were found between N_ADHD and ADHD participants. For N_ADHD participants in the first cycle in the inattention condition, *Inappropriate elements* were used more frequently than

Table 4
Crosstabs between the contextual attentional measures (*School equipment*, *School supplies* and *Inappropriate elements*) and group membership (*N_ADHD* vs. *ADHD*), both in the attention than in inattention condition, for the participants of the first school cycle: Chi-square test or Fisher Exact Test.

Condition						
	Attention			Inattention		
	N-ADHD	ADHD	p	N-ADHD	ADHD	p
School equipment						
Functional	15 (.9)	10 (-.9)	n.s.	1 (-1.9)	5 (1.9)	n.s.
Not functional	1 (-.9)	2 (.9)		14 (1.9)	9 (-1.9)	
School supplies						
Functional	15 (1.0)	9 (-1.0)	n.s.	8 (-1.0)	7 (1.0)	n.s.
Not functional	1 (-1.0)	2 (1.0)		8 (1.0)	3 (-1.0)	
Inappropriate elements						
Present	2 (.6)	1 (-.6)	n.s.	7 (2.4)	1 (-2.4)	.041
Not present	14 (-.6)	15 (.6)		9 (-2.4)	15 (2.4)	

Note. ADHD = children with ADHD symptoms; N-ADHD: children without ADHD symptoms.

Table 5
Crosstabs between the contextual attentional measures (*School equipment*, *School supplies* and *Inappropriate elements*) and group membership (*N_ADHD* vs. *ADHD*), both in the attention than in inattention condition, for the participants of the second school cycle: Chi-square test or Fisher Exact Test.

Condition						
	Attention			Inattention		
	N-ADHD	ADHD	p	N-ADHD	ADHD	p
School equipment						
Functional	23 (.1)	18 (-.1)	n.s.	27 (1.9)	20 (-1.9)	n.s.
Not functional	7 (-.1)	6 (.1)		1 (-1.9)	5 (1.9)	
School supplies						
Functional	29 (3.3)	18 (-3.3)	< .001	10 (-1.3)	14 (1.3)	n.s.
Not functional	1 (-3.3)	11 (3.3)		20 (1.3)	14 (-1.3)	
Inappropriate elements						
Present	2 (.6)	1 (-.6)	n.s.	5 (.0)	5 (.0)	n.s.
Not present	28 (-.6)	29 (.6)		25 (.0)	25 (.0)	

Note. ADHD = children with ADHD symptoms; N-ADHD: children without ADHD symptoms.

for the first cycle ADHD participants in the same condition (std. residual = 2.4) [χ^2 (1) = 4.17, p < .05, effect size w = .43, $1\text{-}\beta$ = .68] (Table 4).

Regarding the second cycle participants, in the attention condition, the only significant difference between N_ADHD and ADHD participants was *School supplies* [χ^2 (1) = 10.89, p < .001, effect size w = .43, $1\text{-}\beta$ = .91] where N_ADHD participants were more likely to draw *School supplies* (std. residual = 3.3) in a functional manner than ADHD participants. For the inattention condition, no significant differences were found (Table 5).

3.4. CAAD - cognitive awareness

This specific category of CAAD was not differentiated between the clinical and control groups, nor between the two different school cycles, nor between the two experimental conditions.

3.5. CAAD - social awareness

Regarding the functional presence of the depiction of the teacher and classmates measured by CAAD, no significant result was obtained for the two different school cycles, either for attention or for the inattention experimental condition.

3.6. CAAD - emotional awareness

Regarding emotions, no significant differences were observed between N_ADHD and ADHD groups for the first cycle participants, whereas in the second cycle group, for the attention condition, the majority of N_ADHD primary school participants drew themselves with an expression of wellbeing (std. residual = 2.5) [χ^2 (1) = 4.56, p < .05, $1\text{-}\beta$ = .71], while ADHD participants only in a few cases. The effect-size was medium (w = .34). For the inattention condition, N_ADHD and ADHD participants did not differ (Table 6 Fig. 1).

4. Discussion

The aim of this research was to identify participant's knowledge of the concept of attention in first and second cycles of primary

Table 6
Crosstabs between the attentional emotional measures (*Facial expression*) and group membership (*N_ADHD* vs. *ADHD*), both in the attention than in inattention condition, for the participants of the second school cycle: Chi-square test.

Condition						
	Attention			Inattention		
	N-ADHD	ADHD	p	N-ADHD	ADHD	p
Facial expression						
Wellbeing	26 (2.5)	17(-2.5)	.012	22 (1.3)	17 (-1.3)	n.s.
Negative emotions	2 (-2.5)	9 (2.5)		6 (-1.3)	10 (1.3)	

Note. ADHD = children with ADHD symptoms; N-ADHD: children without ADHD symptoms.

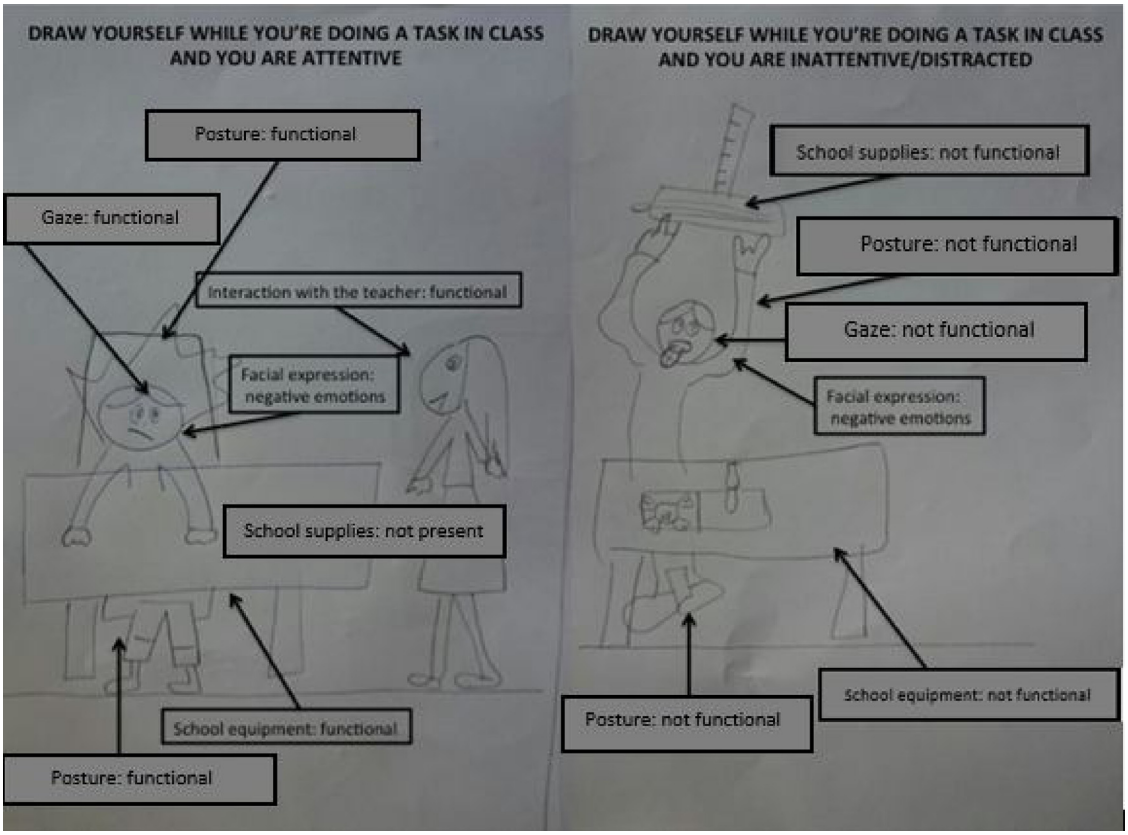

Fig. 1. Drawings and coding system of a third grade student from the ADHD group representing the attentive vs. inattentive condition.

school and assess whether this is specific to children with ADHD compared to a matched control group of typically developing children. Primary school in Italy has a duration of 5 years, the first cycle is considered the first two years (the age of the children is between 5 and 8 years) and the second cycle the next three (the age of the children is between 8 and 11 years).

The first aim of the research was to detect whether the CAAD was a pictorial tool accessible to all drawers regardless of age. For that purpose, in each group, the two school cycles were compared to detect if younger children were less able to use pictorial indicators. Differences between first- and second-cycle children were found in two codes: state of mind for N-ADHD group and school supplies for the ADHD group.

Children from the N-ADHD group represent their state of mind mainly in the second-cycle group. This result was already found in previous research (Pezzica et al., 2015) and it seems reasonable to attribute this difference, not so much to a graphical immaturity of younger children (first cycle), but to a conceptual frame describing different development stages of this specific knowledge. Typical developing children start to use verbs such as “think” and “know” from age 3 (Flavell, 1999), which can be considered early metacognitive elements of the higher-order thinking that develops later, becoming increasingly more explicit and managed through conscious control (Kuhn, 2000). Metacognition as a multidimensional construct includes different cognitive functions that develop differently according to the type of education and teaching (Schraw, 1998). Referring to attention, studies on metacognitive knowledge show different levels of awareness through the lifespan. Primary school students are initially aware of the perceptual characteristics of attention: e.g., “it's easy to get distracted in a noisy environment.” Only at a later time, from age 8, do they appear to develop greater awareness of the internal characteristics of this process that starts to be bonded to interest, motivation, and information processing (Pillow, 1989). Children come to be aware of the active and responsible use of their attentional process around 8–10 (Pezzica et al., 2015; Parault & Schwanenflugel, 2000). This may explain why the “state of mind” code in our sample is mainly represented by children of the second scholastic cycle in the N-ADHD group.

Starting from these premises, the absence of change between first and second scholastic cycle, found in the group with ADHD, becomes even more interesting. The percentages by which typically developing children and children with ADHD use this code are similar in the first cycle group, but in the ADHD group we did not find the progress that we would expect based on the evolution of the not clinical group. This data can be explained referring to the clinical characteristics of the disorder. Children with ADHD are easily distracted and their attention is often captured by off-task thoughts during an on-going task or activity, but they show an insufficient ability to be aware of distraction (Franklin et al., 2017) and activate executive-control (Castellanos et al., 2008). Moreover, they seem to be less prone to use internal language to organize and direct attention to the task (Alvarado et al., 2011). Up until now, there has been scarcely if any research on ADHD school performance from the perspective of metacognition. Based on

these results, it would be interesting to verify whether the difficulties in planning and managing attention would benefit from metacognitive strategies, enabling the student to recognize mind wandering and to internalize linguistic self-instruction.

The second difference between first and second cycle has been identified in the pictorial representation of school supplies in the ADHD group while no differences were found in the N-ADHD group. When children of the first cycle with ADHD are asked to represent themselves in the school environment, they do not focus on the specific tools used in that environment to support learning, unlike the N-ADHD group that showed a specific focalization on this aspect already during the first cycle. As children with ADHD experience a difficulty in organizing materials it is possible to argue that this is not represented in their mind and they become aware of the importance of this dimension when they become older, in the second cycle of primary school.

According to our results, the youngest and oldest children from the same group used most attentional codes assessed by CAAD in a similar way. This data supports the hypothesis that the indicators are not too difficult to perform even for children in the first cycle with ADHD.

The second research question explored the metacognitive awareness of inattention with children who have this specific deficit. According to our hypothesis, children with ADHD and N-ADHD have similar representations for attention vs. inattention at school. Differences were found in the timing of the acquisition of the correct posture, in the ability to organize educational tools and in the emotional state associated with the school.

Posture is a mode that defines how to behave at school and can be useful as an indicator of the attentive state. From the early years of schooling children from the N-ADHD group seem to differentiate their posture according to the attentive condition, conversely children of the first school cycle with ADHD seem to be unaware that a specific posture can be functional to the task. This information will be internalized later. Difficulties in self-regulated behavior persist in children with ADHD throughout the primary school but, starting from the second cycle their representation of the attentive vs. inattentive posture moves toward that of the N-ADHD group. We can therefore assert that children with ADHD have a delay in the representation of the attentive student condition as characterized by a specific posture. Self-monitoring systems are often used with student with behavior disorders to increase on-task behavior (Crum, 2004) but, in order to be implemented effectively, they should be routed on the specific knowledge of the child. Our findings stress the importance of improving the awareness of body and posture in children of the first school cycle with ADHD. From kindergarten on it would be useful to organize activities that support the pupils not only in improving the control of movements, but also in defining the most appropriate behavior to attention as different from that of inattention. In addition, in the administration of a command or rule, it might be useful to verify the child's awareness of his behavior. Once the representation of the expected behavior is acquired, the child does not lack information on expectations but experiences disregard of them. In this case, it may be useless to explain the already known rule, because it is not a problem of knowledge but an inability to follow it. It might be more opportune to support and organize the child's behavior using compensatory behavioral strategies that are found to be effective in the school setting (Fabiano et al., 2009). To combine metacognitive and behavioral interventions can be a way of setting clear and understandable limits and developing greater autonomy over time.

In this research, pictorial representation acquainted us with the mental space occupied by materials typically present in classrooms (school supplies, school equipment) in the construction of attentive behavior. The characterization of context is a typical element of pictorial execution that can instead be circumvented in a conversation. Even if children with ADHD have difficulties sitting at a school desk, their representation of this scholastic tool is not different from children in the N-ADHD group. The school desk, as part of school equipment, can be useful to define personal spaces and can be considered as a workstation for attention. It would be reasonable to guess that the school desk is the tool that denotes the belonging to the student role just like a rifle for a soldier or a ship for a sailor. Paraphrasing the field theory (Lewin, 1939), we could say that the specific characteristics of the environment are a primitive organizer that, interacting with the student, produces the school mental space. Children with ADHD, however, even if they recognize their student identity in the school desk, at the same time they have difficulties in using the spatial boundary that it delimits constructively. While typically developing children consider the organization of their materials fundamental information of being attentive in school, children with ADHD do not have this awareness, or probably they are not able to pursue it. Difficulties in the organization of materials in primary school have been shown to predict grade point average in high school (Langberg et al., 2011) while improvements in organizational skills mediated the relationship between improvement in ADHD symptoms and academic skills (Pfiffner, Villodas, Kaiser, Rooney, & McBurnett, 2013). The appropriate use of the educational tools and, more generally, the implementation of tools that can serve as study organizers should be considered subject to intervention starting from the organization of their own knowledge. The child with ADHD is able to recognize that there is a correct position of attention at school, a position that probably he cannot maintain for prolonged times, but which remains in his representation of attention. With respect to materials instead, there seems to be a lack of knowledge, or at least they are not given the importance they deserve.

Typically developing children seem to be better organized even in inattention as they know that extra-school items can be interesting tools associated with inattention. Children with ADHD, on the other hand, seem to be less aware of what the sources of distraction are; they do not connect attention with the object of attention probably because they get easily distracted in different ways.

Self-representation, through drawing of facial expressions, can lead to an emotional characterization of the protagonist in that specific situation. The data on 'Emotional Awareness' show a different pattern in children in the first and second cycles. From the age of four, children are able to represent different emotional manifestations such as joy and sadness (Brechet, Baldy, & Picard, 2009). Despite this, children in the first cycle from both groups chose to mainly represent a happy facial expression in the two proposed conditions (attention/inattention). This result may be attributable to the tendency to resort to the canonical representation of the face (smiling) when not explicitly instructed to produce different emotional expressions. Differences between groups are found in children in the second cycle showing a greater propensity in the ADHD group to characterize the attentive condition with negative emotions.

This could probably be attributable to the fatigue associated with this process. It is interesting to note that in the inattentive condition the number of negative feelings expressed by the N-ADHD group increases, while the percentage of children with ADHD who expresses negative emotions remains almost unchanged. According to this data, children in the second cycle without a diagnosis do associate a specific feeling of pleasure to the attention condition, while children with ADHD seem to be generally less happy to be represented in the school. ADHD is associated with poorer long-term self-esteem outcomes compared with non-ADHD (Harpin, Mazzone, Raynaud, Kahle, & Hodgkins, 2016) therefore intervention should take into account the reinforcement of adequate feelings of self-esteem and competence, enhancing awareness of the abilities and potentials (Hanć & Brzezińska, 2009).

No differences between groups were found in the state of mind representation but it is interesting to note that in both groups the children do not use the description of the internal language to represent the attentive condition. Internal language is predominantly represented in the distraction condition. This result is counterintuitive. Considering that language is often thought to play a pivotal role in organizing complex thoughts and action (Vygotsky, 1986), it is critical during complex sequencing demands (Baddeley, Chincotta, & Adlam, 2001), it may be recruited as a tool for retrieving and activating the relevant task goal (Miyake, Emerson, Padilla, & Ahn, 2004), to comment on events (McGonigle-Chalmers, Slater, & Smith, 2014). From a Vygotskian perspective, the internalization of private speech represents the transition from the external social regulation of behavior to the use of speech as a tool to regulate and guide one's own behavior and cognition (Cragg & Nation, 2010). Private speech is considered to be developmentally related to executive functions that are considered an important component of the complex neuropsychology of ADHD (Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). In order to counteract apparent delays in verbal strategy use, (Rosenzweig, Krawec, & Montague, 2011) teachers could encourage its use by providing children with instructions that they can repeat themselves (Diamond & Lee, 2011; Diamond, Barnett, Thomas, & Munro, 2007; Winsler, Fernyhough, & Montero, 2009), but first of all they should help children to understand the connection between concentration and information processing or active thinking. Both the groups predominantly draw the state of mind code in the inattentive condition, hinting at the idea that private thought could be primarily a means of escape from the commitment. To reflect on learning can be considered costly in terms of cognitive energy and distant from one's own goals; establishing a system of verbal instructions in a previously defined mode can sometimes improve performance but increases the student's liabilities and the perception of not belonging (Diaz & Berk, 1995). To promote a representation of themselves as students that are able to think, it is necessary to consolidate the perception of mastery and to sew the intervention on the effective children's resources and needs recognizing their strategies and their ability to engage in a social and scaffold process (Alderson-Day & Fernyhough, 2015).

No differences between groups were found in the representations of the social actors usually involved in the school context. All the children worked mainly on the codes referred to the self or to the environment. In this way, they did not recognize the function of the teacher as source of support. Social interaction, acts as a facilitating tool for the development of learning. This especially happens in the context of interaction between a more competent subject, who can be a teacher or a child of the same age, and a child that is not yet sufficiently competent to operate effectively on his own. In this case the most experienced (although in different degrees of capacity) may support cognitive activity of the other simplifying the setting, focusing his attention on major aspects, suggesting metacognitive strategies. We would have expected that, especially in the inattentive condition, teachers were present to represent a kind of attentional reminder or to scaffolding behaviors and cognition.

5. Conclusions

Our analysis of the thematic drawings shows that children with ADHD have a metacognitive awareness of attention almost similar to N-ADHD except for delay in the acquisition of the correct posture, and for less maturation in the management of school materials and greater expression of negative feeling over time.

Typically, children find pleasure in being attentive, as this means achieving something positive i.e., to challenge themselves, increase their sense of value, gratify the teacher or make a new discovery. Children with ADHD do find pleasure in being attentive, rather they consider it as an expensive process that will probably not result rewarding consequences (CIT). Through the pictorial instrument, children with ADHD seem to communicate their emotional difficulties associated with the school environment. From a metacognitive point of view, they are aware of what is required in the school context but they probably are not able to pursue it. Behavioral intervention and structured learning are two targets of intervention that can help children with ADHD to adapt and to stay at school. The next step is to reflect on how they stay at school: recognition and clarification of what a student feels and thinks helps him to maintain respect for himself and give the possibility of feeling syntonic with the environment. This means working first of all on the idea of classrooms as a relational setting for development and in recognizing the relationships and interactions with teachers as a means either to produce or inhibit developmental change to the extent that they engage, meaningfully challenge, and provide social and relational supports (Pianta, Hamre, & Allen, 2012).

Finally, for the moment a limitation is the absence of previous research that tested validity and reliability of CAAD. An important aim of future studies will be to carry out measures that verify these important aspects in typical and clinical samples with higher sample sizes. In our opinion, the results obtained in this research will be very precious to corroborate the importance of achieving future studies about the validity and reliability of CAAD.

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Ethical standards

The study was approved by the Departmental Ethics Committee, Department of Psychology and followed the latest ethical standards for research i.e., the Declaration of Helsinki by the World Medical Association. The study was approved by the Departmental Ethics Committee, Department of Education and Psychology, University of Florence, Italy.

All the children and their parents gave informed consent prior to their inclusion in the study.

All the authors of the present study declare that it has not been published before (neither in English nor in any other language), and that the paper is not currently under consideration for publication elsewhere.

Conflict of interest

The authors declare that they have no conflict of interest.

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Iniziativa nell'ambito del Progetto di Neuropsichiatria dell'Infanzia e dell'Adolescenza
(Delibera n. 406 - 2014 del 04/06/2014 Progetti NPI)
Il Progetto è realizzato con il contributo, parziale, della Regione Lombardia
(in attuazione della D.G. sanità n. 3798 del 08/05/2014, n. 778 del 05/02/2015, n. 5954 del 05/12/2016 e N. 1077 del 02/02/2017) Capofila Progetto: UONPIA Azienda Ospedaliera "Spedali Civili di Brescia" "*Percorsi diagnostico-terapeutici per l'ADHD*".

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