



NEWSLETTER



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1. Dalle banche dati bibliografiche

Vizzini L, et al.

MATERNAL ANXIETY, DEPRESSION AND SLEEP DISORDERS BEFORE AND DURING PREGNANCY, AND PRESCHOOL ADHD SYMPTOMS IN THE NINFEA BIRTH COHORT STUDY.

Epidemiol Psychiatr Sci. 2018;1-11

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COGNITIVE PROCESSES IN ADHD AND ASPERGER'S DISORDER: OVERLAPS AND DIFFERENCES IN PASS PROFILES.

J Atten Disord. 2017 Nov;21:1087-93

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FACE MEMORY AND FACE RECOGNITION IN CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW.

Neurosci Biobehav Rev. 2018;89:1-12

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2. Segnalazioni

Incontro, Progetto Regione Lombardia "Percorsi diagnostico-terapeutici per l'ADHD"

L'ANDAMENTO DEI FOLLOW UP NELL'AMBITO DEL PROGETTO REGIONALE ADHD.

16 maggio 2018 c/o IRCCS Istituto di Ricerche Farmacologiche Mario Negri, Milano

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Maurizio Bonati (a cura di)

PSICOFARMACI IN ETÀ EVOLUTIVA.

Il Pensiero Scientifico Ed. (edizione 2017)

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BIBLIOGRAFIA ADHD APRILE 2018

Accid Anal Prev. 2017 Dec;109:70-77.

HAZARD PERCEPTION SKILLS OF YOUNG DRIVERS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) CAN BE IMPROVED WITH COMPUTER BASED DRIVER TRAINING: AN EXPLORATORY RANDOMISED CONTROLLED TRIAL.

Bruce CR, Unsworth CA, Dillon MP, et al.

BACKGROUND: Young drivers with Attention Deficit Hyperactivity Disorder (ADHD) are at higher risk of road traffic injuries than their peers. Increased risk correlates with poor hazard perception skill. Few studies have investigated hazard perception training using computer technology with this group of drivers.

OBJECTIVES: *Determine the presence and magnitude of the between-group and within- subject change in hazard perception skills in young drivers with ADHD who receive Drive Smart training. *Determine whether training-facilitated change in hazard perception is maintained over time.

METHODS: This was a feasibility study, randomised control trial conducted in Australia. The design included a delayed treatment for the control group. Twenty-five drivers with a diagnosis of ADHD were randomised to the Immediate Intervention or Delayed Intervention group. The Immediate Intervention group received a training session using a computer application entitled Drive Smart. The Delayed Intervention group watched a documentary video initially (control condition), followed by the Drive Smart computer training session. The participant's hazard perception skill was measured using the Hazard Perception Test (HPT).

FINDINGS: After adjusting for baseline scores, there was a significant between group difference in post-intervention HPT change scores in favour of the Immediate Intervention group. The magnitude of the effect was large. There was no significant within-group delayed intervention effect. A significant maintenance effect was found at 6-week follow-up for the Immediate Intervention group.

CONCLUSIONS: The hazard perception skills of participants improved following training with large effect size and some maintenance of gain. A multimodal approach to training is indicated to facilitate maintenance. A full-scale trial is feasible

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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 Obstetrica et Gynecologica Scandinavica. 2018.

OBSTETRIC SYNTHETIC OXYTOCIN USE AND SUBSEQUENT HYPERACTIVITY/INATTENTION PROBLEMS IN DANISH CHILDREN.

Stokholm L, Juhl M, et al.

Introduction: The objective was to examine the association between obstetric synthetic oxytocin use and hyperactivity/inattention problems in offspring.

Material and methods: We identified children born in 2000-2003, enrolled in the Danish National Birth Cohort, with data on the Strengths and Difficulties Questionnaire (SDQ) reported by parents at age 7 (n = 33 896) and age 11 (n = 27 561) and the children themselves around age 11 (n = 27 251). Information on oxytocin administration was provided in the Medical Birth Register. We estimated mean differences and odds ratios for childhood hyperactivity/inattention problems according to oxytocin exposure.

Results: Synthetic oxytocin was administered in 26% of the deliveries. We did not find the use of synthetic oxytocin during birth to be associated with childhood hyperactivity/inattention problems, whether analyzed in linear or logistic regression models.

Conclusions: Our findings do not support any effects of obstetric use of synthetic oxytocin on hyperactivity/inattention problems in children when measured with the SDQ subscale at 7 or 11 years of age

Addict Behav. 2017 Feb;65:118-24.

CHILDHOOD TRAUMA EXPOSURE IN SUBSTANCE USE DISORDER PATIENTS WITH AND WITHOUT ADHD .

Konstenius M, Leifman A, van Emmerik-van OK, et al.

ADHD Atten Deficit Hyperact Disord. 2018;1-8.

PERFORMANCE-BASED MEASURES AND BEHAVIORAL RATINGS OF EXECUTIVE FUNCTION IN DIAGNOSING ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN.

Tan A, Delgaty L, Steward K, et al.

Deficits in real-world executive functioning (EF) are a frequent characteristic of attention-deficit/hyperactivity disorder (ADHD). However, the predictive value of using performance-based and behavioral rating measures of EF when diagnosing ADHD remains unclear. The current study investigates the use of performance-based EF measures and a parent-report questionnaire with established ecological validity and clinical utility when diagnosing ADHD. Participants included 21 healthy controls, 21 ADHD primary inattentive, and 21 ADHD combined type subjects aged 6-15 years. A brief neuropsychological battery was administered to each subject including common EF assessment measures. Significant differences were not found between groups on most performance-based EF measures, whereas significant differences ($p < 0.05$) were found on most parent-report behavioral rating scales. Furthermore, performance-based measures did not predict group membership above chance levels. Results further support differences in predictive value of EF performance-based measures compared to parent-report questionnaires when diagnosing ADHD. Further research must investigate the relationship between performance-based and behavioral rating measures when assessing EF in ADHD

ADHD Atten Deficit Hyperact Disord. 2018;1-11.

HOW DO CHILDREN WITH AND WITHOUT ADHD TALK ABOUT FRUSTRATION?: USE OF A NOVEL EMOTION NARRATIVE RECALL TASK.

Fogleman ND, Leaberry KD, Rosen PJ, et al.

Children with attention-deficit/hyperactivity disorder (ADHD) experience difficulties related to emotional reactivity and regulation. The current study examines differences in the emotional reactivity and regulation of children with and without ADHD in the context of their real-life experiences of negative emotion using a novel ecologically valid methodology. Eighty-three 8-12-year-old children (46 ADHD, 38 non-ADHD)

participated in the study. Children completed the negative emotion narrative recall task, a novel task whereby children provided a narrative recall of a real-life event where they experienced negative emotion. ANCOVA indicated children with ADHD recalled significantly more overall frustration and intense frustration than children without ADHD. Children with ADHD exhibiting more negative emotional reactivity while recalling negative emotions than children without ADHD. The current study suggests that children with ADHD are uniquely impacted by negative emotional experiences and represents an important step in understanding the emotional reactivity and regulation of children with ADHD

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American Journal of Geriatric Psychiatry. 2017;25:S65.

A DIAGNOSTIC DILEMMA: CO-MORBID ATTENTION DEFICIT HYPERACTIVITY DISORDER AND BIPOLAR DISORDER IN GERIATRIC PATIENTS.

Heard EN, Poscablo-Stein C, Sohail Y, et al.

Introduction: In the adult population, lifetime prevalence of comorbid Attention Deficit and Hyperactivity Disorder (ADHD) and Bipolar Disorder (BD) co-occur at rates of 17.6% [1]. Rates in the elderly population have not been well studied. Those who present with both disorders simultaneously present a diagnostic and treatment challenge. These challenges are present due to the overlapping symptomatology and the complications that can arise when treating these disorders inappropriately, with the major complication that treatment of ADHD with stimulants can induce mania.

Methods: Review of the literature regarding ADHD and bipolar disorder comorbidity and the treatment of comorbid these illnesses.

Results: A 64 year old Caucasian male presented to the outpatient clinic for treatment of ADHD and BD. During initial evaluation he endorsed symptoms most consistent with ADHD but not with BD. There was no family history of BD and no previous hospitalizations. He never had episodes of depression. His symptoms were not periodic, rather consistent since childhood. Neuropsychiatric testing was completed and confirmed the diagnosis of ADHD, thus mood stabilizer tapered off to discontinuation. He was eventually continued only on lisdexamfetamine (Vyvanse). He initially showed improvement in symptoms of hyperactivity, inability to focus, and was better able to complete tasks around the house. After a year of stimulant treatment, he presented with complaints of increased forgetfulness, decreased need for sleep, decreased concentration, worse distractibility, increased impulsivity, worsened irritability, and mood lability. On mental status exam he was hyperverbal, with mood lability, easily distracted, tangential, and psychomotor agitation. He did not have any delusions or hallucinations. He was recently started on opioids and these were discontinued. Medical work up was initiated due to a change in behavior. The work up, including a MRI of the brain, was negative. Vyvanse was tapered off and Divalproex Sodium was initiated with the plan to up titrate to symptom improvement. He was noted to have significant improvement of manic symptoms with these medication changes, however, hyperactivity and concentration again worsened. Additional neuropsychiatric testing was ordered.

Conclusions: This case illustrates the diagnostic difficulty and treatment of comorbid ADHD and BD. It demonstrates the need for a longitudinal history of these patients and close monitoring when initiating treatment. Additionally, it is important to recognize the intersection of these two disease entities and the appropriate management of both, especially in the geriatric population

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Am J Med Genet B Neuropsychiatr Genet. 2018 Apr;177:287-300.

SLC6A3 POLYMORPHISM AND RESPONSE TO METHYLPHENIDATE IN CHILDREN WITH ADHD: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Soleimani R, Salehi Z, Soltanipour S, et al.

Methylphenidate (MPH) is the most commonly used treatment for attention-deficit hyperactivity disorder (ADHD) in children. However, the response to MPH is not similar in all patients. This meta-analysis investigated the potential role of SLC6A3 polymorphisms in response to MPH in children with ADHD. Clinical trials or naturalistic studies were selected from electronic databases. A meta-analysis was conducted using

a random-effects model. Cohen's d effect size and 95% confidence intervals (CIs) were determined. Sensitivity analysis and meta-regression were performed. Q-statistic and Egger's tests were conducted to evaluate heterogeneity and publication bias, respectively. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) system was used to assess the quality of evidence. Sixteen studies with follow-up periods of 1–28 weeks were eligible. The mean treatment acceptability of MPH was 97.2%. In contrast to clinical trials, the meta-analysis of naturalistic studies indicated that children without 10/10 repeat carriers had better response to MPH (Cohen's d: -0.09 and 0.44, respectively). The 9/9 repeat polymorphism had no effect on the response rate (Cohen's d: -0.43). In the meta-regression, a significant association was observed between baseline severity of ADHD, MPH dosage, and combined type of ADHD in some genetic models. Sensitivity analysis indicated the robustness of our findings. No publication bias was observed in our meta-analysis. The GRADE evaluations revealed very low levels of confidence for each outcome of response to MPH. The results of clinical trials and naturalistic studies regarding the effect size between different polymorphisms of SLC6A3 were contradictory. Therefore, further research is recommended

Am J Med Genet Part B Neuropsychiatr Genet. 2018.

DELINEATING THE PSYCHIATRIC AND BEHAVIORAL PHENOTYPE OF RECURRENT 2Q13 DELETIONS AND DUPLICATIONS.

Wolfe K, McQuillin A, Alesi V, et al.

Recurrent deletions and duplications at the 2q13 locus have been associated with developmental delay (DD) and dysmorphisms. We aimed to undertake detailed clinical characterization of individuals with 2q13 copy number variations (CNVs), with a focus on behavioral and psychiatric phenotypes. Participants were recruited via the Unique chromosomal disorder support group, U.K. National Health Service Regional Genetics Centres, and the DatabasE of genomIc variation and Phenotype in Humans using Ensembl Resources (DECIPHER) database. A review of published 2q13 patient case reports was undertaken to enable combined phenotypic analysis. We present a new case series of 2q13 CNV carriers (21 deletion, 4 duplication) and the largest ever combined analysis with data from published studies, making a total of 54 deletion and 23 duplication carriers. DD/intellectual disabilities was identified in the majority of carriers (79% deletion, 70% duplication), although in the new cases 52% had an IQ in the borderline or normal range. Despite the median age of the new cases being only 9 years, 64% had a clinical psychiatric diagnosis. Combined analysis found attention deficit hyperactivity disorder (ADHD) to be the most frequent diagnosis (48% deletion, 60% duplication), followed by autism spectrum disorders (33% deletion, 17% duplication). Aggressive (33%) and self-injurious behaviors (33%) were also identified in the new cases. CNVs at 2q13 are typically associated with DD with mildly impaired intelligence, and a high rate of childhood psychiatric diagnoses-particularly ADHD. We have further characterized the clinical phenotype related to imbalances of the 2q13 region and identified it as a region of interest for the neurobiological investigation of ADHD

Ann Med Psychol (Paris). 2018 Mar;176:243-48.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND CHILDHOOD-ONSET SCHIZOPHRENIA: COMPLEXITY OF THE DIFFERENTIAL DIAGNOSIS.

Saglier C.

Introduction: Attention-Deficit/Hyperactivity Disorder is a neurodevelopmental disease underlain by cognitive deficits. Establishing an Attention-Deficit/Hyperactivity Disorder diagnosis in children is difficult, because attention symptoms, hyperactivity and impulsivity are common to several other pathologies like childhood-onset schizophrenia. Thus, Attention-Deficit/Hyperactivity Disorder can be considered in literature like a prodromal symptom of childhood-onset schizophrenia.

Objectives: This paper is meant to show the complexity of the differential diagnosis of Attention-Deficit/Hyperactivity Disorder and childhood-onset schizophrenia in prodromal phase, two pathologies sharing symptomatic connections. By investigating their behavioral, developmental and cognitive similarities and dissimilarities, we bring to light specific indicators enabling to distinguish among them as part of a differential diagnostic approach.

Methods: The field's international literature has been critically reviewed using ScienceDirect, Google Scholar, PubMed and Cairn Info.

Results: It seems difficult to isolate behavioral, developmental or cognitive indicators specific to each pathology. Furthermore, neuropsychological evaluations appear to provide little in favor of an easy discrimination between Attention-Deficit/Hyperactivity Disorder and childhood-onset schizophrenia. However, the combined use of some of the neuropsychological tests and projective testing, the use of CBCL and K-SADS questionnaires, or social cognitions investigations could provide valuable clues when establishing the differential diagnosis. Finally, psychopathological family antecedents and pediatric investigations could contribute to differentiate ADHD and childhood-onset schizophrenia.

Conclusions: Differential diagnosis between Attention-Deficit/Hyperactivity Disorder and childhood-onset schizophrenia in prodromal phase requires multiple investigations in the medical and psychological domains to avoid confusion

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Arch Dis Child. 2018;103:A192.

CO-OCCURRENCE AND CO-MORBIDITIES AMONG CHILDREN AND ADOLESCENTS WITH ADHD AND ASD IN A SCOTTISH LOCAL AUTHORITY.

Ogundele MO.

ADHD is the commonest childhood neuro-behavioural disorder, affecting 5% to 12% of school-age children and about 1% of children meet the criteria for ASD. Co-occurrence of ASD and ADHD is increasingly recognised after introduction of DSM-5. They both share difficulties with emotional control, attention and high levels of negative affect, with differing underlying motivational and behavioural tendencies. Objectives We analysed the clinical characteristics of children and young people with ADHD and ASD audited within two Community Child Health clinics of a Scottish NHS Trust over a 12 month period. Methods A retrospective review of all patients seen in the outpatient clinics between June 2016 and May 2017 within an NHS Region was carried out. ADHD was diagnosed using validated Swanson, Nolan, and Pelham-IV Questionnaire (SNAP-IV). Sleep problems were diagnosed empirically from detailed clinical history provided by the parents/carers/patients. ASD was diagnosed by a multidisciplinary approach involving detailed assessment individually by the Educational Psychologist, Clinical Psychologist, Speech and Language Therapist and the Community Paediatrician, followed by group discussion, using the ICD-10 checklist criteria to confirm or refute a Diagnosis. Results ASD and ADHD constituted 13% and 17% of the clinic caseloads respectively. They presented with similar characteristics including male gender preponderance (4.3:1 and 4.5:1), proportion of new referrals (20% and 18%) and discharges (22% and 19%) respectively. 19% of ASD children had ADHD while 14% of ADHD children had ASD. They had a similar range of co-morbidities but sleep, emotional problems and DCD were commoner among ADHD patients (52%, 25% and 19% vs 44%, 17% and 9% respectively). CAMHS and General Paediatricians were more commonly involved with ADHD patients (33% and 14% vs 20% and 6%) than ASD children. ASD patients were equally distributed between young (5-9 years) and older school age (10-14 years) children (20% and 18% respectively) while most ADHD patients were chiefly older (10-14 years). ADHD patients were on average 20 months older, attended more clinics (average 2.2 vs 1.6) and had higher number of co-morbidities (average 2.3 vs 1.6). Table 1 summarises the clinical and epidemiological characteristics of children and adolescents with ADHD and ASD

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Arch Dis Child. 2018;103:A190-A191.

MANAGEMENT OF SLEEP DIFFICULTIES AMONG A COHORT OF CHILDREN WITH ADHD IN A SCOTTISH LOCAL AUTHORITY.

Ogundele MO.

An estimated 25%-50% of children and adolescents with ADHD are known to experience problems with sleep, which is approximately five-fold that of healthy controls. ADHD-related sleep problems include high rates of daytime sleepiness, increased risk of sleep disordered breathing (50% vs 22% in controls), restless legs syndrome and periodic leg movement disorder. Sleep deprivation may mimic AND exacerbate many

symptoms of ADHD, impair scholastic performance and cause memory problems. Aims We aimed to analyse the prevalence of ADHD and sleep problems among children and young people seen within local Community Child Health clinics of a Scottish NHS Trust over a 12 month period. Methods A retrospective review of all patients seen in the outpatient clinics between June 2016 and May 2017 in two different clinics within NHS Fife was carried out. ADHD was diagnosed using validated Swanson, Nolan, and Pelham-IV Questionnaire (SNAP-IV). Sleep problems were diagnosed empirically from detailed clinical history provided by the parents/carers and patients. Results 93 (17%) out of 543 children reviewed had ADHD. Prevalence of sleep difficulties was higher among the ADHD children (52%) compared to 30% in the whole cohort. A significantly higher proportion of ADHD patients with sleep problems were on treatment with Melatonin compared to those without ADHD (75% vs 56%). There was a statistically significant association between the degree of socioeconomic deprivation and the prevalence of ADHD and or sleep difficulties. The proportion of children with either or both ADHD and sleep difficulties living in the most deprived (Quintile 1) areas was four times higher than those from the most affluent areas (11.2% vs 2.8%). Conclusion Identification and effective management of daytime sleepiness, sleep-disordered breathing or problematic behaviours at bedtime and upon awakening at night can profoundly improve the symptoms of ADHD in children and adolescents. Evidence-based guidelines for the management of sleep problems in children with ADHD are urgently needed

Arch Dis Child. 2018;103:A191.

ADHD MANAGEMENT-A QUALITY IMPROVEMENT PROJECT.

Khan B, Rajendran G, Sylvester N, et al.

Attention Deficit Hyperactivity Disorder has an incidence of 3%-5% among school-going children; 60% of which will continue to have symptoms into adulthood. The aim of this project was to assess all aspects of service delivery to these children as per NICE guidelines at Mid Yorkshire Hospitals NHS Trust. Methods The first cycle was run retrospectively in September-November 2016. An audit tool was used that reviewed children attending clinics in August 2016. Patients with a diagnosis after 1 st January 2011 were included. The patients were reviewed for details at time of diagnosis or management. Following the audit, a form was developed to ensure that essential information was documented properly. The unit liaised with local services to improve parent and children workshops availability. A re-audit was run for patients attending in August 2017 using the same parameters to complete the audit loop. Results 74 patients were included in 2016, while 50 patients have been studied in 2017 (table 1). [Table Presented] Conclusion The project reveals improvement in compliance with NICE guidelines, particularly for monitoring of patients' BP on drug treatment, as well as better education for parents and children. However, parental training and child social skills training are not available to all families due to limited resources

Arch Dis Child. 2018;103:A201.

USING A SURVEILLANCE METHODOLOGY TO ESTIMATE THE INCIDENCE OF TRANSITION FOR YOUNG PEOPLE WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) REQUIRING ONGOING SUPPORT FROM CHILD TO ADULT SERVICES.

Eke H, Janssens A, Lynn RM, et al.

Aims The surveillance study is one stream of the ADHD in transition between children's services and adult services (CATCH-U) study and is run in collaboration with the British Paediatric Surveillance Unit (BPSU) and the Child and Adolescent Psychiatry Surveillance System (CAPSS) across the United Kingdom. It aims to quantify the need for young people with ADHD to transition from children's to adult services, describe this group of young people, estimate the proportion that successfully transition and describe the proportion experiencing optimal transition.

Methods Starting in November 2015 for 13 months, paediatricians and psychiatrists registered with BPSU/CAPSS (n=4500) reported monthly any patients seen with a diagnosis of ADHD, within 6 months of the age boundary of the service, requiring transition to an adult service to continue their ADHD treatment and

supervision. All clinicians reporting a case received a questionnaire to confirm eligibility and to gather further information. A follow up questionnaire was sent nine months after notification of an eligible case to establish the details and outcome of the transition.

Results 228 eligible cases were reported via BPSU and 138 via CAPSS, with initial questionnaire response rates of 91% and 67% respectively. Follow up questionnaire response rates were 67% and 60% respectively. There were no duplicate cases reported across both systems. Preliminary results indicate poor transition processes with less than 25% of clinicians holding a transition planning meeting, only 25% having a handover period and less than 50% having the referral to an adult service accepted; 50% were referred to a specialist adult ADHD service and 12% to primary care.

Conclusion Results indicate that patients requiring transition are not experiencing a smooth or successful process. The effectiveness of using a surveillance study methodology to estimate the incidence of transition is reported, as well as study findings. It is likely that results are an underestimate of the incidence of cases requiring transition to an adult service; it relies on clinicians reporting regularly and accurately, not all clinicians treating ADHD patients are registered with BPSU or CAPSS, and patients can be seen by other professionals not reporting via these systems

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Arch Dis Child. 2018;103:A190.

THE NEED AND RISE OF ADHD SERVICE IN A DGH SETTING.

Nelapatla S, Pulla V.

Aim There are no national or regional models of care in CAMHS or Paediatrics. To share our experience of our model of care in setting up and running ADHD service (fully compliant with NICE guidelines) for nearly 20 years, actively managing about 200 children per year in a borough with child population of 40 000. We will be presenting care pathway, customised templates, assessments, monitoring, resources, stake holder involvement, specialist nurse role, specialist and speciality trainee involvement and transtion arrangements to adult care. **Conclusion** Mental Health-The new epidemic needs novel ways and models of care. Our model demonstrates collaborative working, efficient use of limited NHS resources in ever increasing demand on Paedi-atric and CAMHS services

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Asian J Psychiatr. 2017 Aug;28:28-31.

PSYCHOLOGICAL DISTRESS AMONG COLLEGE STUDENTS IN KERALA, INDIA-PREVALENCE AND CORRELATES.

Ts J, Rani A, Menon PG, et al.

AIMS: To study the prevalence and correlates of psychological distress among college students in Kerala, India.

MATERIAL AND METHODS: 5784 students across 58 colleges were self-administered Kessler's Psychological Distress Scale (K10) and other standardized instruments.

RESULTS: The prevalence of psychological distress was 34.8% (Mild-17.3%; Moderate-9.2%; Severe-8.3%) with a female predominance. Students with psychological distress were more likely to report academic failures, substance use, suicidality, sexual abuse and symptoms of attention deficit hyperactivity disorder. Students with severe distress had higher morbidity.

CONCLUSIONS: Psychological distress is common among college students and its association with negative correlates suggests the need for early interventions

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Asian J Psychiatr. 2017 Aug;28:1-2.

X-LINKED ICTHYOSIS AND NEURODEVELOPMENTAL DISORDERS: A CASE REPORT AND REVIEW OF LITERATURE.

Gnanavel S, Hussain S.

The genetics of neurodevelopmental disorders have long intrigued clinicians and researchers alike. In this case report, we report a rare case of neurodevelopmental disorders associated with ichthyosis with an underlying SHOX (short stature homeobox) gene mutation

Asian J Psychiatr. 2017 Aug;28:51-56.

PROFILE OF TWO HUNDRED CHILDREN WITH AUTISM SPECTRUM DISORDER FROM A TERTIARY CHILD AND ADOLESCENT PSYCHIATRY CENTRE.

Kommu JVS, K R G, Srinath S, et al.

BACKGROUND: There is a recent trend of increase in diagnosis of Autism Spectrum Disorder in India. Till date, there are few retrospective and prospective Indian studies with limited sample sizes ranging from 16 to 94 children. With this background, we planned a retrospective chart review of all new cases of Autism Spectrum Disorder for a period of 1 year in our tertiary care child psychiatry centre.

METHODOLOGY: Objectives of this study were to compare the sociodemographic and clinical profile of children below and above 3 years of age and between those who were self-referred versus those referred by professionals.

RESULTS: Out of a total of 1957 case records, 201 children (10.3%) were diagnosed with Autism Spectrum Disorder. Male to female ratio was 4:1.2. Mean age of consultation was significantly higher in males. Seventy six percent had a comorbid disorder with Intellectual disability, Attention Deficit Hyperactivity Disorder and Epilepsy being the most common comorbidities. Most caregivers (92.5%) recognized symptoms by 3 years of age. Presenting complaint of poor social response was more prevalent in children <3 years and comorbidities in children above 3 years. Presenting complaint of speech delay was more common in children who were referred by professionals when compared with those who were self-referred.

DISCUSSION: There is a need to sensitize parents and professionals for early intervention and to standardize protocols for assessment and intervention

Autism. 2017 Jul;21:622-34.

LESSONS LEARNED: ENGAGING CULTURALLY DIVERSE FAMILIES IN NEURODEVELOPMENTAL DISORDERS INTERVENTION RESEARCH.

Ratto AB, Anthony BJ, Pugliese C, et al.

Low-income and ethnic minority families continue to face critical disparities in access to diagnostic and treatment services for neurodevelopmental conditions, such as autism spectrum disorder and attention deficit hyperactivity disorder. Despite the growing cultural diversity of the United States, ethnic minority children and families continue to be substantially underrepresented across research on neurodevelopmental disorders, and there is a particularly concerning lack of research on the treatment of these conditions in low-income and ethnic minority communities. Of note, there are currently no published studies on adapting autism spectrum disorder treatment for low-income Latino communities and relatively few studies documenting adapted treatments for children with attention deficit hyperactivity disorder in these communities. This article describes methodological considerations and adaptations made to research procedures using a Diffusion of Innovation framework in order to effectively recruit and engage low-income, ethnic minority, particularly Latino, families of children with neurodevelopmental disorders, in a comparative effectiveness trial of two school-based interventions for executive dysfunction

Autism Res. 2017 Jan;10:78-88.

THE AUTISM SYMPTOM INTERVIEW, SCHOOL-AGE: A BRIEF TELEPHONE INTERVIEW TO IDENTIFY AUTISM SPECTRUM DISORDERS IN 5-TO-12-YEAR-OLD CHILDREN.

Bishop SL, Huerta M, Gotham K, et al.

This study reports on the initial validation of the Autism Symptom Interview (ASI), School-Age, a brief (15-20 min) phone interview derived from questions from the Autism Diagnostic Interview-Revised (ADI-R). The ASI, School-Age was administered by interviewers with minimal training to parents of children ages 5 to 12 who had all been previously identified with (or referred for assessment of) ASD or another neurodevelopmental disorder. Children then underwent a comprehensive assessment to determine a best-estimate clinical diagnosis of ASD (n = 159) or non-ASD (e.g. language disorder, intellectual disability, ADHD; n = 130). Clinicians who conducted the assessments were blind to ASI results. ROC analyses compared ASI scores to clinical diagnosis. Due to the small number of participants with non-ASD diagnoses who were classified as nonverbal (i.e. not yet using phrases on a daily basis), it was not possible to assess sensitivity and specificity of the nonverbal algorithm in this sample. The verbal algorithm yielded a sensitivity of 0.87 (95% CI = 0.81-0.92) and a specificity of 0.62 (95% CI = 0.53-0.70). When used in conjunction with the Autism Diagnostic Observation Schedule (ADOS), sensitivity and specificity were 0.82 (95% CI = 0.74-0.88) and 0.92 (95% CI = 0.86-0.96), respectively. Internal consistency and test-retest reliability were both excellent. Particularly for verbal school age children, the ASI may serve as a useful tool to more quickly ascertain or classify children with ASD for research or clinical triaging purposes. Additional data collection is underway to determine the utility of the ASI in children who are younger and/or nonverbal

Autism Res. 2017 Jun;10:1155-62.

AGGRESSIVE BEHAVIORS AND TREATABLE RISK FACTORS OF PRESCHOOL CHILDREN WITH AUTISM SPECTRUM DISORDER.

Chen C, Shen YD, Xun GL, et al.

Aggressive behaviors of children with autism spectrum disorder (ASD) are common. We conducted this study to describe the aggressive mode of preschool children with ASD and examine the associations between specific aggressive behaviors and two treatable factors: sleep problems and attention deficit hyperactivity disorder (ADHD) symptoms. In total, 577 typically developing (TD) children and 490 children with ASD were investigated in this study. The Institute for Basic Research - Modified Overt Aggression Scale (IBR-MOAS) was used to assess aggressive behaviors. Children's social impairments, sleep problems and ADHD symptoms were also measured with specific scales. The total IBR-MOAS score was significantly higher (worse) in the TD group [4.47 (5.36)] than in the ASD group [3.47 (5.63), P = 0.004]. The aggressive modes differed between groups: when compared with each other, the TD group received higher scores on Verbal and Physical Aggression Toward Others (all P < 0.01), while the ASD group had higher scores on Physical Aggression Against Self (P = 0.006). The linear regression model demonstrated that the aggressive behaviors of children with ASD were significantly associated with two treatable factors: sleep problems and ADHD symptoms. These findings have substantial clinical implications: treatment of these two risk factors may be helpful in managing aggressive behavior in children with ASD

Autism Res. 2017 May;10:778-89.

THE INFLUENCE OF SEX AND AGE ON PREVALENCE RATES OF COMORBID CONDITIONS IN AUTISM.

Supekar K, Iyer T, Menon V.

Individuals with ASD frequently experience one or more comorbid conditions. Here, we investigate the influence of sex and age-two important, yet understudied factors-on ten common comorbid conditions in ASD, using cross-sectional data from 4790 individuals with ASD and 1,842,575 individuals without ASD. Epilepsy, ADHD, and CNS/cranial anomalies showed exceptionally large proportions in both male (>19%) and female (>15%), children/adolescents with ASD. Notably, these prevalence rates decreased drastically with age in both males and females. In contrast, the prevalence of schizophrenia increased with age affecting

a disproportionately large number of older (≥ 35 year) adult males (25%), compared to females (7.7%), with ASD. Bowel disorders showed a complex U-pattern accompanied by changes in sex disparity with age. These results highlight crucial differences between cross-sectional comorbidity patterns and their interactions with sex and age, which may aid in the development of effective sex- and age-specific diagnostic/treatment strategies for ASD and comorbid conditions

Basic Clin Neurosci. 2017;8:267-78.

FUNCTIONAL BRAIN CONNECTIVITY DIFFERENCES BETWEEN DIFFERENT ADHD PRESENTATIONS: IMPAIRED FUNCTIONAL SEGREGATION IN ADHD-COMBINED PRESENTATION BUT NOT IN ADHD-INATTENTIVE PRESENTATION.

Ghaderi AH, Nazari MA, Shahrokhi H, et al.

Introduction: Contrary to Diagnostic and Statistical Manual of Mental Disorders (DSM-5), fifth edition, some studies indicate that ADHD-inattentive presentation (ADHD-I) is a distinct diagnostic disorder and not an ADHD presentation.

Methods: In this study, 12 ADHD-combined presentation (ADHD-C), 10 ADHD-I, and 13 controls were enrolled and their resting state EEG recorded. Following this, a graph theoretical analysis was performed and functional integration and segregation of brain network was calculated.

Results: The results show that clustering coefficient of theta band was significantly different among three groups and significant differences were observed in theta global efficiency between controls and ADHD-C. Regarding the alpha band, a lower clustering coefficient was observed in control subjects. In the beta band, clustering coefficient was significantly different between the control and children with ADHD-C and also between ADHD-I and ADHD-C. The clustering coefficient, in the subjects with ADHD-C, demonstrated a rapid decline and was significantly lower than the subjects with ADHD-I and control.

Conclusion: Decreased clustering, in high thresholds, may be associated with hyperactivity while increased segregation in low thresholds with inattentiveness. A different functional network occurs in the ADHD-C brain that is consistent with several studies that have reported ADHD-I as a distinct disorder

Behav Ther. 2018.

BEHAVIORAL VERSUS NONBEHAVIORAL GUIDED SELF-HELP FOR PARENTS OF CHILDREN WITH EXTERNALIZING DISORDERS IN A RANDOMIZED CONTROLLED TRIAL.

Hautmann C, Dose C, Duda-Kirchhof K, et al.

Self-help interventions for parents, which have a behavioral basis, are considered to be an effective treatment option for children with externalizing disorders. Nonbehavioral approaches are widely used but have little empirical evidence. The main objective of this trial was to compare the efficacy of a behavioral and a nonbehavioral guided self-help program for parents. Families of children (aged 4-11 years) diagnosed with attention-deficit/hyperactivity disorder (ADHD) or oppositional defiant disorder (ODD) were randomized to either a behavioral or a nonbehavioral guided self-help program including 8 parenting booklets and 10 counseling telephone calls. The analyses considered the ratings of 5 informants: blinded clinician, therapist, participant, (her or his) partner, and teacher. Of the 149 families randomized to treatment (intention-to-treat sample [ITT]), 110 parents completed the intervention (per-protocol sample [PP]). For the 4 primary outcome measures (blinded clinician- and participant-rated ADHD and ODD) at post-assessment, the analysis revealed a treatment advantage for the behavioral group in blinded clinician-rated ODD symptoms (ITT: $d = 0.37$; PP: $d = 0.35$). Further treatment differences, all in favor of the behavioral group (ITT and PP), were detected in therapist ratings (i.e., ODD) and participant ratings (e.g., parental self-efficacy [only PP], negative parenting behavior, parental stress). In both samples, no differences were found at post-assessment for ratings of the partner and the teacher, or at the 12-month follow-up (only participant ratings available). Behavioral guided self-help shows some treatment advantage in the short term. No superiority over nonbehavioral therapy was detected 12 months after treatment termination

Biocybernetics and Biomedical Engineering. 2018;38:425-37.

THE ADHD EFFECT ON THE ACTIONS OBTAINED FROM THE EEG SIGNALS.

Yaghoobi KR, Azadi S, Keshavarzi P.

Attention-deficit/hyperactivity disorder (ADHD) is an important challenge in studies of children's ethology that unbalances the opposite behaviors for creating inattention along with or without hyperactivity. Nevertheless, most studies on the ADHD children, which employed the EEG signals for analyzing the ADHD influence on the brain activities, considered the EEG signals as a random or chaotic process without considering the role of these opposites in the brain activities. In this study, we considered the EEG signals as a biotic process according to these opposites and examined the ADHD effect on the brain activity by defining the dual sets of transitions between states in the complement plots of quantized EEG segments. The results of this study generally indicated that the complement plots of quantized EEG signal have a surprising regularity similar to the Mandala patterns compared to the chaotic processes. These results also indicated that the probability of occurrence of dual sets in the complement plots of ADHD children was averagely different ($p < 0.01$) from that of healthy children, so that the SVM classifier developed by these probabilities could significantly separate the ADHD from healthy children (99.37% and 98.25% for training and testing sets, respectively). Therefore, the complement plots of quantized EEG signals relevant to the ADHD children not only can quantify informational opposition caused by inattention, hyperactivity and impulsivity, but also these plots can provide remarkable information for developing new diagnostic and therapeutic techniques

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BMC Med. 2018 Jan;16:6.

ANTIDEPRESSANT USE DURING PREGNANCY AND RISK OF AUTISM SPECTRUM DISORDER AND ATTENTION DEFICIT HYPERACTIVITY DISORDER: SYSTEMATIC REVIEW OF OBSERVATIONAL STUDIES AND METHODOLOGICAL CONSIDERATIONS.

Morales DR, Slattery J, Evans S, et al.

BACKGROUND: Antidepressant exposure during pregnancy has been associated with an increased risk of autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) in several observational studies. We performed a systematic review of these studies to highlight the effect that important methodological limitations have on such analyses and to consider approaches to the conduct, reporting and interpretation of future studies.

METHODS: A review of MEDLINE and EMBASE identified case-control, cohort and sibling studies assessing the risk of ASD and ADHD with antidepressant use during pregnancy. Approaches to confounding adjustment were described. Crude and adjusted effect estimates for comparisons between antidepressant exposure during pregnancy vs. all unexposed women were first meta-analysed using a generic inverse variance method of analysis, followed by effect estimates for alternative pre-selected comparison groups.

RESULTS: A total of 15 studies measuring ASD as an outcome (involving 3,585,686 children and 40,585 cases) and seven studies measuring ADHD as an outcome (involving 2,765,723 patients and 52,313 cases) were identified. Variation in confounding adjustment existed between studies. Updated effect estimates for the association between maternal antidepressant exposure during pregnancy vs. all unexposed women remained statistically significant for ASD (adjusted random-effects risk ratio [RaRR] 1.53, 95% confidence interval [CI] 1.31-1.78). Similar significant associations were observed using pre-pregnancy maternal antidepressant exposure (RaRR 1.48, 95% CI 1.29-1.71) and paternal antidepressant exposure during pregnancy (1.29, 95% CI 1.08-1.53), but analyses restricted to using women with a history of affective disorder (1.18, 95% CI 0.91-1.52) and sibling studies (0.96, 95% CI 0.65-1.42) were not statistically significant. Corresponding associations for risk of ADHD with exposure were: RaRR 1.38, 95% CI 1.13-1.69 (during pregnancy), RaRR 1.38, 95% CI 1.14-1.69 (during pre-pregnancy), RaRR 1.71, 95% CI 1.31-2.23 (paternal exposure), RaRR 0.98, 95% CI 0.77-1.24 (women with a history of affective disorder) and RaRR 0.88, 95% CI 0.70-1.11 (sibling studies).

CONCLUSIONS: Existing observational studies measuring the risk of ASD and ADHD with antidepressant exposure are heterogeneous in their design. Classical comparisons between exposed and unexposed women during pregnancy are at high risk of residual confounding. Alternative comparisons and sibling

designs may aid the interpretation of causality and their utility requires further evaluation, including understanding potential limitations of undertaking meta-analyses with such data

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BMC Pediatr. 2017 Jul;17:173.

BRAIN BIOMARKERS AND PRE-INJURY COGNITION ARE ASSOCIATED WITH LONG-TERM COGNITIVE OUTCOME IN CHILDREN WITH TRAUMATIC BRAIN INJURY.

Wilkinson AA, Dennis M, Simic N, et al.

BACKGROUND: Children with traumatic brain injury (TBI) are frequently at risk of long-term impairments of attention and executive functioning but these problems are difficult to predict. Although deficits have been reported to vary with injury severity, age at injury and sex, prognostication of outcome remains imperfect at a patient-specific level. The objective of this proof of principle study was to evaluate a variety of patient variables, along with six brain-specific and inflammatory serum protein biomarkers, as predictors of long-term cognitive outcome following paediatric TBI.

METHOD: Outcome was assessed in 23 patients via parent-rated questionnaires related to attention deficit hyperactivity disorder (ADHD) and executive functioning, using the Conners 3rd Edition Rating Scales (Conners-3) and Behaviour Rating Inventory of Executive Function (BRIEF) at a mean time since injury of 3.1 years. Partial least squares (PLS) analyses were performed to identify factors measured at the time of injury that were most closely associated with outcome on (1) the Conners-3 and (2) the Behavioural Regulation Index (BRI) and (3) Metacognition Index (MI) of the BRIEF.

RESULTS: Higher levels of neuron specific enolase (NSE) and lower levels of soluble neuron cell adhesion molecule (sNCAM) were associated with higher scores on the inattention, hyperactivity/impulsivity and executive functioning scales of the Conners-3, as well as working memory and initiate scales of the MI from the BRIEF. Higher levels of NSE only were associated with higher scores on the inhibit scale of the BRI.

CONCLUSIONS: NSE and sNCAM show promise as reliable, early predictors of long-term attention-related and executive functioning problems following paediatric TBI

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BMC Pediatr. 2018;18.

PREVALENCE OF PROBABLE ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS: RESULT FROM A SPANISH SAMPLE OF CHILDREN.

Cerrillo-Urbina AJ, Garc+ja-Hermoso A, Mart+inez-Vizca+jno V, et al.

Background: The aims of our study were to: (i) determine the prevalence of children aged 4 to 6 years with probable Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms in the Spanish population; and (ii) analyse the association of probable ADHD symptoms with sex, age, type of school, origin (native or foreign) and socio-economic status in these children.

Methods: This cross-sectional study included 1189 children (4 to 6 years-old) from 21 primary schools in 19 towns from the Ciudad Real and Cuenca provinces, Castilla-La Mancha region, Spain. The ADHD Rating Scales IV for parents and teachers was administered to determine the probability of ADHD. The 90th percentile cut-off was used to establish the prevalence of inattention, hyperactivity/impulsivity and combined subtype.

Results: The prevalence of children with probable ADHD symptoms was 5.4% (2.6% inattention subtype symptoms, 1.5% hyperactivity/impulsivity subtype symptoms, and 1.3% combined subtype symptoms). Children aged 4 to 5 years showed a higher prevalence of probable ADHD in the inattention subtype symptoms and in total of all subtypes than children aged 6 years, and children with low socio-economic status reported a higher prevalence of probable ADHD symptoms (each subtype and total of all of them) than those with medium and high socio-economic status.

Conclusions: Early diagnosis and an understanding of the predictors of being probable ADHD are needed to direct appropriate identification and intervention efforts. These screening efforts should be especially addressed to vulnerable groups, particularly low socio-economic status families and younger children

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BMJ Open. 2017 Jun;7:e016244.

THE 2015 MIDDLE CHILDHOOD SURVEY (MCS) OF MENTAL HEALTH AND WELL-BEING AT AGE 11 YEARS IN AN AUSTRALIAN POPULATION COHORT.

Laurens KR, Tzoumakis S, Dean K, et al.

PURPOSE: The Middle Childhood Survey (MCS) was designed as a computerised self-report assessment of children's mental health and well-being at approximately 11 years of age, conducted with a population cohort of 87 026 children being studied longitudinally within the New South Wales (NSW) Child Development Study.

PARTICIPANTS: School Principals provided written consent for teachers to administer the MCS in class to year 6 students at 829 NSW schools (35.0% of eligible schools). Parent or child opt-outs from participation were received for 4.3% of children, and MCS data obtained from 27 808 children (mean age 11.5 years, SD 0.5; 49.5% female), representing 85.9% of students at participating schools.

FINDINGS TO DATE: Demographic characteristics of participating schools and children are representative of the NSW population. Children completed items measuring Social Integration, Prosocial Behaviour, Peer Relationship Problems, Supportive Relationships (at Home, School and in the Community), Empathy, Emotional Symptoms, Conduct Problems, Aggression, Attention, Inhibitory Control, Hyperactivity-Inattention, Total Difficulties (internalising and externalising psychopathology), Perceptual Sensitivity, Psychotic-Like Experiences, Personality, Self-esteem, Daytime Sleepiness and Connection to Nature. Distributions of responses on each item and construct demarcate competencies and vulnerabilities within the population: most children report mental health and well-being, but the population distribution spanned the full range of possible scores on every construct.

FUTURE PLANS: Multiagency, intergenerational linkage of the MCS data with health, education, child protection, justice and early childhood development records took place late in 2016. Linked data were used to elucidate patterns of risk and protection across early and middle child development, and these data will provide a foundation for future record linkages in the cohort that will track mental and physical health, social and educational/occupational outcomes into adolescence and early adulthood

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Br J Clin Pharmacol. 2018.

PATTERNS AND PROFILES OF METHYLPHENIDATE USE BOTH IN CHILDREN AND ADULTS.

Pauly V, Frauger E, Lepelley M, et al.

Aim: The aim of the present study was to characterize patterns of use of methylphenidate (MPH), a prescription stimulant medication recommended in the treatment of attention deficit hyperactivity disorder (ADHD) and of narcolepsy, in France, both in children and adults, over a 3-year period.

Methods: Using the French General Health Insurance database, limited to two areas covering approximately 4 million individuals, we made up a cohort of incident MPH users between July 2010 and June 2013. Splitting them into distinct age groups (18-24, 25-49 and 50 years of age for adults and <6, 6-11 and 12-17 years of age for children), we established the characteristics of these populations at MPH initiation and during follow-up according to the duration of treatment, quantities dispensed and coprescription with central nervous system (CNS) drugs.

Results: We included a cohort of 3534 incident users, involving 30238 dispensings of MPH, leading to an annual rate of 29 incident users per 100000 in 2013. Children (66% of new users) were characterized by long-term use of MPH with few comedications. The group of 25-49-year-old patients were dispensed MPH more frequently than other groups, had the highest mean dose and were more often coprescribed other CNS drugs. The 50 year-old group was more often coprescribed antidepressants and antiparkinsonian drugs.

Conclusions: Our pharmacoepidemiological study involving incident MPH users with a large number of characteristics showed different patterns of MPH use among children and adults. The results from the 25-49-year-old group suggested that MPH might be being used for medical conditions other than ADHD or narcolepsy in adults, and that it might be subject to misuse and/or abuse

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Br J Psychiatry. 2018;212:234-38.

RISK OF SUICIDE ATTEMPTS IN ADOLESCENTS AND YOUNG ADULTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER: A NATIONWIDE LONGITUDINAL STUDY.

Huang K-L, Wei H-T, Hsu J-W, et al.

Background: Attention-deficit hyperactivity disorder (ADHD) increases the risk of suicidal behaviours through psychiatric comorbidities; however, a significant direct association has not been observed between ADHD and suicide attempts.

Aims: To evaluate the risk of suicide attempt in adolescents and young adults with ADHD. Method: Using a nationwide, population-based insurance claims database, this longitudinal cohort study enrolled 20 574 adolescents and young adults with ADHD and 61 722 age- and gender-matched controls between 2001 and 2009. Any suicide attempt was identified from enrolment to 31 December 2011. The association between ADHD medications and the likelihood of suicide attempt was assessed.

Results: ADHD was an independent risk factor for any suicide attempt (hazard ratio = 3.84, 95% CI = 3.19-4.62) and repeated suicide attempts (hazard ratio = 6.52, 95% CI = 4.46-9.53). Subgroup analyses of men, women, adolescents and young adults demonstrated the same trend. Methylphenidate or atomoxetine treatment did not increase the risk of suicide attempt or repeated suicide attempts. Long-term methylphenidate treatment was associated with a significantly decreased risk of repeated suicide attempts in men (hazard ratio = 0.46, 95% CI = 0.22-0.97).

Conclusion: ADHD was a risk factor for suicide attempt and a stronger predictor of repeated suicide attempts, independent of comorbidities. Further investigation is warranted to explore the mechanism underlying the association between ADHD and suicidal behaviours

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Childs Nerv Syst. 2017 Aug;33:1373-78.

RELATIONSHIP OF SERUM FERRITIN LEVEL AND TIC SEVERITY IN CHILDREN WITH TOURETTE SYNDROME.

Ghosh D, Burkman E.

PURPOSE: Tics can be considered hyperkinetic movements akin to restless leg syndrome (RLS). Drawing the analogy of iron deficiency as an etiology of RLS, it is conceivable that iron deficiency may underlie or worsen tics in Tourette syndrome (TS). The purpose of this study was to evaluate the relationship between serum ferritin levels and tic severity, as well as consequent impact on life, in children with TS.

METHODS: Children <18 years, diagnosed with TS during 2009-2015, were reviewed. Only those with serum ferritin testing were included. The following data were collected: tic severity, impact on life, medication, comorbidities, blood count, and serum ferritin at diagnosis and follow-up.

RESULTS: In fifty-seven patients, M:F = 2:1, serum ferritin was 48.0 +/- 33.28 ng/mL, tic severity score 2.3 +/- 0.80, impact on life score 2.2 +/- 0.93, and composite score 4.57 +/- 1.6. Serum ferritin was not influenced by comorbid obsessive compulsive disorder (OCD), attention deficit hyperactive disorder (ADHD), or anxiety (P > 0.16). Thirty-eight percent with low serum ferritin (<=50 ng/mL) (n = 37) had severe tics (>5 composite score), compared with 25% in normal ferritin group (n = 20). Over 6-12 months, tic severity score improved in both iron treated groups, deficient (2.70 to 1.90) and sufficient (2.40 to 1.95), whereas tics worsened or remained the same when not treated with iron.

CONCLUSIONS: Our data suggest iron deficiency may be associated with more severe tics with higher impact on TS children, independent of the presence of OCD, ADHD, or anxiety. Iron supplementation showed a trend towards improvement of tic severity upon follow-up. We suggest a double-blind, placebo-controlled prospective study to reach a definite conclusion

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Chin Med J (Engl). 2017 Jul;130:1513-20.

EFFECT OF AN ECOLOGICAL EXECUTIVE SKILL TRAINING PROGRAM FOR SCHOOL-AGED CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A RANDOMIZED CONTROLLED CLINICAL TRIAL.

Qian Y, Chen M, Shuai L, et al.

BACKGROUND: As medication does not normalize outcomes of children with attention deficit hyperactivity disorder (ADHD), especially in real-life functioning, nonpharmacological methods are important to target this field. This randomized controlled clinical trial was designed to evaluate the effects of a comprehensive executive skill training program for school-aged children with ADHD in a relatively large sample.

METHODS: The children (aged 6-12 years) with ADHD were randomized to the intervention or waitlist groups. A healthy control group was composed of gender- and age-matched healthy children. The intervention group received a 12-session training program for multiple executive skills. Executive function (EF), ADHD symptoms, and social functioning in the intervention and waitlist groups were evaluated at baseline and the end of the final training session. The healthy controls (HCs) were only assessed once at baseline. Repeated measures analyses of variance were used to compare EF, ADHD symptoms, and social function between intervention and waitlist groups.

RESULTS: Thirty-eight children with ADHD in intervention group, 30 in waitlist group, and 23 healthy children in healthy control group were included in final analysis. At posttreatment, intervention group showed significantly lower Behavior Rating Inventory of Executive Function (BRIEF) total score (135.89 +/- 16.80 vs. 146.09 +/- 23.92, $P=0.04$) and monitoring score (18.05 +/- 2.67 vs. 19.77 +/- 3.10, $P=0.02$), ADHD-IV overall score (41.11 +/- 7.48 vs. 47.20 +/- 8.47, $P<0.01$), hyperactivity-impulsivity (HI) subscale score (18.92 +/- 5.09 vs. 21.93 +/- 4.93, $P=0.02$), and inattentive subscale score (22.18 +/- 3.56 vs. 25.27 +/- 5.06, $P<0.01$), compared with the waitlist group. Repeated measures analyses of variance revealed significant interactions between time and group on the BRIEF inhibition subscale ($F=5.06$, $P=0.03$), working memory ($F=4.48$, $P=0.04$), ADHD-IV overall score ($F=21.72$, $P<0.01$), HI subscale score ($F=19.08$, $P<0.01$), and inattentive subscale score ($F=12.40$, $P<0.01$). Multiple-way analysis of variance showed significant differences on all variables of BRIEF, ADHD-rating scale-IV, and WEISS Functional Impairment Scale-Parent form (WFIRS-P) among the intervention and waitlist groups at posttreatment and HCs at baseline.

CONCLUSIONS: This randomized controlled study on executive skill training in a relatively large sample provided some evidences that the training could improve EF deficits, reduce problematic symptoms, and potentially enhance the social functioning in school-aged children with ADHD.

CLINICAL TRIAL REGISTRATION: <http://www.clinicaltrials.gov>; NCT02327585

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Clin Genet. 2017 Aug;92:221-23.

ASSOCIATION OF THE MISSENSE VARIANT P.ARG203TRP IN PACS1 AS A CAUSE OF INTELLECTUAL DISABILITY AND SEIZURES.

Stern D, Cho MT, Chikarmane R, et al.

Graphical abstract key: ADHD, attention deficit hyperactivity disorder; ASD, atrial septal defect; DD, developmental delay; EEG, electroencephalogram; Ht, height; ID, intellectual disability; OCD, obsessive-compulsive disorder; OFC, open fontanelle; PDA, patent ductus arteriosus; PFO, patent foramen ovale; VSD, ventricular septal defect; Wt, weight

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Clin Ther. 2017 Oct;39:2006-23.

DIFFERENCES IN ADVERSE EVENT REPORTING RATES OF THERAPEUTIC FAILURE BETWEEN TWO ONCE-DAILY EXTENDED-RELEASE METHYLPHENIDATE MEDICATIONS IN CANADA: ANALYSIS OF SPONTANEOUS ADVERSE EVENT REPORTING DATABASES.

Park-Wyllie L, van SJ, Castillon G, et al.

PURPOSE: Our study evaluated adverse events of therapeutic failure (and specifically reduced duration of action) with the use of a branded product, Osmotic Release Oral System (OROS) methylphenidate, which is approved for the treatment of attention deficit/hyperactivity disorder, and a generic product (methylphenidate, methylphenidate ER-C), which was approved for marketing in Canada based on bioequivalence to OROS methylphenidate. This study was initiated following reports that some US-marketed generic methylphenidate ER products had substantially higher reporting rates of therapeutic failure than did the referenced brands.

METHODS: Through methodology similar to that used by the US Food and Drug Administration to investigate the issue with the US-marketed generic, reporting rates were calculated from cases of therapeutic failure identified in the Canadian Vigilance Adverse Reaction Online database for a 1-year period beginning 8 months after each product launch. Corresponding population exposure was estimated from the number of tablets dispensed. An in-depth analysis of narratives of individual case safety reports (ICSRs) with the use of the generic product was conducted in duplicate by 2 physicians to assess causality and to characterize the potential safety risk and clinical pattern of therapeutic failure. Similar secondary analyses were conducted on the US-marketed products.

FINDINGS: Reporting rates of therapeutic failure with the use of methylphenidate ER-C (generic) and OROS methylphenidate (brand name) were 411.5 and 37.5 cases per 100,000 patient-years, respectively (reporting rate ratio, 10.99; 95% CI, 5.93-22.21). In-depth analysis of narratives of 230 ICSRs of therapeutic failure with the Canadian-marketed generic determined that all ICSRs were either probably (60 [26%]) or possibly (170 [74%]) causally related to methylphenidate ER-C. Clinical symptoms suggestive of overdose were present in 31 reports of loss of efficacy (13.5%) and occurred primarily in the morning, and premature loss of efficacy (shorter duration of action) was described in 98 cases (42.6%) and occurred primarily in the afternoon. Impacts on social functioning, such as disruption in work or school performance or adverse social behaviors, were found in 51 cases (22.2%).

IMPLICATIONS: The ~10-fold higher reporting rate of therapeutic failure with the generic product relative to its reference product in the present Canadian study resembles findings with US-marketed generic products. While these results should be interpreted with caution due to the limitations of spontaneous adverse event reporting, which may confound comparisons across products, similar findings nonetheless led the US Food and Drug Administration to declare in 2014 that 2 methylphenidate ER generic products in the United States were neither bioequivalent nor interchangeable with OROS methylphenidate-their reference product. Our results indicate a potential safety issue with the Canadian-marketed generic and suggest a need for further investigation by Health Canada

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Clin Neuropharmacol. 2018;41:84-85.

ATOMOXETINE IN THE TREATMENT OF ADOLESCENT WITH TRICHOTILLOMANIA AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Türkoğlu S, Çetin FH.

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Clin Neurophysiol. 2018;129:1192-200.

THE ROLE OF RESTING-STATE EEG LOCALIZED ACTIVATION AND CENTRAL NERVOUS SYSTEM AROUSAL IN EXECUTIVE FUNCTION PERFORMANCE IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Zhang D-W, Johnstone SJ, Roodenrys S, et al.

Objective: This study explored the relationships between resting-state electroencephalogram (RS-EEG) localized activation and two important types of executive functions (EF) to extend the prognostic utilization

of RS-EEG in children with Attention-Deficit/Hyperactivity Disorder (AD/HD). Also, the role of central nervous system (CNS) arousal in the relationships was examined.

Methods: Fifty-eight children with AD/HD participated in the study. RS-EEG localized activation was derived from spectral power differences between EEG in eyes-closed and eyes-open conditions. CNS arousal was measured based on alpha band power. Common and everyday EF scores were obtained as EF outcomes.

Results: Frontal delta activation predicted common EF ability and posterior alpha activation predicted everyday EF. A serial mediation analysis found that lower CNS baseline arousal was related to greater arousal and delta activation in series, which in turn related to worse common EF. A follow-up study found that baseline arousal was related to larger interference cost.

Conclusions: RS-EEG is indicative of individual differences in two important types of EF in children with AD/HD. Lower CNS arousal may be a driving force for the poorer common EF performance. Significance: The current study supports prognostic utilization of RS-EEG and AD/HD models that take resting brain activity into consideration in children with AD/HD

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Clinical Nutrition ESPEN. 2018.

DOCOSAHEXAENOIC ACID SUPPLEMENTATION FOR CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A COMPREHENSIVE REVIEW OF THE EVIDENCE.

Ramalho R, Pereira AC, Vicente F, et al.

Attention deficit hyperactivity disorder (ADHD) is considered the most common behavioural disorder in school-age children. ADHD is a complex and multifactorial disorder characterised by a variety of symptoms, including concentration problems, excessive motor activity and impulsivity which interferes with execution of simple school tasks. Diagnosis has been essentially subjective, since no specific laboratory tests are available. However, ADHD remains overdiagnosed, probably due to social pressures for children to be successful in school from an early age, which leads parents to seek medical support. Although therapeutic approaches for ADHD have been essentially pharmacologic, in recent years several studies were performed to investigate the role of nutrition, especially omega 3 polyunsaturated fatty acid (omega 3-PUFA), in the development and treatment of this disorder. In this review, the authors gathered the most relevant evidence regarding omega 3-PUFA, mainly docosahexaenoic acid, as coadjuvant or as a single therapy, in the management of ADHD symptoms. The authors also reviewed this disorder's current medical and therapeutic features

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CNS Drugs. 2017 Aug;31:685-97.

EFFICACY AND SAFETY OF SHP465 MIXED AMPHETAMINE SALTS IN THE TREATMENT OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN ADULTS: RESULTS OF A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, FORCED-DOSE CLINICAL STUDY.

Weisler RH, Greenbaum M, Arnold V, et al.

OBJECTIVE: The objective of this randomized, double-blind, placebo-controlled study was to evaluate the efficacy and safety of SHP465 mixed amphetamine salts (MAS) in adults with attention-deficit/hyperactivity disorder (ADHD).

METHODS: Eligible adults [aged 18-55 years; meeting the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition ADHD criteria; baseline ADHD Rating Scale with Adult Prompts (ADHD-RS-AP) total scores ≥ 28] were randomized 1:1:1 to placebo or forced-dose SHP465 MAS (12.5 or 37.5 mg/day) for 4 weeks. The ADHD-RS-AP total score change from baseline to week 4 (primary endpoint) and Clinical Global Impressions-Improvement score at week 4 (key secondary endpoint) were assessed using linear mixed-effects models for repeated measures. Other efficacy endpoints were changes from baseline to week 4 on the ADHD-RS-AP hyperactivity/impulsivity and inattentiveness subscales and the percentage of participants categorized as improved on the dichotomized Clinical Global Impressions-Improvement. Safety and tolerability assessments were treatment-emergent adverse events, vital sign and weight changes, Columbia-Suicide Severity Rating Scale responses, and electrocardiogram results.

RESULTS: Of 369 screened participants, 275 were randomized (placebo, n = 91; 12.5 mg/day of SHP465 MAS, n = 92; 37.5 mg/day of SHP465 MAS, n = 92) and 236 completed the study (placebo, n = 80; 12.5 mg/day of SHP465 MAS, n = 80; 37.5 mg/day of SHP465 MAS, n = 76). Least-squares mean (95% confidence interval) treatment differences at week 4 significantly favored SHP465 MAS over placebo for the ADHD-RS-AP total score change from baseline [12.5 mg/day: -8.1 (-11.7, -4.4), effect size = 0.67; 37.5 mg/day: -13.4 (-17.1, -9.7), effect size = 1.11; both $p < 0.001$] and Clinical Global Impressions-Improvement score [12.5 mg/day: -0.8 (-1.1, -0.4), effect size = 0.68; 37.5 mg/day: -1.2 (-1.6, -0.9), effect size = 1.11; both $p < 0.001$]. Treatment differences for the change from baseline at week 4 favored 12.5 and 37.5 mg/day of SHP465 MAS, respectively, over placebo on the ADHD-RS-AP hyperactivity/impulsivity (both nominal $p < 0.001$; effect size = 0.56 and 0.91) and inattentiveness (both nominal $p < 0.001$; effect size = 0.70 and 1.19) subscales. At the final on-treatment assessment, the percentage of participants categorized as improved on Clinical Global Impressions-Improvement was higher with both SHP465 MAS doses than with placebo (both nominal $p < 0.001$). Treatment-emergent adverse events reported (>5%) with SHP465 MAS were decreased appetite, dry mouth, insomnia, headache, anxiety, initial insomnia, irritability, and bruxism. Severe treatment-emergent adverse events and treatment-emergent adverse events leading to discontinuation, respectively, were reported by 8 and 12 participants (placebo, n = 2 and 0; 12.5 mg/day SHP465 MAS, n = 1 and 7; 37.5 mg/day SHP465 MAS, n = 5 and 5). At the final on-treatment assessment, mean +/- standard deviation increases from baseline were observed with 12.5 and 37.5 mg/day of SHP465 MAS for pulse (3.3 +/- 10.52 and 7.1 +/- 11.48 bpm) and blood pressure (systolic 0.2 +/- 7.24 and 1.7 +/- 9.99 mmHg; diastolic 1.0 +/- 7.46 and 2.8 +/- 7.90 mmHg) and decreases were observed for weight (-0.97 +/- 1.523 and -1.65 +/- 2.333 kg), body mass index (-0.33 +/- 0.519 and -0.56 +/- 0.777 kg/m²), and Fridericia corrected QT interval (-3.0 +/- 10.72 and -1.6 +/- 13.70 ms). No participant in any treatment group had a positive response for on-study Columbia-Suicide Severity Rating Scale assessments.

CONCLUSIONS: SHP465 MAS was superior to placebo in reducing ADHD symptoms, with a safety profile consistent with other long-acting stimulants. ClinicalTrials.gov Registry Number: NCT02604407

Compr Psychiatry. 2017 Oct;78:1-8.

PREDICTORS OF COMORBID EATING DISORDERS AND ASSOCIATION WITH OTHER OBSESSIVE-COMPULSIVE SPECTRUM DISORDERS IN TRICHOTILLOMANIA.

Greenberg E, Grant JE, Curley EE, et al.

Trichotillomania (TTM) and eating disorders (ED) share many phenomenological similarities, including ritualized compulsive behaviors. Given this, and that comorbid EDs may represent additional functional burden to hair pullers, we sought to identify factors that predict diagnosis of an ED in a TTM population. Subjects included 555 adult females (age range 18-65) with DSM-IV-TR TTM or chronic hair pullers recruited from multiple sites. 7.2% (N=40) of our TTM subjects met criteria for an ED in their lifetime. In univariable regression analysis, obsessive-compulsive disorder (OCD), Yale-Brown Obsessive Compulsive Scale (Y-BOCS) worst-ever compulsion and total scores, certain obsessive-compulsive spectrum disorders, anxiety disorder, attention-deficit/hyperactivity disorder (ADHD), and substance disorder all met the pre-specified criteria for inclusion in the multivariable analysis. In the final multivariable model, diagnosis of OCD (OR: 5.68, 95% CI: 2.2-15.0) and diagnosis of an additional body-focused repetitive behavior disorder (BFRB) (OR: 2.69, 95% CI: 1.1-6.8) were both associated with increased risk of ED in TTM. Overall, our results provide further support of the relatedness between ED and TTM. This finding highlights the importance of assessing for comorbid OCD and additional BFRBs in those with TTM. Future research is needed to identify additional predictors of comorbid disorders and to better understand the complex relationships between BFRBs, OCD and EDs

Curr Opin Pediatr. 2017 Oct;29:616-18.

FIDGET SPINNERS: PURPORTED BENEFITS, ADVERSE EFFECTS AND ACCEPTED ALTERNATIVES.

Schechter RA, Shah J, Fruitman K, et al.

PURPOSE OF REVIEW: In the span of a few months, fidget spinners have caught the eyes of millions of children, parents, educators and paediatricians. Fidget spinners, hand-held toys designed to spin freely in your grasp, have become a source of entertainment for consumers of all ages. Despite a lack of scientific evidence, toy marketers have advertised the benefits of fidget spinners for children with attention-deficit/hyperactivity disorder and other disorders (e.g. autism, anxiety, sensory issues). Parents are incentivized by these purported benefits to purchase fidget spinners to improve their child's concentration and decrease stress.

RECENT FINDINGS: While fidget spinners are a new phenomenon, existing therapy toys (e.g. sensory putty) have been used by occupational therapists for similar reasons, with comparably little research supporting these claims. The purpose of this review is to explore literature regarding sensory toys and examine educator/professional-reported concerns and medical adverse effects of using fidget spinners.

SUMMARY: Due to a recent surge in popularity, fidget spinners and other self-regulatory occupational therapy toys have yet to be subjected to rigorous scientific research. Thus, their alleged benefits remain scientifically unfounded. Paediatricians should be aware of potential choking hazards with this new fad, and inform parents that peer-reviewed studies do not support the beneficial claims

Current Treatment Options in Pediatrics. 2018;4:94-107.

CURRENT BEST PRACTICES FOR ASSESSING AND TREATING CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Power TJ, Hom J, Huang P.

Purpose: This article provides updated information about the diagnosis and assessment of attention-deficit/hyperactivity disorder (ADHD), multimodal interventions, strategies for combining behavioral and pharmacological interventions, and approaches for treating ADHD when it occurs with other conditions.

Recent findings: ADHD is a common neurodevelopmental disorder with a well-documented genetic and neurobiological basis. The assessment of ADHD is grounded in criteria delineated in DSM-5 and includes an assessment of ADHD symptoms, symptom-related impairments, and comorbid conditions. Evidence-based interventions for ADHD include medication, in particular stimulants, and behavioral treatments, including behavioral parent training, classroom behavioral intervention, peer behavioral intervention, and organization skills training. Strategies for combining and sequencing behavioral and medication treatments need to take into account family preferences, problem severity, intervention accessibility, safety considerations, and family level of engagement and motivation. Disparities in ADHD service use as a function of socioeconomic and minority status point to the need for system reforms to improve access to care for all children and adolescents.

Summary: Evidence-based interventions for ADHD need to be more accessible for children and families, and strategies need to integrate the efforts of health providers, mental health professionals, and educators

Dev Psychopathol. 2017 Oct;29:1215-26.

PHENOTYPIC AND GENETIC ASSOCIATIONS BETWEEN READING AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER DIMENSIONS IN ADOLESCENCE.

Plourde V, Boivin M, Brendgen M, et al.

Multiple studies have shown that reading abilities and attention-deficit/hyperactivity disorder symptoms, mainly inattention symptoms, are phenotypically and genetically associated during childhood. However, few studies have looked at these associations during adolescence to investigate possible developmental changes. The aim of the study is to examine the genetic and environmental etiology of the associations between inattention and hyperactivity reported by parents, and reading accuracy, reading speed, and word reading in a population-based twin sample (Quebec Newborn Twin Study). Participants were between 14

and 15 years of age at the time of testing (N = 668-837). Phenotypic results showed that when nonverbal and verbal abilities were controlled, inattention, but not hyperactivity/impulsivity, was a modest and significant predictor of reading accuracy, reading speed, and word reading. The associations between inattention and all reading abilities were partly explained by genetic and unique environmental factors. However, the genetic correlations were no longer significant after controlling for verbal abilities. In midadolescence, inattention is the attention-deficit/hyperactivity disorder dimension associated with reading abilities, but they could also share genetic factors with general verbal skills

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Dev Med Child Neurol. 2018.

HEALTH-RELATED QUALITY OF LIFE AND PEER RELATIONSHIPS IN ADOLESCENTS WITH DEVELOPMENTAL COORDINATION DISORDER AND ATTENTION-DEFICIT-HYPERACTIVITY DISORDER.

Dewey D, Volkovinskaia A.

Aim: Health-related quality of life (HRQoL) and peer relationships were investigated in adolescents with developmental coordination disorder (DCD) and attention-deficit-hyperactivity disorder (ADHD).

Method: Adolescents with DCD (n=9), ADHD (n=9), DCD and ADHD (n=10), and typically developing adolescents (n=16) completed the following questionnaires: KIDSCREEN-52 Health-Related Quality of Life Questionnaire and Peer Relations Questionnaire for Children. Twenty-five participants took part in semi-structured interviews.

Results: Adolescents with DCD and ADHD had lower HRQoL on the mood and emotions, school environment, and financial resources scales of the KIDSCREEN-52 than adolescents in the DCD and typically developing groups (all $p < 0.05$). On the Peer Relations Questionnaire for Children, the DCD and ADHD group reported significantly higher victimization compared with those in the typically developing ($p = 0.030$) and DCD ($p = 0.010$) groups. Qualitative interviews among young people with DCD and ADHD revealed feelings of marginalization and victimization. Descriptors such as 'misfits', 'oddballs', 'weird', and 'the rejects' were used to describe themselves.

Interpretation: HRQoL and peer relationships are negatively affected in adolescents with DCD and ADHD. What this paper adds?: Children with developmental coordination disorder (DCD) do not display poorer overall health-related quality of life (HRQoL) versus typically developing controls. Having DCD and attention-deficit-hyperactivity disorder (ADHD) was associated with poorer HRQoL. Adolescents with DCD and ADHD experience significantly higher levels of peer victimization than typically developing adolescents. HRQoL and peer relationships are significantly associated in adolescent respondents

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Dev Psychol. 2018 Apr.

A SMARTPHONE-BASED ECOLOGICAL MOMENTARY ASSESSMENT OF PARENTAL BEHAVIORAL CONSISTENCY: ASSOCIATIONS WITH PARENTAL STRESS AND CHILD ADHD SYMPTOMS.

Li JJ, Lansford JE.

Inconsistent parental discipline is a robust correlate of child attention-deficit/hyperactivity disorder (ADHD) symptoms, but few studies have considered the role of inconsistent positive parenting on ADHD, as well as the effects of stress on negative and positive parental consistency. This study advanced a novel ecological momentary assessment (EMA) using participant smartphones to measure parental consistency, and examined its associations with family, social, and parenting-related dimensions of stress and child ADHD symptoms. Participants were 184 kindergartners with and without ADHD and their parents. Harsh and warm dimensions of parental behavior were assessed using questionnaires, observations, and an EMA administered through parents' smartphones, which measured parent-child behaviors every day for a period of 1 week. Family, social, and parenting-related stress were assessed from questionnaires, and child ADHD symptoms were assessed from a fully structured diagnostic interview with the parent. Child ADHD symptoms were associated with variability in warm parenting behaviors, and higher levels of parenting-related stress were related to greater variability in harsh parenting behaviors. No significant interactions were detected between parental stress and child ADHD on parental variability. These findings suggest that different factors

influence the consistency in parenting behavior, depending on whether positive parenting or negative parenting is assessed. Parent-based treatment programs for children with ADHD should include a stronger focus on reducing stress from parenting (e.g., teaching coping skills for parents), as this may lead to greater consistency in parental behavior more generally, and presumably better child outcomes

Diabetes Care. 2018;41:770-74.

TYPE 1 DIABETES IN PARENTS AND RISK OF ATTENTION DEFICIT/HYPERACTIVITY DISORDER IN OFFSPRING: A POPULATION-BASED STUDY IN SWEDEN.

Ji J, Chen T, Sundquist J, et al.

OBJECTIVE To explore whether a family history of type 1 diabetes (T1D) is associated with an increased incidence of attention deficit/hyperactivity disorder (ADHD) in offspring.

RESEARCH DESIGN AND METHODS Individuals with T1D were identified from the nationwide Swedish National Hospital Discharge Register and Swedish Outpatient Register in Sweden and were linked to the Swedish Multi-Generation Register to identify their offspring. Cox regression was used to calculate the hazard ratio (HR) of ADHD in offspring of patients with T1D compared with the general population.

RESULTS A total of 15,615 individuals were born after their parents were diagnosed with T1D. After a set of confounding factors was controlled for, offspring of T1D patients had a significantly increased risk of ADHD with an HR of 1.29 (95% CI 1.15-1.42). Maternal T1D was associated with an enhanced risk of ADHD (HR 1.35 [95% CI 1.18-1.55]) compared with paternal T1D (HR 1.20 [95% CI 1.03-1.41]), but the difference was not statistically significant.

CONCLUSIONS In this retrospective cohort study, we found that a parental history of T1D was associated with a 29% increased risk of being diagnosed with ADHD. However, the underlying mechanisms need to be explored in future studies

Drug Alcohol Depend. 2018;184:33-41.

ASSOCIATIONS BETWEEN CHILDHOOD ADHD, GENDER, AND ADOLESCENT ALCOHOL AND MARIJUANA INVOLVEMENT: A CAUSALLY INFORMATIVE DESIGN.

Elkins IJ, Saunders GRB, Malone SM, et al.

Background: We report whether the etiology underlying associations of childhood ADHD with adolescent alcohol and marijuana involvement is consistent with causal relationships or shared predispositions, and whether it differs by gender.

Methods: In three population-based twin samples (N = 3762; 64% monozygotic), including one oversampling females with ADHD, regressions were conducted with childhood inattentive or hyperactive-impulsive symptoms predicting alcohol and marijuana outcomes by age 17. To determine whether ADHD effects were consistent with causality, twin difference analyses divided effects into those shared between twins in the pair and those differing within pairs.

Results: Adolescents with more severe childhood ADHD were more likely to initiate alcohol and marijuana use earlier, escalate to frequent or heavy use, and develop symptoms. While risks were similar across genders, females with more hyperactivity-impulsivity had higher alcohol consumption and progressed further toward daily marijuana use than did males. Monozygotic twins with more severe ADHD than their co-twins did not differ significantly on alcohol or marijuana outcomes, however, suggesting a non-causal relationship. When co-occurring use of other substances and conduct/oppositional defiant disorders were considered, hyperactivity-impulsivity remained significantly associated with both substances, as did inattention with marijuana, but not alcohol.

Conclusions: Childhood ADHD predicts when alcohol and marijuana use are initiated and how quickly use escalates. Shared familial environment and genetics, rather than causal influences, primarily account for these associations. Stronger relationships between hyperactivity-impulsivity and heavy drinking/frequent marijuana use among adolescent females than males, as well as the greater salience of inattention for marijuana, merit further investigation

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Dusunen Adam. 2018;31:11-20.

EFFECTS OF METHYLPHENIDATE TREATMENT ON QUALITY OF LIFE IN ADOLESCENTS.

Karci CK, Toros F, Tahiroglu AY, et al.

Objective: Attention-deficit hyperactivity disorder (ADHD) is one of the most common childhood mental disorders. Improvement in quality of life is observed with the treatment of ADHD which is a chronic disorder that disrupts the quality of life. In this study, it was aimed to investigate the changes in symptoms of anxiety and depression associated with ADHD and quality of life of adolescents after methylphenidate treatment.

Method: Fifty patients between 13-18 years old, who admitted to Mersin University Medical Faculty Hospital Pediatric and Adolescent Psychiatry Outpatient Clinics; were diagnosed with ADHD; received methylphenidate treatment for the first time; and continued with the treatment for three months; were included in the study. Pretreatment and 3rd month results of Children's Depression Inventory (CDI), State- Trait Anxiety Inventory for Children (STAI-CH), and Adolescent and Parent forms of Pediatric Quality of Life Inventory TM 4.0 (PedsQLTM 4.0) were assessed by retrospectively screening of patient charts.

Results: After methylphenidate treatment, quality of life scores were improved, except for physical functioning. Quality of life scores were higher in adolescent reports, compared to parents. Male adolescents scored their quality of life more positively than girls before and after the treatment. In addition, anxiety symptoms improved after methylphenidate treatment.

Conclusion: It is important to determine the changes in quality of life with the treatment of ADHD in terms of emphasizing the importance of ADHD treatment, evaluating treatment outcomes, and establishing effective and sophisticated treatment plans

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Dusunen Adam. 2018;31:50-60.

ASSESSMENT OF PERCEIVED PARENTAL ACCEPTANCE-REJECTION AND PSYCHOLOGICAL ADJUSTMENT LEVELS OF CHILDREN DIAGNOSED WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Guzel HS, Guney E, Dinc GS.

Objective: This study aimed to assess the perceived parental acceptance-rejection and psychological adjustment levels of children diagnosed with attention-deficit hyperactivity disorder (ADHD).

Method: This study included 64 children aged 9 to 12 who were diagnosed with ADHD and 52 healthy children and their parents. Children were evaluated with 'Schedule for Affective Disorders and Schizophrenia for School-Age Children-Present and Lifetime version'. The Parental Acceptance-Rejection Questionnaire-Child Form, Personality Assessment Questionnaire and a Personal Information Questionnaire formed by the researchers have been used as data collection tools.

Results: In this study in which ADHD and control groups were compared, it was found that children diagnosed with ADHD perceived parental rejection more and had worse psychological adjustment than those without the diagnosis. Children with ADHD reported more rejection from the mother whereas children in the control group reported less care from the father.

Conclusion: This study is exceptionally important in terms of demonstrating perceived parental acceptance-rejection and psychological adjustment of children with ADHD. Besides, it has been seen that depending on the presence of ADHD, the child's perceived parental acceptance-rejection is differently affected from the

mother and the father. The findings on acceptance-rejection, in addition to giving helpful clues for ADHD family education, they will be also helpful in studies to improve the psychological assessment of these children

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Emot Behav Difficulties. 2018;1-14.

'YOU'RE 18 NOW, GOODBYE': THE EXPERIENCES OF YOUNG PEOPLE WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER OF THE TRANSITION FROM CHILD TO ADULT SERVICES.

Newlove-Delgado T, Ford TJ, Stein K, et al.

The term transition is used to refer to the process of moving from child to adult services. Among child and adolescent mental health services attenders, young people with Attention Deficit Hyperactivity Disorder (ADHD) are less likely to transition successfully, but there is a gap in understanding their views and why they might disengage from services. The aim of this study was to explore the experiences of transition of young people with ADHD in Southwest England using semi-structured interviews and thematic analysis. Seven young people aged 17-19 years participated. Four key themes were identified: professionals roles and relationships with young people; the role of ADHD medication, uncertainties around transition and medication management, and identified needs and increasing independence. Although this study presents the experiences of a small number of people, their stories suggest that best practice around transition is not always being followed. There is consequently a need to better understand the facilitators and barriers to best practice implementation

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Encephale. 2018;44:176-82.

INTRAFAMILIAL DISRUPTIVE BEHAVIOUR DISORDERS IN CHILDREN AND ADOLESCENTS: PRESENT DATA AND TREATMENT PROSPECTS.

Bousquet E, Franc N, Ha C, et al.

Child-to-parent violence is a form of family violence that is still a well-kept secret. Abused parents can be victims of different types of abuse. Children can use both physical and psychological violence such as financial threats to take control of the home. In this situation, parents often no longer dare to contradict their children by fear of triggering uncontrollable violence. Although the phenomenon recently drew the attention of the media, there is still little knowledge about its prevalence and clinical characteristics. Most families remain isolated for a long time and, even in case of consulting in a mental health setting, disclosure of the nature of the difficulties is often delayed. This article presents the specificities of these children and their clinical characteristics. It also studies the victimized parents, the entire family, and their relation to the external environment. When observing these young offenders oppositional defiant disorder, conduct disorder and attention deficit hyperactivity disorder are frequently found. The diagnosis of conduct disorder confined to family context defined in the ICD 10 is the most appropriate to describe them. But it is regrettable that there has currently been no study to validate it and to determine its specificity. Compared with other young children who have classic disruptive disorders, children involved in violence against their parents have more difficulties with affect regulation, impulse control, and interpersonal skills. These children also frequently have low self-esteem and difficulties interacting with their peers. They may be isolated and bullied. They feel more sadness than these other young people and use violence as a way to express their emotions. Within the family both girls and boys commit violence against their parents. Girls will mostly use psychological violence but can also be involved in physical aggression. The first victim of child-to-parent violence is the mother. As mothers are often more present at home and seen by their children as weaker than the father, they are seen as an easy target. If the classic conduct disorder is most frequently encountered in low social status families, intra familial disruptive behavior can be observed in families from all socio economic status. With respect to the parent-child relationship in those families, there are some relevant specificities. First, the quality of communication is bad, parents and children are not intimate and the tension is permanent. Furthermore, children do not respect their parents authority. They perceive parenting style as permissive and negligent without enough support and control, and they may want to restore a coherent authority in the family. It is

important to mention that potential vulnerability factors such as older age, a history of mental illness and social isolation have been described in parents of these children. Thereby, victimized parents have all the more difficulty to stand up against their children or to cleverly adapt their authority to their behavior. Other types of inappropriate education can be the origin of the child-to-parent violence. There is a direct correlation between the high frequency of punishments and violent attitude of the children towards their parents. So, the family dynamic is characterized by an inversion of the family hierarchy, the parents fear of violent behavior from their child, and shame expressed by the parents with regards to the nature of familial relationships. Their fear and their shame will contribute to ensuring that their child's behavior is kept secret. Finally, several factors can therefore be at the source of the development of child-to-parent violence; this study aims to raise awareness of clinicians of this impairing and frequently hidden condition. Due to the absence of specific studies, management of intra-familial disruptive disorder is likely to be less than optimal and heterogeneous. The development of a group of targeted parental psychoeducation is a promising management technique. We will describe the basic principles of -½ active parental control-+ a programme using techniques of -½ non-violent resistance-+ to help parents cope with violence and control children's behavior. The results of this programme are still being evaluated, but preliminary results seem promising since the parents included in the pilot group have described a significant improvement in the feeling of parental competence and, notably, self-control

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Epidemiol Psychiatr Sci. 2018;1-11.

MATERNAL ANXIETY, DEPRESSION AND SLEEP DISORDERS BEFORE AND DURING PREGNANCY, AND PRESCHOOL ADHD SYMPTOMS IN THE NINFEA BIRTH COHORT STUDY.

Vizzini L, Popovic M, Zugna D, et al.

Aims.: Maternal mental disorders have been associated with the risk of attention-deficit/hyperactivity disorder (ADHD) in children. Within the context of a mother child cohort, we examined whether maternal anxiety, depression and sleep disorders are associated with pre-school ADHD symptoms.

Methods.: The study included 3634 singletons from the Italian NINFEA (Nascita e INFanzia: gli Effetti dell'AmbienteΓÇÖ) cohort. Maternal doctor-diagnosed anxiety, depression and sleep disorders before and during pregnancy were assessed from the questionnaires completed during pregnancy and 6 months after delivery. Mothers rated child ADHD symptoms at 4 years of age, according to the Diagnostic and Statistical Manual of Mental Disorders. Hyperactive impulsive (ADHD-H), inattentive (ADHD-I) and total ADHD scores were analysed in the models adjusted for child's gender, first-born status, maternal age, education, alcohol consumption and smoking during pregnancy.

Results.: The total ADHD score at age 4 was associated with maternal lifetime anxiety (17.1% percentage difference in score compared with never; 95% CI 7.3ΓÇô27.9%), sleep disorders (35.7%; 95% CI 10.7ΓÇô66.5%) and depression (17.5%; 95% CI 3.2ΓÇô33.8%). Similar positive associations were observed also for ADHD-H and ADHD-I traits, with slightly attenuated associations between maternal sleep disorders and child ADHD-I score, and maternal depression and both ADHD scores. All the estimates were enhanced when the disorders were active during pregnancy and attenuated for disorders active only during the pre-pregnancy period.

Conclusions.: Maternal anxiety, depression and sleep disorders are associated with a relative increase in the number of ADHD-H, ADHD-I and total ADHD symptoms in preschoolers

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Epilepsy Behav. 2018;82:164-69.

THE RELEVANCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN SELF-LIMITED CHILDHOOD EPILEPSY WITH CENTROTEMPORAL SPIKES.

Lima EM, Rzezak P, Dos SB, et al.

In this study, we aimed to evaluate the attentional and executive functions in patients with benign childhood epilepsy with centrotemporal spikes (BCECTS) with and without attention-deficit hyperactivity disorder (ADHD) compared with controls and compared with patients with ADHD without epilepsy. We evaluated 12

patients with BCECTS and ADHD (66.7% boys; mean age of 9.67 years); 11 children with non-ADHD BCECTS (63.6% boys; mean age of 11.91 years); 20 healthy children (75% boys; mean age of 10.15 years); and 20 subjects with ADHD without epilepsy (60% boys; mean age of 10.9 years). We used a comprehensive battery of neuropsychological tests to evaluate attentional and executive functions in their broad domains. Patients with BCECTS and ADHD had worse performance in Conners' Continuous Performance Test II (reaction time standard error [$p = 0.008$], variability [$p = 0.033$], perseverations [$p = 0.044$] and in reaction time interstimuli interval [$p = 0.016$]). Patients with ADHD showed worse performance in Trail Making Test B errors [$p = 0.012$]. In conclusion, patients with BCECTS and ADHD had worse executive and attentional performance compared with controls than non-ADHD patients with BCECTS. Regardless of the presence of epilepsy, ADHD also negatively impacted executive and attentional functions but in different executive subdomains compared with patients with epilepsy

Epilepsy Behav. 2017 Oct;75:36-41.

ADHERENCE TO ANTIEPILEPTIC DRUGS IN CHILDREN AND ADOLESCENTS: A RETROSPECTIVE STUDY IN PRIMARY CARE SETTINGS IN GERMANY.

Jacob L, Hamer HM, Kostev K.

OBJECTIVE: The goal of this study was to analyze adherence to antiepileptic drugs (AED) in children and adolescents treated in pediatric practices in Germany.

METHODS: The present study included patients aged between 2 and 17 years who were diagnosed with epilepsy (ICD-10: G40) and had received at least two prescriptions of AED between January 2006 and December 2015 in 243 pediatric practices in Germany. The medication possession ratio (MPR) was used to estimate adherence, and patients with a MPR greater than 80% were considered adherent. The impact of patient and drug characteristics on adherence was analyzed using a multivariate logistic regression model.

RESULTS: A total of 5214 patients were included. Mean age was 10.9 years (SD=4.9 years). The overall MPR was 88.8% (SD=34.1%), and 68.9% of patients were considered adherent. Children aged 5 years or younger were more adherent to AED than those aged between 14 and 17 years (OR=1.22, 95% CI: 1.07-1.39). Individuals living in western Germany were also found to be more adherent than those living in eastern Germany (OR=1.71, 95% CI: 1.55-1.88). Asthma as a comorbidity (OR=1.59, 95% CI: 1.29-1.96) was positively and attention-deficit hyperactivity disorder (OR=0.81, 95% CI: 0.71-0.93) negatively associated with treatment adherence. Finally, no significant association was found between adherence and the type of AED.

CONCLUSIONS: Two-thirds of children and adolescents suffering from epilepsy in Germany were adherent to AED. Age, place of residence, and comorbidities were significantly associated with adherence

Epilepsy Behav. 2017 Oct;75:60-65.

INCREASED RATES OF INTERMITTENT RHYTHMIC DELTA AND THETA ACTIVITY IN THE ELECTROENCEPHALOGRAPHIES OF ADULT PATIENTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER .

Endres D, Maier S, Feige B, et al.

INTRODUCTION: Adult attention-deficit hyperactivity disorder (ADHD) is a common neurodevelopmental disorder. In subgroups of patients with a (para)epileptic pathomechanism, this might be due to intermittent rhythmic delta or theta activity (IRDA/IRTA).

PARTICIPANTS AND METHODS: Using a fully data-driven analysis, we compared the IRDA/IRTA rates in the resting electroencephalography (EEG) results of 97 adult patients with ADHD and 30 control subjects. The IRDA/IRTA rates before hyperventilation (HV) and for HV difference (difference between IRDA/IRTA rate after and before HV) were compared between groups using a linear model.

RESULTS: We detected significantly increased rates of IRDA/IRTA before HV ($F=4.209$, $p=0.042$) in patients with ADHD but no significant difference between the groups for HV-difference ($F=2.46$, $p=0.119$).

DISCUSSION: The increased IRDA/IRTA rates before HV in the group with ADHD might lead to (para)epileptic short-term effects (e.g., impulsivity) via local area network inhibition, and to long-term effects (e.g., cognitive deficits) via connectivistic brain restructuring

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Epileptic Disord. 2017 Jun;19:178-85.

EDUCATIONAL NEEDS OF EPILEPTOLOGISTS REGARDING PSYCHIATRIC COMORBIDITIES OF THE EPILEPSIES: A DESCRIPTIVE QUANTITATIVE SURVEY.

Mula M, Cavaleiro E, Guekht A, et al.

Psychiatric disorders are relatively frequent comorbidities in epilepsy and they have an impact on morbidity, mortality, and quality of life. This is a report from the Task Force on Education of the ILAE Commission on Neuropsychiatry based on a survey about educational needs of epileptologists regarding management of the psychiatric comorbidities of epilepsy. The Task Force designed a quantitative questionnaire to survey the self-perceived confidence of child and adult epileptologists and psychiatrists in managing major psychiatric comorbidities of epilepsy to identify: (1) critical areas of improvement from a list of skills that are usually considered necessary for effective management of these conditions, and (2) the preferred educational format for improving these skills. A total of 211 respondents from 36 different countries participated in the survey. Confidence and usefulness scores suggest that responders would most value education and training in the management of specific clinical scenarios. Child neurologists identified major Axis I disorders, such as mood and anxiety disorders, while adult neurologists identified attention deficit hyperactivity disorder, intellectual disabilities, and autistic spectrum disorder as key areas. Both adult and child neurologists identified screening skills as the priority. Psychiatrists mainly valued specific training in the management of psychiatric complications of epilepsy surgery or psychiatric adverse events of antiepileptic drugs. Sessions during congresses and face-to-face meetings represent the preferred educational format, while e-learning modules and review papers were chosen by a minority of respondents. Results of this survey identify key areas for improvement in managing the psychiatric comorbidities of epilepsy and suggest specific strategies to develop better training for clinicians involved in epilepsy care

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Eur Neuropsychopharmacol. 2017 Aug;27:795-808.

CANNABINOIDS IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A RANDOMISED-CONTROLLED TRIAL.

Cooper RE, Williams E, Seegobin S, et al.

Adults with ADHD describe self-medicating with cannabis, with some reporting a preference for cannabis over ADHD medications. A small number of psychiatrists in the US prescribe cannabis medication for ADHD, despite there being no evidence from randomised controlled studies. The EMA-C trial (Experimental Medicine in ADHD-Cannabinoids) was a pilot randomised placebo-controlled experimental study of a cannabinoid medication, Sativex Oromucosal Spray, in 30 adults with ADHD. The primary outcome was cognitive performance and activity level using the QbTest. Secondary outcomes included ADHD and emotional lability (EL) symptoms. From 17.07.14 to 18.06.15, 30 participants were randomly assigned to the active (n=15) or placebo (n=15) group. For the primary outcome, no significant difference was found in the ITT analysis although the overall pattern of scores was such that the active group usually had scores that were better than the placebo group (Est=-0.17, 95%CI-0.40 to 0.07, p=0.16, n=15/11 active/placebo). For secondary outcomes Sativex was associated with a nominally significant improvement in hyperactivity/impulsivity (p=0.03) and a cognitive measure of inhibition (p=0.05), and a trend towards improvement for inattention (p=0.10) and EL (p=0.11). Per-protocol effects were higher. Results did not meet significance following adjustment for multiple testing. One serious (muscular seizures/spasms) and three mild adverse events occurred in the active group and one serious (cardiovascular problems) adverse event in the placebo group. Adults with ADHD may represent a subgroup of individuals who experience a reduction

of symptoms and no cognitive impairments following cannabinoid use. While not definitive, this study provides preliminary evidence supporting the self-medication theory of cannabis use in ADHD and the need for further studies of the endocannabinoid system in ADHD

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Eur Psychiatry. 2017 Sep;45:221-26.

STRESS, ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) SYMPTOMS AND TOBACCO SMOKING: THE I-SHARE STUDY.

Galera C, Salla J, Montagni I, et al.

BACKGROUND: The contribution of mental health to the risk of smoking is increasingly acknowledged but still insufficiently studied during the key period of student life. In particular, the simultaneous action of stress and Attention Deficit Hyperactivity Disorder (ADHD) symptoms on the risk of smoking remains poorly understood. **AIMS:** To assess the effects of stress and ADHD symptoms on tobacco smoking.

METHOD: Multivariate modeling was conducted on the French i-Share study (n=8110, median age 20.3 years, 74.8% females, 32.9% regular/occasional smokers) to evaluate the associations between stress, ADHD symptoms and tobacco smoking, adjusting for potential family/socio-demographic confounders.

RESULTS: Students with high levels of stress were more likely to smoke >10 cigarettes/day (adjusted odds ratio (aOR): 1.48, 95% CI: 1.12-1.96) than those with low levels of stress. Students with high levels of ADHD symptoms were more likely to smoke >10 cigarettes/day (aOR: 2.08, 95% CI: 1.58-2.75) than those with low levels of ADHD symptoms.

CONCLUSIONS: Stress and ADHD contribute independently to the risk of smoking. Interventions targeting each condition are likely to reduce the burden of tobacco use in students

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Eur Arch Psychiatry Clin Neurosci. 2018;1-3.

SYMPTOMS IN INDIVIDUALS WITH ADULT-ONSET ADHD ARE MASKED DURING CHILDHOOD.

Kosaka H, Fujioka T, Jung M.

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Eur Child Adolesc Psychiatry. 2018;27:353-65.

THE IMPACT OF COMORBID MENTAL HEALTH SYMPTOMS AND SEX ON SLEEP FUNCTIONING IN CHILDREN WITH ADHD.

Becker SP, Cusick CN, Sidel CA, et al.

Children with attention-deficit/hyperactivity disorder (ADHD) display more sleep problems than their peers, but it remains unclear whether comorbid mental health symptoms [i.e., anxiety, depression, oppositional-defiant disorder (ODD)] are uniquely related to sleep functioning. It is also largely unknown whether boys and girls with ADHD differ in their sleep functioning. This study (1) examined whether boys or girls with ADHD differ in their sleep functioning, (2) evaluated comorbid symptoms as uniquely related to sleep functioning domains, and (3) explored whether sex moderated associations between comorbid symptoms and sleep. Participants were 181 children (ages 7-13; 69% male; 82% White) diagnosed with ADHD. Parents completed measures assessing their child's ADHD symptoms, comorbid symptoms, and sleep functioning. Girls had poorer sleep functioning than boys across most sleep functioning domains. Sixty percent of children met cutoff criteria for having sleep problems, though rates differed significantly between girls (75%) and boys (53%). No differences in rates of sleep problems were found between ADHD subtypes/presentations or between younger and older children. In path models including ADHD and comorbid symptom dimensions, anxiety symptoms were uniquely associated with increased bedtime resistance and sleep anxiety, ADHD hyperactive-impulsive symptoms were associated with more night wakings and more parasomnia behaviors, and ODD and depressive symptoms were associated with shorter sleep duration. Depression was also uniquely associated with increased daytime sleepiness and overall sleep problems. Sex did not moderate associations between comorbid symptoms and sleep problems. This study provides important preliminary evidence that girls with ADHD experience more sleep problems than

boys with ADHD. Findings also demonstrate that the associations between comorbid symptoms and sleep functioning in children with ADHD vary based on both the specific symptoms and sleep domains examined

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Eur Child Adolesc Psychiatry. 2018;1-12.

INFORMANT-RELATED EFFECTS OF NEUROFEEDBACK AND COGNITIVE TRAINING IN CHILDREN WITH ADHD INCLUDING A WAITING CONTROL PHASE: A RANDOMIZED-CONTROLLED TRIAL.

Minder F, Zuberer A, Brandeis D, et al.

There is controversy regarding the clinical efficacy of neurofeedback (NF) and computerized cognitive training (CogT) as treatments for ADHD. Meta-analyses claim that probably blinded teachers observe smaller effects than parents, because they are less biased. We investigated informant-specific effects by manipulating the involvement of informants, by controlling for waiting time effects, and by adding a blinded outcome measure. Seventy-seven children with ADHD were randomly allocated to slow cortical potential NF or to individualized CogT (of attention, working memory or inhibition). The training was conducted in schools (NF: $n = 19$, CogT: $n = 19$) or in outpatient clinics (NF: $n = 19$, CogT: $n = 20$). Three assessments were scheduled: baseline, followed by a waiting period, pre-training, and post-training. Multivariate Analyses of Variance were conducted to assess parent- and teacher-rated changes in ADHD symptoms and executive functions (EF), and changes according to standardized classroom observations. Both treatments resulted in significant improvements according to informants, with larger effects for parents (ADHD symptoms: parent $+ \Delta p^2 = .32$; teacher $+ \Delta p^2 = .10$), and according to observations ($+ \Delta p^2 = .19$). The setting had no effect on outcome. Considerable waiting time effects were revealed for ADHD symptom ratings by both informants, for EF ratings only by teachers. Changed classroom behavior was uncorrelated with teacher-rated changes. Overall, the results do not support the notion that teachers are more objective while being as sensitive to change as parents. The three sources seem to contribute differential and mostly unrelated pieces of information to the evaluation of treatments

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Eur Child Adolesc Psychiatry. 2018;27:367-76.

CLINICAL FACTORS ASSOCIATED WITH DECISION TO RECOMMEND METHYLPHENIDATE TREATMENT FOR CHILDREN WITH ADHD IN FRANCE.

Courtabessis E, Pupier F, Surig L, et al.

European guidelines advise on best practices for the diagnosis and non-pharmacological and pharmacological treatment of attention-deficit hyperactivity disorder (ADHD). This study aimed to (1) assess whether clinician's decisions to initiate methylphenidate treatment in children diagnosed with ADHD are in accordance with European guidelines and (2) identify clinical factors associated with the decision to recommend methylphenidate prescription. 5 to 13-year-old patients with an ADHD diagnosis were consecutively evaluated in an outpatient child and adolescent psychiatry clinic in France. Patients underwent a multidisciplinary evaluation including a diagnostic interview, symptom severity assessments with parent questionnaires, and IQ testing. We compared children with ($n = 105$) and without ($n = 55$) recommended methylphenidate treatment using Student's t test or Wilcoxon Mann-Whitney test and Chi-square or Fisher's test. Multivariate logistic regression was implemented to determine the respective influence of each variable on treatment recommendation. Recommendation to initiate methylphenidate treatment was associated with (1) ADHD combined presentation, (2) co-occurring Oppositional Defiant Disorder/Conduct Disorder (ODD/CD), Developmental Coordination Disorder (DCD) and Learning Disorder (LD), (3) clinical severity and impairment indicated on parent questionnaires, and (4) reduced perceptual reasoning. Using a multivariate regression model, ADHD combined presentation [combined versus predominantly hyperactive/impulsive and unspecified OR 4.52 (1.23-16.55), $p = 0.023$], age [OR 1.46 (1.14-1.88), $p = 0.003$], ODD/CD [OR 5.53 (2.19-14.01), $p < 0.001$], DCD [OR 4.22 (1.70-10.48), $p = 0.002$], PRI [OR 0.97 (0.94-0.99), $p = 0.01$] were significantly associated with recommendation of methylphenidate treatment. Our results indicate that

clinicians' treatment decision-making complies with European guidelines and is furthermore associated with the type and severity of ADHD symptoms but also with co-occurring disorders

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Eur Child Adolesc Psychiatry. 2018;1-9.

SEX-SPECIFIC TRAJECTORIES OF ADHD SYMPTOMS FROM ADOLESCENCE TO YOUNG ADULTHOOD.

Millenet S, Laucht M, Hohm E, et al.

Reports of current ADHD symptoms in adults with a childhood diagnosis of ADHD are often discrepant: While one subgroup reports a particularly high level of current ADHD symptoms, another reports a very low level. The reasons for this difference remain unclear. Although sex might play a moderating role, it has not yet been examined in this regard. In an epidemiological cohort study from birth to young adulthood, childhood ADHD diagnoses were assessed at the ages of 4.5, 8, and 11 years based on parent ratings. Sex-specific development of ADHD symptoms was analyzed from the age of 15 to 25 years via self-reported ADHD symptoms in participants with (n = 47) and without childhood ADHD (n = 289) using a random coefficient regression model. The congruence between parent reports and adolescents' self-ratings was examined, and the role of childhood ADHD diagnosis, childhood OCC/CD, and childhood internalizing disorder as possible sex-specific predictors of self-reported ADHD symptoms at age 25 years was investigated. With regard to self-reported ADHD symptoms, females with a childhood ADHD diagnosis reported significantly more ADHD symptoms compared to females without childhood ADHD and males with and without ADHD throughout adolescence and young adulthood. In contrast, males with childhood ADHD did not differ from control males either at age 15 or at age 25 years. Only in females did a childhood diagnosis of an externalizing disorder (ADHD and CD/ODD) predict self-reported ADHD symptoms by age 25 years. Our findings suggest that self-reports of young adults with a childhood diagnosis of ADHD are influenced by sex. Specifically, females with childhood ADHD report increased levels of ADHD symptoms upon reaching adulthood. To correctly evaluate symptoms and impairment in this subgroup, other, more objective, sources of information may be advisable, such as neurophysiological measures

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Expert Opinion on Drug Safety. 2018;1-7.

EVALUATION OF DYSTONIA IN CHILDREN AND ADOLESCENTS TREATED WITH ATOMOXETINE WITHIN THE TRUVEN MARKETSCAN DATABASE: A RETROSPECTIVE COHORT STUDY.

Meyers KJ, Upadhyaya HP, Goodloe R, et al.

OBJECTIVE: Atomoxetine is a non-stimulant drug indicated for the treatment of attention-deficit/hyperactivity disorder in children aged ≥ 6 years, adolescents, and adults. In this retrospective cohort study, the incidence and risk of dystonia in children and adolescents treated with atomoxetine was compared to a propensity score-matched cohort of stimulant users.

METHODS: Data between 1 January 2006 and 31 December 2014 from patients aged 6-17 years in the Truven Health Analytics MarketScan database were used to generate two cohorts of patients: (1) atomoxetine users and (2) stimulant (methylphenidates or amphetamines) users. A Cox proportional hazards regression model was used to compare incidence of dystonia across propensity score-matched cohorts.

RESULTS: Of the 70,657 atomoxetine users, 70,655 users were propensity score-matched to a stimulant user. In the atomoxetine- and stimulant-treated cohorts, the crude incidence rates of dystonia were 54.9 (95% CI: 27.1-82.7) and 77.9 (95% CI: 49.1-106.8) per 100,000 person-years, respectively. The hazard ratio for occurrence of dystonia with atomoxetine use relative to stimulant use was 0.68 (95% CI: 0.36 - 1.28; P = 0.23).

CONCLUSION: In this large retrospective cohort study, there was no significant difference in incidence or risk of dystonia among patients treated with atomoxetine compared to stimulants

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Fam Syst Health. 2017 Mar;35:46-57.

COLLABORATIVE MENTAL HEALTH CARE FOR PEDIATRIC BEHAVIOR DISORDERS IN PRIMARY CARE: DOES IT REDUCE MENTAL HEALTH CARE COSTS?

Yu H, Kolko DJ, Torres E.

OVERVIEW: One recently completed randomized controlled trial (RCT) demonstrated the effectiveness of a doctor-office collaborative care (DOCC), relative to enhanced usual care (EUC), for pediatric behavior problems and attention-deficit/hyperactivity disorder. In this study, we sought to extend the literature by incorporating a cost-analysis component at the conclusion of the aforementioned trial. To our knowledge, it was the first study to examine whether the DOCC model leads to lower costs of mental health services for children.

METHOD: Financial records from the RCT provided cost information about all the 321 child study participants in the 6-month intervention period, and claims data from insurance plans provided cost information about community mental health services for 57 children, whose parents consented to release their claims data, in both pre- and postintervention periods. Both descriptive and multivariate analyses were performed.

RESULTS: The DOCC group had higher intervention costs, but the cost per patient treated in the DOCC group was lower than the EUC group during the 6-month intervention period. In terms of costs of community mental health services, although the 2 groups had similar costs in the 6 months before the RCT intervention, the DOCC group had significantly lower costs during the 6-month intervention period and 6 or 12 months after the intervention, but not in the 18 or 24 months after the intervention.

DISCUSSION: The DOCC model has the potential for cost savings during the intervention period and the follow-up periods immediately after the intervention while improving clinical effectiveness

Genet Epidemiol. 2018.

GENETIC ASSOCIATIONS WITH CHILDHOOD BRAIN GROWTH, DEFINED IN TWO LONGITUDINAL COHORTS.

Szekely E, Schwantes-An T-H, Justice CM, et al.

Genome-wide association studies (GWASs) are unraveling the genetics of adult brain neuroanatomy as measured by cross-sectional anatomic magnetic resonance imaging (aMRI). However, the genetic mechanisms that shape childhood brain development are, as yet, largely unexplored. In this study we identify common genetic variants associated with childhood brain development as defined by longitudinal aMRI. Genome-wide single nucleotide polymorphism (SNP) data were determined in two cohorts: one enriched for attention-deficit/hyperactivity disorder (ADHD) (LONG cohort: 458 participants; 119 with ADHD) and the other from a population-based cohort (Generation R: 257 participants). The growth of the brain's major regions (cerebral cortex, white matter, basal ganglia, and cerebellum) and one region of interest (the right lateral prefrontal cortex) were defined on all individuals from two aMRIs, and a GWAS and a pathway analysis were performed. In addition, association between polygenic risk for ADHD and brain growth was determined for the LONG cohort. For white matter growth, GWAS meta-analysis identified a genome-wide significant intergenic SNP (rs12386571, $P = 9.09 \times 10^{-9}$), near AKR1B10. This gene is part of the aldo-keto reductase superfamily and shows neural expression. No enrichment of neural pathways was detected and polygenic risk for ADHD was not associated with the brain growth phenotypes in the LONG cohort that was enriched for the diagnosis of ADHD. The study illustrates the use of a novel brain growth phenotype defined in vivo for further study

Hum Mov Sci. 2018;59:134-42.

FUNCTIONAL BRAIN CORRELATES OF MOTOR RESPONSE INHIBITION IN CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER AND ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Thornton S, Bray S, Langevin LM, et al.

Motor impairment is associated with developmental coordination disorder (DCD), and to a lesser extent with attention-deficit/hyperactivity disorder (ADHD). Previous functional imaging studies investigated children with DCD or ADHD only; however, these two disorders co-occur in up to 50% of cases, suggesting that similar

neural correlates are associated with these disorders. This study compared functional brain activation in children and adolescents (age range 8-17, $M = 11.73$, $SD = 2.88$) with DCD ($n = 9$), ADHD ($n = 20$), co-occurring DCD and ADHD ($n = 18$) and typically developing (TD) controls ($n = 20$). When compared to TD controls, children with co-occurring DCD/ADHD showed decreased activation during response inhibition in primary motor and sensory cortices. These findings suggest that children with co-occurring DCD and ADHD display significant functional changes in brain activation that could interfere with inhibition of erroneous motor responses. In contrast to previous studies, significant alterations in brain activation relative to TD controls, were not found in children with isolated DCD or ADHD. These findings highlight the importance of considering co-occurring disorders when investigating brain function in children with neurodevelopmental disorders

Indian J Psychiatry. 2018;60:131-34.

A STUDY ON ASSOCIATION OF IRON DEFICIENCY WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN A TERTIARY CARE CENTER.

Islam K, Seth S, Saha S, et al.

Background: Iron is important for brain development and cognitive function. Iron deficiency may cause alteration of neurotransmitters and may be manifested by different central nervous system disorders including attention deficit hyperactivity disorder (ADHD).

Aims: As studies are scarce in the Indian context, we had undertaken this study to find out the association between iron deficiency and ADHD.

Settings and Design: Hospital-based cross-sectional study.

Materials and Methods: Hematological parameters indicating iron status (hemoglobin [Hb], ferritin, Iron, total iron binding capacity [TIBC], mean corpuscular volume [MCV], and mean corpuscular Hb [MCH]) were measured among 119 ADHD patients selected by complete enumeration method and 119 controls.

Statistical Analysis: Shapiro-Wilk test, Mann-Whitney U-test, Spearman's correlation, and binary logistic regression were used. $P < 0.01$ was taken as statistically significant.

Results: Hb, iron, ferritin, MCV, and MCH were lower among cases and negatively correlated to ADHD, while reverse is true for TIBC and ADHD. Iron deficiency anemia makes one 3.82 times more prone for ADHD.

Conclusion: Iron deficiency was associated with ADHD

Int J Epidemiol. 2017 Apr;46:421-28.

ASSOCIATION BETWEEN POLYGENIC RISK SCORES FOR ATTENTION-DEFICIT HYPERACTIVITY DISORDER AND EDUCATIONAL AND COGNITIVE OUTCOMES IN THE GENERAL POPULATION.

Stergiakouli E, Martin J, Hamshere ML, et al.

Background: Children with a diagnosis of attention-deficit hyperactivity disorder (ADHD) have lower cognitive ability and are at risk of adverse educational outcomes; ADHD genetic risks have been found to predict childhood cognitive ability and other neurodevelopmental traits in the general population; thus genetic risks might plausibly also contribute to cognitive ability later in development and to educational underachievement.

Methods: We generated ADHD polygenic risk scores in the Avon Longitudinal Study of Parents and Children participants (maximum $N = 6928$ children and 7280 mothers) based on the results of a discovery clinical sample, a genome-wide association study of 727 cases with ADHD diagnosis and 5081 controls. We tested if ADHD polygenic risk scores were associated with educational outcomes and IQ in adolescents and their mothers.

Results: High ADHD polygenic scores in adolescents were associated with worse educational outcomes at Key Stage 3 [national tests conducted at age 13-14 years; $\beta = -1.4$ (-2.0 to -0.8), $P = 2.3 \times 10^{-6}$], at General Certificate of Secondary Education exams at age 15-16 years ($\beta = -4.0$ (-6.1 to -1.9), $P = 1.8 \times 10^{-4}$), reduced odds of sitting Key Stage 5 examinations at age 16-18 years [odds ratio (OR) = 0.90 (0.88 to 0.97), $P = 0.001$] and lower IQ scores at age 15.5 [$\beta = -0.8$ (-1.2 to -0.4), $P = 2.4 \times 10^{-4}$]. Moreover,

maternal ADHD polygenic scores were associated with lower maternal educational achievement [$\beta = -0.09$ (-0.10 to -0.06), $P = 0.005$] and lower maternal IQ [$\beta = -0.6$ (-1.2 to -0.1), $P = 0.03$].

Conclusions: ADHD diagnosis risk alleles impact on functional outcomes in two generations (mother and child) and likely have intergenerational environmental effects

Int J Epidemiol. 2017 Apr;46:409-20.

PARENTAL AGE AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD).

Hvolgaard MS, Olsen J, Bech BH, et al.

Background: Previous studies have suggested that young mothers more often have children with ADHD. We used sibling comparisons to examine the nature of this association and to investigate if this association is explained by early environment or genetic and socioeconomic factors.

Methods: A large population-based cohort including all singletons born in Denmark from 1 January 1991 through 31 December 2005 was followed from birth until 30 April 2011. Data were available for 94% ($N = 943\,785$) of the population. Offspring ADHD was identified by an ICD-10 diagnosis of Hyperkinetic Disorder (HKD). We used sibling-matched Cox regression to control for genetic and socioeconomic factors.

Results: In the population cohort we found that children born by parents aged 20 years or younger had more than twice the risk of being diagnosed with ADHD compared with children with parents between 26 and 30 years of age. When comparing full siblings the associations were attenuated, but we found a trend of increased risk of ADHD with decreasing maternal age, which was not seen for paternal age.

Conclusions: Sibling comparisons suggested that the associations between both maternal and paternal age and ADHD are partly explained by common genetic and socioeconomic factors. The trend of increased risk of ADHD with decreasing maternal age, but not with paternal age, may be linked to pregnancy or early-life environmental factors. Even though only a smaller part of the association can be attributed to environmental factors, there is a public health interest to support young parents through their first years of parenthood

Int J Psychiatry Med. 2017 Jan;52:72-87.

SLEEP AND QUALITY OF LIFE IN CHILDREN WITH TRAUMATIC BRAIN INJURY AND ADHD.

Ekinci O, Okuyaz C, Gunes S, et al.

Objective Attention problems are common in children who sustain a traumatic brain injury (TBI). The differential features of TBI-related Attention Deficit Hyperactivity Disorder (ADHD) and primary ADHD are largely unknown. This study aimed to compare sleep problems and quality of life between children with TBI and ADHD and children with primary ADHD.

Methods Twenty children with TBI (mean age = 12.7 +/- 3.1 years) who had clinically significant ADHD symptoms according to the structured diagnostic interview and rating scales and a control group with primary ADHD ($n = 20$) were included. Parents completed Children's Sleep Habits Questionnaire (CSHQ) and Kinder Lebensqualitätsfragebogen: Children's Quality of Life Questionnaire-revised (KINDL-R). Neurology clinic charts were reviewed for TBI-related variables.

Results When compared to children with primary ADHD, the Total Score and Sleep Onset Delay, Daytime Sleepiness, Parasomnias, and Sleep Disordered Breathing subscores of CSHQ were found to be higher in children with TBI and ADHD. The Total Score and Emotional Well-Being and Self-Esteem subscores of the KINDL-R were found to be low (poorer) in children with TBI and ADHD. The Total Score and certain subscores of KINDL-R were found to be lower in TBI patients with a CSHQ > 56 (corresponds to significant sleep problems) when compared to those with a CSHQ < 56. CSHQ Total Score was negatively correlated with age.

Conclusion Children with TBI and ADHD symptoms were found to have a poorer sleep quality and quality of life than children with primary ADHD. ADHD in TBI may be considered as a highly impairing condition which must be early diagnosed and treated

Int J Qual Stud Health Well -being. 2017 Jun;12:1298262.

HEROIC STRUGGLES, CRIMINALS AND SCIENTIFIC BREAKTHROUGHS: ADHD AND THE MEDICALIZATION OF CHILD BEHAVIOUR IN AUSTRALIAN NEWSPRINT MEDIA 1999-2009.

Harwood V, Jones S, Bonney A, et al.

There is a dearth of scholarly analysis and critique of the Australian newsprint media's role in the medicalization of child behaviour. To begin to redress this lack this paper analyses newsprint media's use of metaphors that re/describe and construct realities of ADHD with a medicalizing effect. The interdisciplinary team used the Factiva(TM) database to locate and review 453 articles published in Australian national and metropolitan newspapers during the decade 1999-2009. Data analysis involved generating statistical descriptions of the dataset according to attributes such as: date, state, newspaper titles and author names. This was followed by inductive analysis of article content. Content analysis revealed pervasive and striking use of metaphor in newsprint media reporting of ADHD content, especially when describing health professionals, educators, parents and children. This collection of metaphors was striking, and while the metaphors deployed were varied, this diversity seemed underscored by a common functionality that increased the risk that child behaviour was explained using medicalized knowledge. We contend that these metaphors collectively and coherently functioned to simplify and delimit meanings of children's health and behaviour to favour depictions that medicalize problems of children and childhood

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Int J Qual Stud Health Well -being. 2017 Jun;12:1298269.

INTERPRETING THE INNER WORLD OF ADHD CHILDREN: PSYCHOANALYTIC PERSPECTIVES.

Salomonsson B.

ADHD is increasingly seen as associated with cerebral dysfunction and caused by it. This development is concomitant with an emphasis on medication, behavioural treatments, and parent training programmes. In contrast, psychoanalytic therapy has receded into the background and is often viewed as inefficient or even noxious. This paper argues that such views are based on a misunderstanding of the scope of psychotherapy. Though much more systematic research is needed to establish its efficacy, it can inform on the ADHD child's emotional experiences. It can shed light on the connections between his/her inner world and symptoms, such as attention deficits, hyperactivity, and impulsivity. On the other hand, it cannot establish causality in the individual or general case. If we recall that the diagnosis is based on a list of symptoms, not of etiology, we realize that this limitation applies to any scientific perspective on ADHD. Psychoanalytic treatment is one of several approaches to understanding ADHD and helping the child cope with it. This is achieved by the psychoanalytic method, a hermeneutic approach with which the analyst interprets the child's behaviours and communications as they emerge in the session. The implications of such an approach are discussed.

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Int J Qual Stud Health Well -being. 2017 Jun;12:1298270.

NON-DIAGNOSTIC BASED APPROACHES TO HELPING CHILDREN WHO COULD BE LABELLED ADHD AND THEIR FAMILIES.

Timimi S.

Mental health services are not always good for you. There are some troubling facts to confront such as the increase in the use of diagnostic based approaches and psychotropic medications for children and young people being associated with poorer rather than better outcomes. In this article I will outline some of the evidence around outcome as a result of treatment for young people diagnosed with attention deficit hyperactivity disorder (ADHD) and for those who are prescribed long-term stimulants. I will then discuss clinical approaches that move beyond a focus on symptom management that diagnostic paradigms encourage. This includes clinical models that take account of the diversity of contextual and relational issues that young patients present with and the possibility afforded of engaging in more positive and hopeful therapeutic approaches such as the Relational Awareness Programme (RAP)

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Int J Qual Stud Health Well -being. 2017 Jun;12:1298267.

ADHD: A CRITICAL UPDATE FOR EDUCATIONAL PROFESSIONALS.

Te Meerman S, Batstra L, Grietens H, et al.

A medical approach towards behavioural problems could make professionals without a medical background, like teachers and other educational professionals feel inapt. In this article, we raise six scientifically grounded considerations regarding ADHD, currently the most prevalent childhood psychiatric diagnosis. These "need to knows" show just how misguided and potentially stigmatizing current conceptualizations of unruly behaviour have become. Some examples are given of how teachers are misinformed, and alternative ways of reporting about neuropsychological research are suggested. A reinvigorated conceptual understanding of ADHD could help educational institutions to avoid the expensive outsourcing of behavioural problems that could also-and justifiably better-be framed as part of education's primary mission of professionalized socialization

Int J Qual Stud Health Well -being. 2017 Jun;12:1298266.

IS RESTLESSNESS BEST UNDERSTOOD AS A PROCESS? REFLECTING ON FOUR BOYS' RESTLESSNESS DURING MUSIC THERAPY IN KINDERGARTEN.

Helle-Valle A, Binder PE, Anderssen N, et al.

ADHD can be considered an internationally recognized framework for understanding children's restlessness. In this context, children's restlessness is understood as a symptom of neurodevelopmental disorder. However, there are other possible understandings of children's restlessness. In this article, we explore four boys' collaborative and creative process as it is described and understood by three adults. The process is framed by a community music therapy project in a Norwegian kindergarten, and we describe four interrelated phases of this process: Exploring musical vitality and cooperation, Consolidating positions, Performing together, and Discovering ripple effects. We discuss these results in relation to seven qualities central to a community music therapy approach: participation, resource orientation, ecology, performance, activism, reflexivity and ethics. We argue that in contrast to a diagnostic approach that entails a focus on individual problems, a community music therapy approach can shed light on adult and systemic contributions to children's restlessness

Int J Qual Stud Health Well -being. 2017 Jun;12:1298268.

PHARMACEUTICAL ENTANGLEMENTS: AN ANALYSIS OF THE MULTIPLE DETERMINANTS OF ADHD MEDICATION EFFECTS IN A CHILEAN SCHOOL.

Rojas NS, Vrecko S.

This article draws upon findings from ethnographic fieldwork conducted in a Chilean school to explore how the effects of globally circulating ADHD medications emerge within the localized contexts of everyday users. An analysis of observations of children on ADHD medications within classroom settings is developed which challenges the assumption, pervasive within biomedical paradigms, that the effects of such medications can be understood as resulting directly from their chemical properties and biological modes of action. Our case study highlights the significance of multiple, interacting determinants of drug effects in an everyday setting, focusing in particular on classroom dynamics, teacher-student relations, and the agency of children taking the medications. We conclude that while ADHD medications may act in part by altering physiological processes, an adequate account of their effects requires that analytic attention extends to the sociomaterial contexts in which medications and users are embedded

Integr Psychol Behav Sci. 2018 Mar;52:129-51.

THE DANCE OF ATTENTION: TOWARD AN AESTHETIC DIMENSION OF ATTENTION-DEFICIT.

Levin K.

What role does the aesthetics of bodily movement play in the understanding of attention among children diagnosed with attention-deficit/hyperactivity disorder (ADHD)? This article animates a phenomenological approach to attention and embodiment with a special focus on the relation between aesthetic or expressive bodily movement and behavioral awareness in children diagnosed with ADHD. However, beyond this it is argued that the aesthetic aspect of movement calls for an expansion of the phenomenological perspective. In this context Gilles Deleuze's notion of aesthetics as a 'science of the sensible' is activated and discussed in relation to the phenomenological concept of perception. Empirically the article takes point of departure in a qualitative study conducted with a group of children with attention-deficit practicing the Afro-Brazilian marital art, capoeira. Combining ethnographic and phenomenological methods, it is demonstrated that capoeira can be considered a form of aesthetic movement that offers a transition of attention-deficit into a productive force of expression that changes the notions of sensation and movement in ADHD

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Iran J Pediatr. 2018;28:1-8.

A COMPARATIVE STUDY OF RISPERIDONE AND ARIPIPRAZOLE IN ATTENTION DEFICIT HYPERACTIVITY DISORDER IN CHILDREN UNDER SIX YEARS OLD: A RANDOMIZED DOUBLE-BLIND STUDY.

Razjouyan K, Danesh A, Khademi M, et al.

Background: Stimulants are not very effective on attention deficit hyperactivity disorder (ADHD) children under 6 years old. The most common medication that is used in this range of age is Risperidone. Evaluating the safety and efficacy of Aripiprazole versus Risperidone for treating children under 6 years suffering from ADHD was the aim of this study.

Methods: During this double-blind clinical trial, 34 children aged 3 - 6 years who were diagnosed with ADHD, received treatments with Aripiprazole or Risperidone randomly for 12 weeks. Follow-up measures comprised, CGAS, the ADHD-RS, CPRS and side effect checklist.

Results: The findings revealed that 20 patients in Risperidone group (including 13 boys and 7 girls) and 20 patients in Aripiprazole group (including 13 boys and 7 girls) had at least one follow-up examination. After 12 weeks of the study, both medications showed distinct improvements in ADHD RS ($P < 0.001$), CPRS ($P < 0.001$) and CGAS ($P < 0.001$) scores. The statistic difference between them was not significantly different. The most common side effects in Risperidone group were reported to be panic (20%), nausea and vomiting (20%), while in Aripiprazole they were reported to be increased appetite (25%) and somnolence (15%).

Conclusions: The findings revealed that both Risperidone and Aripiprazole are effective in treating ADHD children under 6 years old and there was no significant difference between the two drugs. Children can tolerate them well. Aripiprazole effect on children showed itself earlier compared to Risperidone

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Ir J Med Sci. 2018;1-9.

GENERAL PRACTITIONERS' (GP) ATTITUDES AND KNOWLEDGE ABOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) IN IRELAND.

Adamis D, Tatlow-Golden M, Gavin B, et al.

Background: ADHD is the most frequent reason for attendance at Child and Adolescent Mental Health Services (CAMHS). General practitioners (GPs) play a key role in recognising symptoms, referring for assessment and supporting ongoing treatment. However, there is an ambiguous understanding of ADHD among GPs, and different attitudes regarding the validity of ADHD as a construct. The present study aims to explore and identify GPs attitudes and beliefs about ADHD in the Irish context, and to find out the association of those attitudes with other factors.

Methods: Representative sample of qualified GPs registered to the Irish Medical Directory. The survey included questions about GPs practice, attitudes towards ADHD, knowledge of symptoms and workup for ADHD, previous training and personal experience of ADHD.

Results: A hundred and forty GPs participated (response rate 28%). Factor analysis indicated 58.8% expressed a positive attitude towards ADHD. Those who have positive attitudes were more likely to be between 36 and 55 years old, seeing fewer children with suspected ADHD per year and working as part of a primary care team. Years of practice, personal experience of ADHD, training and knowledge in ADHD and access to CAMHS or psychology were not significantly related to either positive or negative ADHD attitudes.

Conclusions: Despite the high rates of ADHD among children, a slim majority of Irish GPs have positive attitudes towards ADHD. This could lead to undiagnosed or misdiagnosed cases. Strategies need to be considered to address this

J AAPOS. 2017 Jun;21:185-89.

STRABISMUS AND MENTAL DISORDERS AMONG ISRAELI ADOLESCENTS.

Merdler I, Giladi M, Sorkin N, et al.

PURPOSE: To assess the association between strabismus and mental disorders in adolescents.

METHODS: This case-control study included 662,641 Israeli teenagers that underwent medical evaluation by the Israel Defense Force as part of the precription assessment between 2005 and 2013. The association between common mental disorders (anxiety disorder, mood disorder, adjustment disorder, and attention deficit hyperactivity disorder [ADHD]) and either uncorrected strabismus or corrected strabismus was examined. The association with strabismus correction was assessed by the differences between the corrected and uncorrected groups.

RESULTS: The mean age at the time of the examination was 17.3 +/- 0.53 years, with a male predominance (59%). A total of 1,598 subjects (0.24%) had strabismus. Of those, 952 (60%) underwent successful correction and 646 (40%) did not undergo successful correction. A significant association was found between uncorrected strabismus and anxiety disorders (OR = 1.91; 95% CI = 1.02-3.57; P = 0.047) and between corrected strabismus and ADHD (OR = 2.62; 95% CI = 1.18-5.87; P = 0.03). Strabismus correction (as assessed by comparing the uncorrected and corrected strabismus groups) was not significantly associated with the mental disorders we examined, but a nearly statistically significant association with anxiety disorder was observed (OR = 2.978; 95% CI, 1.013-8.754; P = 0.06).

CONCLUSIONS: The evidence from our cohort suggests that strabismus correction, even in the absence of visual impairment, is not associated with mental disorders examined in this study

J Abnorm Child Psychol. 2017 Aug;45:1105-18.

LANGUAGE DIFFICULTY AT SCHOOL ENTRY AND THE TRAJECTORIES OF HYPERACTIVITY-INATTENTION PROBLEMS FROM AGES 4 TO 11: EVIDENCE FROM A POPULATION-REPRESENTATIVE COHORT STUDY.

Shaun Goh KY, O'Kearney R.

Latent growth curve modelling was used to contrast the developmental trajectories of hyperactivity-inattention (H-I) problems across childhood for children with a language difficulty at the start of school and those with typical language and to examine if the presence of a language difficulty moderates the associations of child, parent and peer predictors with these trajectories. Unconditional and language-status conditional latent growth curves of H-I problems were estimated for a large nationally representative cohort of children, comprising 1627 boys

J Abnorm Child Psychol. 2017 Aug;45:1221-33.

UNIQUE ASSOCIATIONS BETWEEN CHILDHOOD TEMPERAMENT CHARACTERISTICS AND SUBSEQUENT PSYCHOPATHOLOGY SYMPTOM TRAJECTORIES FROM CHILDHOOD TO EARLY ADOLESCENCE.

Forbes MK, Rapee RM, Camberis AL, et al.

Existing research suggests that temperamental traits that emerge early in childhood may have utility for early detection and intervention for common mental disorders. The present study examined the unique

relationships between the temperament characteristics of reactivity, approach-sociability, and persistence in early childhood and subsequent symptom trajectories of psychopathology (depression, anxiety, conduct disorder, and attention-deficit hyperactivity disorder; ADHD) from childhood to early adolescence. Data were from the first five waves of the older cohort from the Longitudinal Study of Australian Children (n = 4983; 51.2% male), which spanned ages 4-5 to 12-13. Multivariate ordinal and logistic regressions examined whether parent-reported child temperament characteristics at age 4-5 predicted the study child's subsequent symptom trajectories for each domain of psychopathology (derived using latent class growth analyses), after controlling for other presenting symptoms. Temperament characteristics differentially predicted the symptom trajectories for depression, anxiety, conduct disorder, and ADHD: Higher levels of reactivity uniquely predicted higher symptom trajectories for all 4 domains; higher levels of approach-sociability predicted higher trajectories of conduct disorder and ADHD, but lower trajectories of anxiety; and higher levels of persistence were related to lower trajectories of conduct disorder and ADHD. These findings suggest that temperament is an early identifiable risk factor for the development of psychopathology, and that identification and timely interventions for children with highly reactive temperaments in particular could prevent later mental health problems

J Affect Disord. 2018 Jan;225:404-12.

SPECIFICITY AND OVERLAP OF ATTENTION AND MEMORY BIASES IN DEPRESSION.

Marchetti I, Everaert J, Dainer-Best J, et al.

BACKGROUND: Attentional and memory biases are viewed as crucial cognitive processes underlying symptoms of depression. However, it is still unclear whether these two biases are uniquely related to depression or whether they show substantial overlap.

METHODS: We investigated the degree of specificity and overlap of attentional and memory biases for depressotypic stimuli in relation to depression and anxiety by means of meta-analytic commonality analysis. By including four published studies, we considered a pool of 463 healthy and subclinically depressed individuals, different experimental paradigms, and different psychological measures.

RESULTS: Memory bias is reliably and strongly related to depression and, specifically, to symptoms of negative mood, worthlessness, feelings of failure, and pessimism. Memory bias for negative information was minimally related to anxiety. Moreover, neither attentional bias nor the overlap between attentional and memory biases were significantly related to depression.

LIMITATIONS: Limitations include cross-sectional nature of the study. **CONCLUSIONS:** Our study showed that, across different paradigms and psychological measures, memory bias (and not attentional bias) represents a primary mechanism in depression

J Am Acad Child Adolesc Psychiatry. 2017 Aug;56:703-12.

SEX DIFFERENCES IN THE RELATIONSHIP BETWEEN CONDUCT DISORDER AND CORTICAL STRUCTURE IN ADOLESCENTS.

Smaragdi A, Cornwell H, Toschi N, et al.

OBJECTIVE: Previous studies have reported reduced cortical thickness and surface area and altered gyrification in frontal and temporal regions in adolescents with conduct disorder (CD). Although there is evidence that the clinical phenotype of CD differs between males and females, no studies have examined whether such sex differences extend to cortical and subcortical structure.

METHOD: As part of a European multisite study (FemNAT-CD), structural magnetic resonance imaging (MRI) data were collected from 48 female and 48 male participants with CD and from 104 sex-, age-, and pubertal-status-matched controls (14-18 years of age). Data were analyzed using surface-based morphometry, testing for effects of sex, diagnosis, and sex-by-diagnosis interactions, while controlling for age, IQ, scan site, and total gray matter volume.

RESULTS: CD was associated with cortical thinning and higher gyrification in ventromedial prefrontal cortex in both sexes. Males with CD showed lower, and females with CD showed higher, supramarginal gyrus

cortical thickness compared with controls. Relative to controls, males with CD showed higher gyrification and surface area in superior frontal gyrus, whereas the opposite pattern was seen in females. There were no effects of diagnosis or sex-by-diagnosis interactions on subcortical volumes. Results are discussed with regard to attention-deficit/hyperactivity disorder, depression, and substance abuse comorbidity, medication use, handedness, and CD age of onset.

CONCLUSION: We found both similarities and differences between males and females in CD-cortical structure associations. This initial evidence that the pathophysiological basis of CD may be partly sex-specific highlights the need to consider sex in future neuroimaging studies and suggests that males and females may require different treatments

J Atten Disord. 2017 Nov;21:1105-20.

A PILOT TRIAL OF MINDFULNESS MEDITATION TRAINING FOR ADHD IN ADULTHOOD: IMPACT ON CORE SYMPTOMS, EXECUTIVE FUNCTIONING, AND EMOTION DYSREGULATION.

Mitchell JT, McIntyre EM, English JS, et al.

OBJECTIVE: Mindfulness meditation training is garnering increasing empirical interest as an intervention for ADHD in adulthood, although no studies of mindfulness as a standalone treatment have included a sample composed entirely of adults with ADHD or a comparison group. The aim of this study was to assess the feasibility, acceptability, and preliminary efficacy of mindfulness meditation for ADHD, executive functioning (EF), and emotion dysregulation symptoms in an adult ADHD sample.

METHOD: Adults with ADHD were stratified by ADHD medication status and otherwise randomized into an 8-week group-based mindfulness treatment (n = 11) or waitlist group (n = 9).

RESULTS: Treatment feasibility and acceptability were positive. In addition, self-reported ADHD and EF symptoms (assessed in the laboratory and ecological momentary assessment), clinician ratings of ADHD and EF symptoms, and self-reported emotion dysregulation improved for the treatment group relative to the waitlist group over time with large effect sizes. Improvement was not observed for EF tasks.

CONCLUSION: Findings support preliminary treatment efficacy, though require larger trials

J Atten Disord. 2017 Oct;21:1009-19.

ADHD SYMPTOMOLOGY AND SOCIAL FUNCTIONING IN COLLEGE STUDENTS.

Sacchetti GM, Lefler EK.

OBJECTIVE: ADHD is no longer considered a disorder that children simply outgrow. Adults experience ADHD at high rates (2.5%-5%) and are impaired in multiple life domains, including social impairment. The purpose of this study was to examine emerging adults with varying degrees of ADHD symptomology in respect to social impairment, state and trait anger, romantic relationship satisfaction, and intimate partner violence (IPV).

METHOD: College students, a subset of emerging adults, were recruited to complete measures online.

RESULTS: Data were analyzed using a series of multiple regressions. Higher levels of ADHD symptomology in college students were related to increased social impairment and higher levels of state and trait anger, but not romantic relationship satisfaction or rates of IPV.

CONCLUSION: Anger management and social skills training may be beneficial treatment components for this group

J Atten Disord. 2017 Oct;21:1020-29.

PEER RELATIONSHIPS IN UNDERGRADUATES WITH ADHD SYMPTOMATOLOGY: SELECTION AND QUALITY OF FRIENDSHIPS.

McKee TE.

OBJECTIVE: This study investigated the relationships between ADHD symptomatology and friendship formation, social skills, and the quality of specific friendships in college students.

METHOD: A total of 156 students, 75 of whom had high self-reported ADHD symptomatology, participated. Friends of 68 participants completed measures of friendship quality.

RESULTS: Students had more positive first impressions of and reported being friends with others whose ADHD symptom severity matched their own. Participants with high ADHD symptoms reported greater difficulty providing emotional support and managing interpersonal conflict than their low-symptom peers. Greater ADHD symptoms in participants and friends were related to reduced quality of specific relationships, but similarity of severity of symptomatology in the dyad benefited the relationship.

CONCLUSION: These findings have implications for the kind of support offered to students with high ADHD symptomatology when they transition to college. Future longitudinal research examining relationships of varying levels of closeness should be conducted

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J Atten Disord. 2017 Oct;21:997-1008.

CHILDHOOD ADHD POTENTIATES THE ASSOCIATION BETWEEN PROBLEMATIC DRINKING AND INTIMATE PARTNER VIOLENCE.

Wymbs BT, Walther CAP, Cheong J, et al.

OBJECTIVE: Excessive alcohol consumption increases risk of perpetrating intimate partner violence (IPV). ADHD is associated with problematic drinking and IPV, but it is unclear whether problem drinkers with ADHD are more likely than those without ADHD to perpetrate IPV.

METHOD: We compared the strength of association between problem drinking trajectories and IPV perpetration among 19- to 24-year-old men with (n = 241) and without (n = 180) childhood ADHD.

RESULTS: Men with ADHD who reported higher heavy episodic drinking or alcohol use problems at age 19, and slower decreases in alcohol use problems from age 19 to 24, were more likely to perpetrate IPV than problem drinkers without ADHD, among whom the same associations were non-significant. Associations between problem drinking and IPV were not attenuated in adults with ADHD upon controlling for antisocial personality disorder.

CONCLUSION: Study findings highlight the heightened risk of problem drinkers with ADHD perpetrating IPV

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J Atten Disord. 2017 Nov;21:1087-93.

COGNITIVE PROCESSES IN ADHD AND ASPERGER'S DISORDER: OVERLAPS AND DIFFERENCES IN PASS PROFILES.

Taddei S, Contena B.

OBJECTIVE: Many studies report on the usefulness of the evaluation of Executive Functions (EF) in the assessment of participants with ADHD, while others underline how deficits of EF in these participants are not consistent and that the same executive deficits are present in many other disorders, particularly in Asperger's disorder. Using the Planning Attention Simultaneous Successive (PASS) theory, the present study explores the cognitive profiles of participants with ADHD or Asperger's disorder and compares the cognitive functioning of these two diagnostic groups.

METHOD: Forty-four children, 24 with a diagnosis of ADHD and 20 with a diagnosis of Asperger's disorder, participated and their cognitive processes were evaluated with the Cognitive Assessment System.

RESULTS: Results underline specific cognitive profiles in ADHD and Asperger's disorder characterized by weaknesses in planning and attention, but with a diverse level of severity.

CONCLUSION: Implications of the different cognitive profiles of these diagnostic groups are discussed

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J Atten Disord. 2017 Nov;21:1094-104.

TREATING COMORBID ANXIETY IN ADOLESCENTS WITH ADHD USING A COGNITIVE BEHAVIOR THERAPY PROGRAM APPROACH.

Houghton S, Alsalmi N, Tan C, et al.

OBJECTIVE: To evaluate an 8-week cognitive behavior therapy (CBT) treatment specifically designed for adolescents with ADHD and comorbid anxiety.

METHOD: Using a multiple baseline design, nine adolescents (13 years to 16 years 9 months) received a weekly CBT, which focused on four identified anxiety-arousing times. Participants self-recorded their levels of anxiety for each of the four times during baseline, intervention, and a maintenance phase. Anxiety was also assessed using the Multidimensional Anxiety Scale for Children (MASC).

RESULTS: Paired samples t tests supported the success of the intervention. Interrupted time-series data for each participant revealed varying rates of success across the four times, however. The MASC data revealed significant reductions in Physical Symptoms of Anxiety, Social Anxiety, Separation Anxiety, Harm Avoidance, and Total Anxiety.

CONCLUSION: The data demonstrate the efficacy of a CBT program for the treatment of comorbid anxiety in adolescents with ADHD

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J Atten Disord. 2017 Nov;21:1121-29.

THE IMPACT OF A MOTOR-COGNITIVE REMEDIATION PROGRAM ON ATTENTIONAL FUNCTIONS OF PRESCHOOLERS WITH ADHD SYMPTOMS.

Chevalier N, Parent V, Rouillard M, et al.

OBJECTIVE: The purpose of this study was to measure the impact of the motor-cognitive remediation program (MCRP) that uses sensorimotor and visual-motor imagery techniques on attentional functions in preschoolers with ADHD symptoms.

METHOD: A total of 15 high-risk preschoolers were selected based on high ADHD symptoms. An experimental group participated in the MCRP and was compared with a control group. The MCRP consisted of 30 activities, 3 times a week, during 12 weeks.

RESULTS: Children in the experimental group improved significantly for orienting (selective attention) and executive control (inhibition, stopping, and engaging mental operations) compared with the control group.

CONCLUSION: These results are a first step to support the postulate that training specific attentional functions by sensorimotor activities and visual-motor imagery has an impact on the cognitive network of attention. This study suggests the potential value of MCRP addressed to preschoolers with ADHD symptoms

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J Atten Disord. 2017 Oct;21:975-85.

IS MATERNAL SMOKING DURING PREGNANCY A RISK FACTOR FOR CIGARETTE SMOKING IN OFFSPRING? A LONGITUDINAL CONTROLLED STUDY OF ADHD CHILDREN GROWN UP.

Biederman J, Martelon M, Woodworth KY, et al.

OBJECTIVE: This study examined whether exposure to maternal smoking during pregnancy in children with and without ADHD is associated with smoking in offspring and whether this association is selective to ADHD children.

METHOD: Ninety-six exposed and 400 unexposed participants were derived from two longitudinal studies of boys and girls with and without ADHD. Maternal smoking during pregnancy was defined by interviews with participants' mothers.

RESULTS: A significant association was observed between exposure to maternal smoking in pregnancy and cigarette smoking in offspring ($p = .02$). Exposed offspring were also more likely to have higher rates of major depression ($p = .04$), bipolar disorder ($p = .04$), and conduct disorder ($p = .04$), and lower IQ ($p = .01$), lower Global Assessment of Functioning (GAF) score ($p = .02$), and more impaired Social Adjustment Inventory for Children and Adolescents (SAICA) scores versus unexposed offspring, adjusting for social class.

CONCLUSION: Maternal smoking during pregnancy was found to increase the risk for smoking and a wide range of adverse psychiatric, cognitive, and functional outcomes in youth

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J Atten Disord. 2017 Nov;21:1063-72.

HEALTH CARE COSTS ASSOCIATED WITH PARENT-REPORTED ADHD: A LONGITUDINAL AUSTRALIAN POPULATION-BASED STUDY.

Sciberras E, Lucas N, Efron D, et al.

OBJECTIVE: To examine the health care costs associated with ADHD within a nationally representative sample of children.

METHOD: Data were from Waves 1 to 3 (4-9 years) of the Longitudinal Study of Australian Children (N = 4,983). ADHD was defined by previous diagnosis and a measure of ADHD symptoms (Strengths and Difficulties Questionnaire [SDQ]). Participant data were linked to administrative data on health care costs. Analyses controlled for demographic factors and internalizing and externalizing comorbidities.

RESULTS: Costs associated with health care attendances and medications were higher for children with parent-reported ADHD at each age. Cost differences were highest at 8 to 9 years for both health care attendances and medications. Persistent symptoms were associated with higher costs ($p < .001$). Excess population health care costs amounted to Aus\$25 to Aus\$30 million over 6 years, from 4 to 9 years of age.

CONCLUSION: ADHD is associated with significant health care costs from early in life. Understanding the costs associated with ADHD is an important first step in helping to plan for service-system changes

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J Atten Disord. 2017 Oct;21:1030-39.

SELF-MONITORING BY COLLEGE STUDENTS WITH ADHD: THE IMPACT ON ACADEMIC PERFORMANCE.

Scheithauer MC, Kelley ML.

OBJECTIVE: There is a lack of empirically supported treatments for college students with ADHD and academic deficits. The current study evaluated self-monitoring, an intervention that may improve academics in children with ADHD, with a college sample diagnosed with ADHD.

METHOD: Fifty-three participants were recruited, 41 of which completed the study and are included in the analyses. Participants were randomly assigned to a group that received study skills instruction, goal setting, and self-monitoring instruction (SM+ group; $n = 22$) or a group that received only study skills and goal setting (SM- group; $n = 19$).

RESULTS: Participants in the SM+ group demonstrated significant improvement in their ADHD symptoms, academic behavior, grade point averages (GPAs), and goal attainment. These improvements were not significant for the SM- group.

CONCLUSION: These findings suggest that self-monitoring might be used to improve academic performance in college students with ADHD

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J Child Neurol. 2017 Jul;32:725-30.

PARENT AND PATIENT PERCEPTIONS OF FUNCTIONAL IMPAIRMENT DUE TO TOURETTE SYNDROME: DEVELOPMENT OF A SHORTENED VERSION OF THE CHILD TOURETTE SYNDROME IMPAIRMENT SCALE.

Barfell KSF, Snyder RR, Isaacs-Cloes KM, et al.

The Child Tourette Syndrome Impairment Scale (CTIM) rates 37 problems in school, social, and home domains separately for tics and for comorbid diagnoses. However, a shorter version would be easier to implement in busy clinics. Using published data from 85 children with Tourette syndrome, 92 controls, and parents, factor analysis was used to generate a "mini-CTIM" composed of 12 items applied to tic and comorbid diagnoses. Child- and parent-rated mini-CTIM scores were compared and correlated across raters and accounting for clinician-rated tic severity and presence of attention-deficit hyperactivity disorder (ADHD) and obsessive-compulsive disorder (OCD). The mini-CTIM achieved domain Cronbach alphas ranging from

0.71 to 0.94 and intra-item correlation coefficients ranging from 0.84 to 0.96. The resulting scale correlated with clinician-rated tic severity and reflected the presence of ADHD and OCD. The mini-CTIM appears promising as a practical assessment tool for tic- and non-tic-related impairment in children with Tourette syndrome

J Dev Behav Pediatr. 2017 Jul;38:446-48.

WEEDING OUT THE JUSTIFICATION FOR MARIJUANA TREATMENT IN PATIENTS WITH DEVELOPMENTAL AND BEHAVIORAL CONDITIONS.

Nelson T, Liu YH, Bagot KS, et al.

CASE: Alex is a 13-year-old adolescent with high-functioning autism spectrum disorder, attention-deficit/hyperactivity disorder (ADHD)-combined type, anxiety, and depression. He has been resistant to engaging in therapy and treatment with various medications has been unsuccessful. Alex's parents are concerned about his anxiety, isolation, oppositional behaviors, academic underachievement, truancy, and substance use. A recent altercation with his stepfather led to a police intervention and a brief removal of Alex from the home. Alex previously used alcohol and other drugs; at present, he reports that his current drug use consists of frequently smoking pot. Alex states that he uses marijuana to relieve his anxiety and does not understand why this is problematic as marijuana is now legal in his state. Kevin is a 24-year-old adult man with diagnoses of autism spectrum disorder, mild intellectual disability, and schizoaffective disorder. He has a long history of challenging and problematic behaviors including aggression toward self and others, property destruction, inappropriate sexual behaviors, elopement, emotional outbursts, anxiety, and suicidal ideation. Past diagnoses include bipolar affective disorder, depression, and intermittent explosive disorder. Kevin is notably obese and somnolent. His current medications include 8 psychotropic medications, 3 antiallergy medications, levothyroxine, and a fish oil supplement. His father reports that medications have gradually been added and dosages increased over time. Two weeks ago, his new psychiatrist initiated a trial of medical marijuana. His father hopes that the marijuana will allow Kevin's other medications to be decreased or discontinued. Linda is an 11-year-old girl with high-functioning autism spectrum disorder, anxiety, and ADHD-inattentive subtype. Anxiety has been her most impairing condition, and Linda has been responding well to a treatment with cognitive behavioral therapy and a selective serotonin reuptake inhibitor. She is also working with her therapist on strategies to address her symptoms of ADHD. Linda has had no side effects from her medication and she and her family have been pleased with her progress. At a follow-up appointment, her mother brings an article from the lay press authored by a parent who claims that marijuana "saved" her autistic son. Linda's mother asks if marijuana should be considered for her daughter

J Dev Behav Pediatr. 2017 Jul;38:378-84.

VICTIMIZATION BY SIBLINGS IN CHILDREN WITH DISABILITY OR WEIGHT PROBLEMS.

Tucker CJ, Finkelhor D, Turner H.

OBJECTIVE: Children with a physical disability, psychological disorder, or of nonnormative weight are often targets of peer victimization. Sibling victimization, however, is more common than peer victimization, but rarely explored. We investigated linkages between sibling victimization and whether children had a physical disability, psychological disorder (i.e., internalizing disorder, attention deficit disorder/attention-deficit hyperactivity disorder), and were perceived by parents as being thinner than average or overweight. Also, we explored how the extent and kinds of sibling victimization experiences were related to these characteristics in childhood.

METHODS: A US probability sample of adult caregivers of a child aged 0 to 9 (N = 780; 50% women; mean age 4.58) in 2-child households who completed a telephone interview.

RESULTS: Controlling for other forms of maltreatment and individual and family characteristics, children with a physical disability and parent-perceived children who are thinner than average and children who are overweight experienced more sibling victimization. Children with an internalizing disorder experienced less sibling victimization. Sibling victimization did not differ for children with and without ADHD. Children perceived

to be overweight by parents and children with a physical disability were at increased risk of experiencing more types of sibling victimization. Children with a physical disability had greater odds of being victims of property victimization by a sibling.

CONCLUSION: Children with a physical disability or perceived as different from average weight are at risk for sibling victimization. Using a nationally representative sample, this is the first study to highlight the importance of screening for sibling victimization in families of children with a disability and/or nonnormative weight status

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J Hypertens. 2017 Nov;35:2123-37.

IN-UTERO EXPOSURE TO ANTIHYPERTENSIVE MEDICATION AND NEONATAL AND CHILD HEALTH OUTCOMES: A SYSTEMATIC REVIEW.

Fitton CA, Steiner MFC, Aucott L, et al.

BACKGROUND: Although medication is generally avoided wherever possible during pregnancy, pharmacotherapy is required for the treatment of pregnancy associated hypertension, which remains a leading cause of maternal and fetal morbidity and mortality. The long-term effects to the child of in-utero exposure to antihypertensive agents remains largely unknown.

OBJECTIVE: The aim of this study was to systematically review published studies on adverse outcomes to the child associated with in-utero exposure to antihypertensive medications.

METHODS: OVID, Scopus, EBSCO Collections, the Cochrane Library, and Web of Science databases were searched for relevant publications published between January 1950 and October 2016 and a total of 688 potentially eligible studies were identified.

RESULTS: Following review, 47 primary studies were eligible for inclusion. The Critical Appraisal Skills Programme checklist was used to assess study quality. Five studies were of excellent quality; the remainder were either mediocre or poor. Increased risk of low birth weight, low size for gestational age, preterm birth, and congenital defects following in-utero exposure to all antihypertensive agents were identified. Two studies reported an increased risk of attention deficit hyperactivity disorder following exposure to labetalol, and an increased risk of sleep disorders following exposure to methyldopa and clonidine.

CONCLUSION: The current systematic review demonstrates a paucity of relevant published high-quality studies. A small number of studies suggest possible increased risk of adverse child health outcomes; however, most published studies have methodological weaknesses and/or lacked statistical power thus preventing any firm conclusions being drawn

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J Med Internet Res. 2017 Dec;19:e406.

END USER AND IMPLEMENTER EXPERIENCES OF MHEALTH TECHNOLOGIES FOR NONCOMMUNICABLE CHRONIC DISEASE MANAGEMENT IN YOUNG ADULTS: SYSTEMATIC REVIEW.

Slater H, Campbell JM, Stinson JN, et al.

BACKGROUND: Chronic noncommunicable diseases (NCDs) such as asthma, diabetes, cancer, and persistent musculoskeletal pain impose an escalating and unsustainable burden on young people, their families, and society. Exploring how mobile health (mHealth) technologies can support management for young people with NCDs is imperative.

OBJECTIVE: The aim of this study was to identify, appraise, and synthesize available qualitative evidence on users' experiences of mHealth technologies for NCD management in young people. We explored the perspectives of both end users (young people) and implementers (health policy makers, clinicians, and researchers).

METHODS: A systematic review and meta-synthesis of qualitative studies. Eligibility criteria included full reports published in peer-reviewed journals from January 2007 to December 2016, searched across databases including EMBASE, MEDLINE (PubMed), Scopus, and PsycINFO. All qualitative studies that evaluated the use of mHealth technologies to support young people (in the age range of 15-24 years) in managing their chronic NCDs were considered. Two independent reviewers identified eligible reports and

conducted critical appraisal (based on the Joanna Briggs Institute Qualitative Assessment and Review Instrument: JBI-QARI). Three reviewers independently, then collaboratively, synthesized and interpreted data through an inductive and iterative process to derive emergent themes across the included data. External validity checking was undertaken by an expert clinical researcher and for relevant content, a health policy expert. Themes were subsequently subjected to a meta-synthesis, with findings compared and contrasted between user groups and policy and practice recommendations derived.

RESULTS: Twelve studies met our inclusion criteria. Among studies of end users (N=7), mHealth technologies supported the management of young people with diabetes, cancer, and asthma. Implementer studies (N=5) covered the management of cognitive and communicative disabilities, asthma, chronic self-harm, and attention deficit hyperactivity disorder. Quality ratings were higher for implementer compared with end user studies. Both complementary and unique user themes emerged. Themes derived for end users of mHealth included (1) Experiences of functionality that supported self-management, (2) Acceptance (technical usability and feasibility), (3) Importance of codesign, and (4) Perceptions of benefit (self-efficacy and empowerment). For implementers, derived themes included (1) Characteristics that supported self-management (functional, technical, and behavior change); (2) Implementation challenges (systems level, service delivery level, and clinical level); (3) Adoption considerations for specific populations (training end users; specific design requirements); and (4) Codesign and tailoring to facilitate uptake and person-centered care.

CONCLUSIONS: Synthesizing available data revealed both complementary and unique user perspectives on enablers and barriers to designing, developing, and implementing mHealth technologies to support young people's management of their chronic NCDs.

TRIAL REGISTRATION: PROSPERO CRD42017056317; http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD_42017056317 (Archived by WebCite at <http://www.webcitation.org/6vZ5UkKlp>)

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J Pediatr Gastroenterol Nutr. 2017 Oct;65:462-66.

VITAMIN D STATUS, CARDIOMETABOLIC, LIVER, AND MENTAL HEALTH STATUS IN OBESE YOUTH ATTENDING A PEDIATRIC WEIGHT MANAGEMENT CENTER.

Macdonald K, Godziuk K, Yap J, et al.

BACKGROUND: Vitamin D (VitD) deficiency and obesity are reaching epidemic proportions in North America, particularly in those with comorbid conditions such as diabetes or liver disease. The study objective was to determine the prevalence of suboptimal vitD status and interrelationships with anthropometric, cardiometabolic, liver, mental health, and lifestyle (sleep/screen time) parameters in an ambulatory population of children with obesity.

METHODS: Children (2-18 years) attending a pediatric weight management clinic (n = 217) were retrospectively reviewed. Variables studied included anthropometric (weight, height, body mass index, waist circumference), vitD (serum 25-hydroxyvitamin D), cardiometabolic (systolic blood pressure, diastolic blood pressure, glucose, insulin, homeostasis model assessment for insulin resistance, triglyceride, high-density lipoprotein, low-density lipoprotein, total cholesterol), liver enzymes (alanine aminotransferase, gamma-glutamyl transferase), and mental health (number, diagnosis) parameters.

RESULTS: Suboptimal vitD status (25-hydroxyvitamin D <75 nmol/L) was present in 76% of children with obesity (12.0 +/- 2.9 years). Blood pressure categorized as prehypertension, stage I hypertension, and stage II hypertension was present in 14%, 25%, and 7% of children, respectively. Mental health diagnoses including anxiety, attention-deficit hyperactivity disorder, mood disorders, and learning disabilities/developmental delays occurred in 18%, 17%, 10%, and 15%, of children, respectively. Waist circumferences >100 cm were associated with lower vitD levels (58 +/- 18 vs 65 +/- 17 nmol/L; P = 0.01). VitD status >=50 nmol/L was associated with lower insulin (15.8 [11.7-23.1] mU/L vs 21.1 [14.3-34.2] mU/L; P < 0.01) and homeostasis model assessment for insulin resistance (3.5 [2.5-4.9] vs 4.8 [3.1-6.9]; P < 0.01) values and systolic blood pressure percentiles (73.0 +/- 25.8 vs 80.6 +/- 17.0; P = 0.04).

CONCLUSIONS: Children with obesity had a high prevalence of vitD deficiency, particularly those at risk for hypertension, reduced insulin sensitivity, and central obesity

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J Phys Act Health. 2018 Jan;15:46-52.

BEHAVIORAL EFFECTS OF A LOCOMOTOR-BASED PHYSICAL ACTIVITY INTERVENTION IN PRESCHOOLERS.

Burkart S, Roberts J, Davidson MC, et al.

BACKGROUND: Poor adaptive learning behaviors (ie, distractibility, inattention, and disruption) are associated with behavior problems and underachievement in school, as well as indicating potential attention-deficit hyperactivity disorder. Strategies are needed to limit these behaviors. Physical activity (PA) has been suggested to improve behavior in school-aged children, but little is known about this relationship in preschoolers. This study examined the effects of a PA intervention on classroom behaviors in preschool-aged children.

METHODS: Eight preschool classrooms (n = 71 children; age = 3.8 +/- 0.7 y) with children from low socioeconomic environments were randomized to a locomotor-based PA (LB-PA) or unstructured free playtime (UF-PA) group. Both interventions were implemented by classroom teachers and delivered for 30 minutes per day, 5 days per week for 6 months. Classroom behavior was measured in both groups at 3 time points, whereas PA was assessed at 2 time points over a 6-month period and analyzed with hierarchical linear modeling.

RESULTS: Linear growth models showed significant decreases in hyperactivity (LB-PA: -2.58 points, P = .001; UF-PA: 2.33 points, P = .03), aggression (LB-PA: -2.87 points, P = .01; UF-PA: 0.97 points, P = .38) and inattention (LB-PA: 1.59 points, P < .001; UF-PA: 3.91 points, P < .001).

CONCLUSIONS: This research provides promising evidence for the efficacy of LB-PA as a strategy to improve classroom behavior in preschoolers

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J Psychiatr Pract. 2017 Jul;23:254-59.

THE PRESENCE OF CHILDHOOD ATTENTION DEFICIT/HYPERACTIVITY DISORDER MAY BE ASSOCIATED WITH INTERPERSONAL SENSITIVITY IN PATIENTS WITH SOCIAL ANXIETY DISORDER.

Koyuncu A, Celebi F, Ertekin E, et al.

The goal of this study was to evaluate a possible association between childhood attention deficit/hyperactivity disorder (ADHD) and interpersonal sensitivity in patients with social anxiety disorder (SAD). The study involved 125 adult outpatients with a primary diagnosis of SAD. To evaluate childhood ADHD, the ADHD module of the Schedule for Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version (K-SADS-PL) was used. Clinical and sociodemographic data were collected and clinical rating scales were completed. Mean total scores on the Interpersonal Sensitivity Measure were significantly higher in the group with SAD and ADHD than in the group with SAD without ADHD. Interpersonal Sensitivity Measure total scores were positively correlated with the severity of SAD symptoms and negatively correlated with mean age of onset of SAD. The presence of childhood ADHD may be associated with greater interpersonal sensitivity in patients with SAD

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J Speech Lang Hear Res. 2017 Jul;60:2124-28.

THE EFFECT OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND METHYLPHENIDATE TREATMENT ON THE ADULT AUDITORY TEMPORAL ORDER JUDGMENT THRESHOLD.

Fostick L.

Purpose: The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition notes that attention-deficit/hyperactivity disorder (ADHD) diagnosed in childhood will persist into adulthood among at least some individuals. There is a paucity of evidence, however, regarding whether other difficulties that often accompany childhood ADHD will also continue into adulthood, specifically auditory processing deficits. The aim of this study was to examine the effect of ADHD and the stimulant medication methylphenidate on auditory perception performance among adults.

Method: A total of 33 adults diagnosed with ADHD according to Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition criteria (ADHD group) and 48 adults without ADHD (non-ADHD group) performed an

auditory temporal order judgment task. Participants with ADHD performed the task twice: with and without taking methylphenidate (Ritalin), in random order.

Results: Temporal order judgment thresholds of the ADHD group were significantly higher than those of the non-ADHD group. Methylphenidate significantly decreased temporal order judgment thresholds within the ADHD group, making their performance similar to the non-ADHD participants.

Conclusions: Auditory processing difficulties of those diagnosed with ADHD seem to persist into adulthood. Similar to findings with children, methylphenidate treatment improves performance on tasks requiring this ability among adults. Therefore, given the association between auditory temporal processing and linguistic skills, the beneficial effect of methylphenidate on adults' academic achievement may be accomplished by positively affecting auditory temporal processing. Further studies in this line of research are needed

Journal of Bodywork and Movement Therapies. 2018.

EFFECTS OF TAIJIQUAN AND QIGONG PRACTICE OVER BEHAVIOURAL DISORDERS IN SCHOOL-AGE CHILDREN: A PILOT STUDY.

Rodrigues JMSM, Mestre MICP, Matos LC, et al.

Child development and wellness are strictly dependent on several factors among them physical activity, a proper nutrition and, of critical importance, a healthy mind. Psychopathologies like attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD) and conduct disorder (CD) have a direct negative impact on social, academic or occupational functioning of the affected children. If left untreated, these pathologies may progress to adulthood, thus requiring research strategies on conventional and nonconventional modalities of treatment. In this pilot study, conducted during the academic year 2015/2016, a combination of exercises of TaijiQuan (TJQ) and Qi Gong (QG) were taught to four selected children, three males and one female, aged between 6 and 10, suffering from the above mentioned behavioural disorders. The main goal was to understand if it is possible to achieve any kind of improvement in their condition, by evaluating the scores of the Achenbach Teacher's Report Form (TRF) in the beginning and ending of the experimental period. Results showed very interesting improvements in symptoms of CD, ODD and ADHD-HI (hyperactive-impulsive), while ADHD-PI (predominantly inattentive) showed only minor improvements. The overall symptom improvement was 43% across pathologies, which demonstrates that TJQ and QG may be a promising treatment of symptoms for children with behavioural disorders. More research is needed with controlled experimental designs and statistically representative samples in order to fully comprehend the versatility of these modalities

J Child Adolesc Psychopharmacol. 2018 Feb;28:29-35.

PHARMACOKINETICS OF A NEW AMPHETAMINE EXTENDED-RELEASE ORAL SUSPENSION IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Sikes CR, McMahon RL, Stark JG, et al.

Objective: An extended-release amphetamine (AMP) oral suspension has been developed to facilitate medication ingestion and dose titration. This study sought to determine the pharmacokinetic (PK) profile of this new formulation in children with attention-deficit/hyperactivity disorder (ADHD).

Methods: This was an open-label, single-period, PK study in 29 pediatric participants with ADHD. Participants were stratified into age groups 1 (6–7 years), 2 (8–9 years), and 3 (10–12 years), and dosed with 15 mL extended-release AMP liquid suspension (equivalent to 30 mg mixed AMP salts) after an overnight fast. Blood samples were collected at prespecified time points and analyzed for D- and L-AMP concentrations. Key PK parameters included maximum plasma concentration (C_{max}), time to maximum plasma concentration, half-life (T_{1/2}), area under the curve from time 0 to last quantifiable concentration (AUC_{last}) and to infinity (AUC_{inf}), oral clearance (CL/F), and volume of distribution (V_z/F). The 95% confidence intervals (CIs) about the geometric means of the weight-normalized CL/F, V_z/F, and AUC_{last} were determined. Safety was also assessed.

Results: All participants completed the study. As age increased, mean maximum and total exposure to AMP decreased; weight-normalized CL/F slightly increased, resulting in decreasing T1/2 values with age. For D- and L-AMP, the 95% CIs for the geometric means of weight-normalized CL/F/kg and Vz/F/kg were within the 60%–140% range for groups 2 and 3, while those of weight-normalized AUClast were within range for all age groups. Adverse events were mild and consistent with the safety profile of AMP.

Conclusions: Exposure (Cmax, AUCinf, and AUClast) to AMP decreased with age, possibly as a result of the 30-mg/15-mL fixed dose across a range of weights (20–57 kg) and the consequent lower dose per kilogram older participants, as well as the slight increase in clearance with age

J Child Psychol Psychiatry. 2018 Mar;59:268-76.

COMORBID SYMPTOMS OF INATTENTION, AUTISM, AND EXECUTIVE COGNITION IN YOUTH WITH PUTATIVE GENETIC RISK.

Arnett AB, Cairney BE, Wallace AS, et al.

Background: Symptoms of autism spectrum disorder (ASD) and inattention (IA) are highly comorbid and associated with deficits in executive cognition. Cognitive deficits have been posited as candidate endophenotypes of psychiatric traits, but few studies have conceptualized cognitive deficits as psychiatric comorbidities. The latter model is consistent with a latent factor reflecting broader liability to neuropsychological dysfunction, and explains heterogeneity in the cognitive profile of individuals with ASD and IA.

Methods: We tested competing models of covariance among symptoms of ASD, IA, and cognition in a sample of 73 youth with a known genetic mutation.

Results: A common executive factor fit best as a cognitive comorbidity, rather than endophenotype, of the shared variance between measures of IA and ASD symptoms. Known genetic risk explained a third of the shared variance among psychiatric and cognitive measures.

Conclusions: Comorbid symptoms of ASD, IA, and cognitive deficits are likely influenced by common neurogenetic factors. Known genetic risk in ASD may inform future investigation of putative genetic causes of IA

J Child Psychol Psychiatry. 2018 Mar;59:213-22.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): INTERACTION BETWEEN SOCIOECONOMIC STATUS AND PARENTAL HISTORY OF ADHD DETERMINES PREVALENCE.

Rowland AS, Skipper BJ, Rabiner DL, et al.

Background: Many studies have reported a higher prevalence of Attention-Deficit/Hyperactivity Disorder (ADHD) among disadvantaged populations, but few have considered how parental history of ADHD might modify that relationship. We evaluated whether the prevalence of ADHD varies by socioeconomic status (SES) and parental history of ADHD in a population-sample of elementary school children age 6–14 years.

Methods: We screened all children in grades 1–5 in 17 schools in one North Carolina (U.S.) county for ADHD using teacher rating scales and 1,160 parent interviews, including an ADHD structured interview (DISC). We combined parent and teacher ratings to determine DSM-IV ADHD status. Data analysis was restricted to 967 children with information about parental history of ADHD. SES was measured by family income and respondent education.

Results: We found an interaction between family income and parental history of ADHD diagnosis ($p = .016$). The SES gradient was stronger in families without a parental history and weaker among children with a parental history. Among children without a parental history of ADHD diagnosis, low income children had 6.2 times the odds of ADHD (95% CI 3.4–11.3) as high income children after adjusting for covariates. Among children with a parental history, all had over 10 times the odds of ADHD as high income children without a parental history but the SES gradient between high and low income children was less pronounced [odds ratio (OR) = 1.4, 95% CI 0.6–3.5].

Conclusions: Socioeconomic status and parental history of ADHD are each strong risk factors for ADHD that interact to determine prevalence. More research is needed to dissect the components of SES that contribute to risk of ADHD. Future ADHD research should evaluate whether the strength of other environmental risk factors vary by parental history. Early identification and interventions for children with low SES or parental histories of ADHD should be explored

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J Child Psychol Psychiatry. 2018 Mar;59:232-46.

VITAMIN-MINERAL TREATMENT IMPROVES AGGRESSION AND EMOTIONAL REGULATION IN CHILDREN WITH ADHD: A FULLY BLINDED, RANDOMIZED, PLACEBO-CONTROLLED TRIAL .

Rucklidge JJ, Eggleston MJF, Johnstone JM, et al.

Background: Evaluation of broad-spectrum micronutrient (vitamins and minerals) treatment for childhood ADHD has been limited to open-label studies that highlight beneficial effects across many aspects of psychological functioning.

Method: This is the first fully blinded randomized controlled trial of medication-free children (n = 93) with ADHD (7–12 years) assigned to either micronutrients (n = 47) or placebo (n = 46) in a 1:1 ratio, for 10 weeks. All children received standardized ADHD assessments. Data were collected from clinicians, parents, participants and teachers across a range of measures assessing ADHD symptoms, general functioning and impairment, mood, aggression and emotional regulation.

Results: Intent-to-treat analyses showed significant between-group differences favouring micronutrient treatment on the Clinical Global Impression-Improvement (ES = 0.46), with 47% of those on micronutrients identified as ‘much’ to ‘very much’ improved versus 28% on placebo. No group differences were identified on clinician, parent and teacher ratings of overall ADHD symptoms (ES ranged 0.03–0.17). However, according to clinicians, 32% of those on micronutrients versus 9% of those on placebo showed a clinically meaningful improvement on inattentive (OR = 4.9; 95% CI: 1.5–16.3), but no group differences on improvement in hyperactive-impulsive symptoms (OR = 1.0; 95% CI: 0.4–2.5). Based on clinician, parent and teacher report, those on micronutrients showed greater improvements in emotional regulation, aggression and general functioning compared to placebo (ES ranged 0.35–0.66). There were two dropouts per group, no group differences in adverse events and no serious adverse events identified. Blinding was successful with guessing no better than chance.

Conclusions: Micronutrients improved overall function, reduced impairment and improved inattention, emotional regulation and aggression, but not hyperactive/impulsive symptoms, in this sample of children with ADHD. Although direct benefit for core ADHD symptoms was modest, with mixed findings across raters, the low rate of adverse effects and the benefits reported across multiple areas of functioning indicate micronutrients may be a favourable option for some children, particularly those with both ADHD and emotional dysregulation

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J Child Psychol Psychiatry. 2018 Mar;59:223-31.

PARSING HETEROGENEITY IN ATTENTION-DEFICIT HYPERACTIVITY DISORDER USING EEG-BASED SUBGROUPS.

Loo SK, McGough JJ, McCracken JT, et al.

Background: Attention-deficit/hyperactivity disorder (ADHD) is a heterogeneous condition for which multiple efforts to characterize brain state differences are underway. The objective of this study was to identify distinct subgroups of resting electroencephalography (EEG) profiles among children with and without ADHD and subsequently provide extensive clinical characterization of the subgroups.

Methods: Latent class analysis was used with resting state EEG recorded from a large sample of 781 children with and without ADHD (N = 620 ADHD, N = 161 Control), aged 6–18 years old. Behavioral and cognitive characteristics of the latent classes were derived from semistructured diagnostic interviews, parent completed behavior rating scales, and cognitive test performance.

Results: A five-class solution was the best fit for the data, of which four classes had a defining spectral power elevation. The distribution of ADHD and control subjects was similar across classes suggesting there is no

one resting state EEG profile for children with or without ADHD. Specific latent classes demonstrated distinct behavioral and cognitive profiles. Those with elevated slow-wave activity (i.e. delta and theta band) had higher levels of externalizing behaviors and cognitive deficits. Latent subgroups with elevated alpha and beta power had higher levels of internalizing behaviors, emotion dysregulation, and intact cognitive functioning.

Conclusions: There is population-level heterogeneity in resting state EEG subgroups, which are associated with distinct behavioral and cognitive profiles. EEG measures may be more useful biomarkers of ADHD outcome or treatment response rather than diagnosis

J Consult Clin Psychol. 2018;86:427-38.

THE IMPORTANCE OF THERAPEUTIC PROCESSES IN SCHOOL-BASED PSYCHOSOCIAL TREATMENT OF HOMEWORK PROBLEMS IN ADOLESCENTS WITH ADHD.

Breaux RP, Langberg JM, McLeod BD, et al.

Objective: To evaluate the importance of therapeutic processes in two brief school-based psychosocial treatments targeting homework problems in adolescents with attention-deficit/hyperactivity disorder (ADHD) as delivered by school mental health professionals.

Method: A sample of 222 middle school students (72% male; Mage = 12.00 years, SD = 1.02) diagnosed with ADHD was randomized to receive either a contingency-management or a skills-based treatment for homework problems. Both treatments included 16 individual sessions (20-min each) and 2 parent/family meetings. Adolescents and school mental health professionals reported on the working alliance in the middle of the treatment; professionals rated adolescent involvement at each of the 16 sessions, parent involvement during both parent meetings, and parent commitment to carry out the established homework plan. Attendance at parent meetings was also recorded.

Results: Therapeutic processes predicted objective, parent-reported, and teacher-reported academic outcomes. Parent engagement was particularly important for the contingency-based treatment, whereas working alliance and adolescent involvement were most important for the skills-based treatment.

Conclusions: Therapeutic processes such as developing a strong working alliance and engaging parents and students are key elements of treatment delivery and receipt in school-based mental health programming and should be explicitly trained and monitored

Journal of Cystic Fibrosis. 2018;17:281-85.

ATTENTION DEFICIT HYPERACTIVITY DISORDER SYMPTOMS IN PATIENTS WITH CYSTIC FIBROSIS.

Cohen-Cyberknoh M, Tanny T, Breuer O, et al.

Background: Cystic fibrosis (CF) is a chronic life-threatening disease. In patients who suffer from chronic disease, Attention Deficit Hyperactivity Disorder (ADHD) is associated with functional impairment that can affect adherence to treatment and consequently influence prognosis.

Methods: CF patients filled in the ADHD Rating Scale (ADHD-RS) adapted to the DSM5 and were assessed on a continuous performance task (MOXO-CPT), a standardized-computerized test designed to evaluate several domains of attention.

Results: Of the 175 patients (99 males), 18% presented ADHD symptoms, according to ADHD-RS; 16% in the younger group (< 18 years), and 18.9% in the adult group. The male to female ratio was 3:1 in children and 1:1 in adults.

Conclusions: The occurrence of ADHD symptoms in patients with CF is substantially higher than in the general population and should be recognized as a co-morbidity of CF. As ADHD can impair adherence to therapy, further research is needed to investigate the effect of ADHD therapy on adherence

J Indian Assoc Child Adolesc Ment Health. 2018;14:60-79.

WORKING MEMORY, VERBAL COMPREHENSION, PERCEPTUAL REASONING AND PROCESSING SPEED IN ADHD AND NORMAL CHILDREN: A COMPARATIVE STUDY.

Kotnala S, Halder S.

Background: Attention-Deficit/Hyperactivity Disorder (ADHD) is a childhood onset disorder marked by persistent, developmentally inappropriate symptoms of inattention, hyperactivity/ impulsivity, or both that impair functioning to a marked degree. Children with Attention Deficit Hyperactivity Disorder (ADHD) exhibit a number of cognitive and behavioral abnormalities that are the direct result of the disorder itself, in school-aged children. The knowledge of their cognitive functioning may help us to set objectives for planning treatment goals and improving their social, academic and personal functioning.

Aims: The aim of the study was to find out cognitive functioning: working memory, verbal comprehension, perceptual reasoning and processing speed among ADHD and comparing with normal children. Settings and Design: Using purposive sampling technique, 30 children diagnosed with ADHD were compared with 30 normal children. Materials and

Methods: Screened on Colored Progressive Matrices (CPM) for intelligence and ADHD-Symptom checklist (ADHD SC-4) for symptom severity of attention deficit and hyperactivity, all the subjects were assessed on the Malin's Intelligence Scale for Indian Children (MISIC) to see the cognitive functioning of both the groups of children.

Results: ADHD children performed significantly different as compared to normal control on Information, General comprehension, Similarities, Arithmetic, Digit span, Picture completion, Coding and Mazes subtests of MISIC. Findings showed overall there was a significant difference between ADHD and normal children's performance on four major cognitive domains, viz. verbal comprehension, perceptual reasoning, working memory and processing speed.

Conclusions: Overall, children with ADHD have poor cognitive functioning compared to normal children

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J Isfahan Med Sch. 2018;36:42-48.

THE EFFECT OF TRIPHALA LAVENDER TABLETS ON THE TREATMENT OF CHILDREN WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Shakibaei F, Kahkeshani M, Ghadimi K.

Background: Attention deficit/hyperactivity disorder (ADHD) is a common psychiatric disorder in the children. The purpose of this study was to evaluate the efficacy of Triphala Lavender tablets as an adjuvant therapy along with methylphenidate on the treatment of children with attention deficit/hyperactivity disorder.

Methods: In this clinical trial study that was done in Isfahan Province, Iran, in 2016, 44 children with attention deficit/hyperactivity disorder were enrolled according to inclusion (aged between 6 to 12 years) and exclusion (failure to follow up) criteria. The patients were randomly divided into two group as intervention (treated with methylphenidate and Triphala lavender tablets) and placebo (treated with methylphenidate and placebo). Patients were treated for 8 weeks. The assessment tool was Attention Deficit/Hyperactivity Disorder Rating Scale-IV (ADHD-RS-IV), which was used at the onset, and 2, 4, and 8 weeks after the intervention.

Findings: The ADHD-RS-IV scores significantly decreased in both groups after intervention ($P < 0.001$ for both). In addition, the ADHD-RS-IV in the intervention group was significantly lower than placebo group at the 4th week after the intervention ($P = 0.042$); but there was no significant difference between the two groups in ADHD-RS-IV at onset, and 2 and 8 weeks after the intervention ($P > 0.050$ for all).

Conclusion: The use of Triphala Lavender tablets as an adjuvant therapy may be effective in patients with attention deficit/hyperactivity disorder, but due to limited study about the role of Triphala Lavender tablets in treatment of these patients, we need future studies with larger sample sizes and longer time

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J Med Genet. 2018;55:249-53.

HETEROGENEOUS CLINICAL SPECTRUM OF DNAJC12-DEFICIENT HYPERPHENYLALANINEMIA: FROM ATTENTION DEFICIT TO SEVERE DYSTONIA AND INTELLECTUAL DISABILITY.

Van Spronsen FJ, Himmelreich N, Ruffenacht V, et al.

Background Autosomal recessive mutations in DNAJC12, encoding a cochaperone of HSP70 with hitherto unknown function, were recently described to lead to hyperphenylalaninemia, central monoamine neurotransmitter (dopamine and serotonin) deficiency, dystonia and intellectual disability in six subjects affected by homozygous variants.

Objective Patients exhibiting hyperphenylalaninemia in whom deficiencies in hepatic phenylalanine hydroxylase and tetrahydrobiopterin cofactor metabolism had been excluded were subsequently analysed for DNAJC12 variants.

Methods To analyse DNAJC12, genomic DNA from peripheral blood (Sanger sequencing), as well as quantitative messenger RNA (Real Time Quantitative Polymerase Chain Reaction (RT-qPCR)) and protein expression (Western blot) from primary skin fibroblasts were performed.

Results We describe five additional patients from three unrelated families with homozygosity/compound heterozygosity in DNAJC12 with three novel variants: c.85delC/p.Gln29Lysfs*38, c.596G>T/p.*199Leuext*42 and c.214C>T/p.(Arg72*). In contrast to previously reported DNAJC12-deficient patients, all five cases showed a very mild neurological phenotype. In two subjects, cerebrospinal fluid and primary skin fibroblasts were analysed showing similarly low 5-hydroxyindolacetic acid and homovanillic acid concentrations but more reduced expressions of mRNA and DNAJC12 compared with previously described patients. All patients responded to tetrahydrobiopterin challenge by lowering blood phenylalanine levels.

Conclusions DNAJC12 deficiency appears to result in a more heterogeneous neurological phenotype than originally described. While early identification and institution of treatment with tetrahydrobiopterin and neurotransmitter precursors is crucial to ensure optimal neurological outcome in DNAJC12-deficient patients with a severe phenotype, optimal treatment for patients with a milder phenotype remains to be defined

J Nerv Ment Dis. 2018;206:296-99.

A CASE OF CONGENITAL INSENSITIVITY TO PAIN WITH ANHIDROSIS COMORBID WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: CLINICAL IMPLICATIONS FOR PATHOPHYSIOLOGY AND TREATMENT.

Shirazi E, Sayyahfar S, Motamed M, et al.

Congenital insensitivity to pain with anhidrosis (CIPA) is a rare autosomal recessive genetic disorder caused by a mutation in the neurotrophic tyrosine kinase receptor (NTRK1) gene. CIPA is accompanied by abnormal catecholamine metabolism and decreased blood concentration of dopamine and norepinephrine. Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder of heterogeneous etiology and presentation, and recent reports have suggested a pathophysiological role of neurotrophins in ADHD. Furthermore, dopamine and norepinephrine are known to play major roles in the pathophysiology of ADHD, and the imbalance of monoaminergic and cholinergic systems as an underlying cause of ADHD has recently been studied. Here, we report the case of an 11-year-old boy with CIPA and comorbid ADHD. Our observations have important clinical implications for patients with CIPA. Because of deficiencies in self-control, proper management of these patients necessitates a highly structured and monitored environment, made dually important by possible comorbidity of ADHD

J Neural Transm. 2018;125:713-26.

UPPER LIMB FUNCTION IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD).

Hotham E, Haberfield M, Hillier S, et al.

Upper limb function was investigated in children with ADHD using objective methods. We hypothesised that children with ADHD exhibit abnormal dexterity, force application during manipulation of a novel object, and movement rhythmicity. Two groups of age- and gender-matched children were investigated: 35 typically developing children (controls, 10.5 ± 0.4 years, 32M-3F) and 29 children (11.5 ± 0.5 years, 27M-2F) with

formally diagnosed ADHD according to DSM-IV-TR criteria. Participants underwent a series of screening tests and tests of upper limb function while "off" medication. Objective quantification of upper limb function involved measurement of force during a grip and lift task, maximal finger tapping task, and maximal pinch grip. Acceleration at the index finger was also measured during rest, flexion and extension, and a postural task to quantify tremor. The Movement Assessment Battery for Children-2 (MABC-2) was also administered. Significant between-group differences were observed in movement rhythmicity, manipulation of a novel object, and performance of the MABC-2 dexterity and aiming and catching components. Children with ADHD lifted a novel object using a lower grip force ($P = 0.036$), and held the object with a more variable grip force ($P = 0.003$), than controls. Rhythmicity of finger tapping ($P = 0.008$) and performance on the dexterity ($P = 0.007$) and aiming and catching ($P = 0.042$) components of the MABC-2 were also significantly poorer in the ADHD group than controls. Movement speed, maximum pinch grip strength, and tremor were unaffected. The results of the study show for the first time that ADHD is associated with deficits in multiple, but not all domains of upper limb function

J Pediatr Neurol. 2018.

ACADEMIC PERFORMANCE OF CHILDREN WITH ADHD IN ILE IFE, SOUTH WEST, NIGERIA.

Oke OJ, Adejuyigbe EA, Oseni SB, et al.

Attention deficit hyperactivity disorder (ADHD) is a neurobehavioral developmental disorder that affects attention and concentration of children. In Africa, there is a lack of information on academic performance of children with ADHD. This article aims to (1) determine the academic performance and intelligent quotient (IQ) of pupils with ADHD, (2) compare the academic performance and IQ of children with ADHD to those without ADHD, and (3) determine other factors affecting academic performance in children with ADHD. A community-based cross-sectional study was conducted in Ile Ife among pupils aged 5 to 12 years. They were screened with Disruptive Behavioral Disorder Rating Scale, IQs determined with the Draw-A-Person test (DAPT), the academic performance determined with academic performance questionnaire (APQ), and continuous assessment (CA) score for 2013/2014 session recorded. A total of 32.3% of 65 pupils with ADHD had low CA score, while 9.6% of 1,320 pupils without ADHD had low CA score. The CA score of pupils with ADHD was significantly lower ($\chi^2 = 36.875$, $p = 0.001$), particularly among older children aged 9 to 12 years ($\chi^2 = 4.135$, $p = 0.042$). A total of 46.2% of 65 pupils with ADHD had subnormal IQ, while 47.2% of 1,320 pupils without ADHD had subnormal IQ. There was no significant difference between the IQ of children with ADHD and their peers without ADHD ($\chi^2 = 0.023$, $p = 0.879$). Children with ADHD had similar IQ as their peers without ADHD but lower CA score. The low academic performance in pupils with ADHD could be attributed to inattentiveness in the affected pupils

J Psychiatr Res. 2018;102:57-64.

RESPONSE INHIBITION AND EMOTIONAL COGNITION IMPROVED BY ATOMOXETINE IN CHILDREN AND ADOLESCENTS WITH ADHD: THE ACTION RANDOMIZED CONTROLLED TRIAL.

Griffiths KR, Leikauf JE, Tsang TW, et al.

Although the non-stimulant medication atomoxetine is effective for attention-deficit hyperactivity disorder (ADHD) in children and adolescents, there are still significant gaps in our knowledge about whether atomoxetine improves anxiety symptoms or cognition in children. Furthermore, while cognition has been proposed as an intermediate phenotype for ADHD dysfunction, the relationships between clinical and cognitive outcomes are not yet understood. We addressed these knowledge gaps in a controlled trial using objective assessments of both general and emotional cognitive functions implicated in ADHD and in anxiety, which commonly co-occurs with ADHD. A total of 136 children and adolescents with ADHD (ages 6-17 years; 80% male; 31.6% with a comorbid anxiety disorder) were enrolled in a randomized double-blind, placebo-controlled, cross-over trial of 6-weeks treatment with atomoxetine. Of these, 109 completed the second cross-over phase. Selected cognitive domains associated with ADHD and anxiety disorders (Sustained attention, response inhibition and fearful face identification) were assessed using a normed, computerized

test battery. Symptom outcomes were assessed by parent reports on the ADHD Rating Scale-IV and Conners Anxious-Shy subscale. For completers, atomoxetine caused a greater improvement in the primary cognitive outcomes of response inhibition and fear identification compared to placebo, but not in sustained attention. Atomoxetine also improved ADHD and anxiety symptoms. Anxiety symptoms improved most for ADHD and anxiety disorder combined, but presence of an anxiety disorder did not moderate any other outcomes. Changes in cognitive and clinical outcomes were not correlated. These findings contribute to the foundations of measurement-based treatment planning and offer targets for probing the mechanisms of atomoxetine action

J Psychopathol Behav Assess. 2018;1-11.

THE ASSOCIATION BETWEEN SELF-REGULATION AND SYMPTOMS OF AUTISM SPECTRUM DISORDER IN PRESCHOOLERS WITH EXTERNALIZING BEHAVIOR PROBLEMS.

Ros R, Gregg D, Hart KC, et al.

The purpose of the current study was to examine the role of autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) symptoms in predicting deficits in self-regulation across the domains of executive functioning and emotion regulation. Parents of 40 preschoolers with externalizing behavior problems reported on children's ADHD and ASD symptoms, and emotion regulation. Children completed a standardized executive functioning battery. Results indicated that 28% of parents and 53% of teachers rated children above the subclinical range on ASD symptoms. An interaction emerged such that higher ASD symptoms were only associated with poorer executive functioning for children with lower ADHD symptoms. However, ASD symptoms were predictive of poorer emotion regulation independent of ADHD symptoms. Findings revealed clinically significant ASD symptoms, which aided in explaining heterogeneity in self-regulation deficits

J Am Acad Child Adolesc Psychiatry. 2018;57:231-32.

PROMOTING SUCCESS ACROSS SCHOOL YEARS FOR CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: COLLABORATIVE SCHOOL-HOME INTERVENTION.

Dupaul GJ.

Children with attention-deficit/hyperactivity disorder (ADHD) typically experience significant difficulties in school, including academic underachievement and impairment in social relationships, such that they are at higher than average risk for special education placement, grade retention, school dropout, and lower lifetime educational attainment.¹ The chronicity of ADHD symptoms and associated impairments requires proactive maintenance of treatment components across school years if amelioration of deleterious long-term outcomes is to be realized. Pfiffner et al.² directly address the ongoing school impairments experienced by students with ADHD by following intensive intervention in 1 school year with booster treatment in a subsequent school year. The Collaborative Life Skills (CLS) program includes multiple components initially delivered over 10 to 12 weeks to train teachers in use of classroom accommodations and strategies (e.g., daily report card), parents in use of behavioral strategies at home and ways to collaborate with teachers, and children in social skills and independent task completion

Medwave. 2017 Jun;17:e6980.

BRIEF PSYCHOSIS INDUCED BY METHYLPHENIDATE IN A CHILD WITH ATTENTION DEFICIT DISORDER: A CASE REPORT AND LITERATURE REVIEW.

Martinez-Aguayo JC, Arancibia M, Meza-Concha N, et al.

Methylphenidate-induced psychosis has been scarcely studied due to bioethical and neurobiological issues regarding its research. Although some authors have hypothesized that there might be a vulnerability for the development of a major psychiatric disorder in the long term, there is no agreement about the predictive

value of this type of psychosis in children and adolescents, and its origin is also uncertain. It has been suggested that higher dopamine levels in some cerebral regions and a family history of mental disorders might increase the risk of psychosis secondary to psychostimulants. We present the case of a nine-year-old child diagnosed with attention deficit disorder and oppositional defiant disorder, who exhibited visual and auditory hallucinations and delirious ideas about harm during methylphenidate treatment. The patients symptoms regressed after drug removal. We discuss the key issues related to the origin, causality, management, and prognosis of psychostimulant-induced psychosis

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Microbes Infect. 2017 Sep;19:443-48.

ANESTHETIC AGENTS, NEURODEVELOPMENTAL RISK AND THE CONNECTION TO BACTERIAL INFECTIONS.

Fluegge K, Fluegge K.

This short communication identifies a significant flaw in research investigating the neurodevelopmental consequences of general anesthesia exposure. We have identified that chronic environmental exposure to pervasive air pollutants that are also widely used as anesthetic agents, specifically nitrous oxide (N₂O), may contribute to the rising prevalence of neurodevelopmental disorders. Consistent with the emerging link between microbes and psychiatric illness risk, this epidemiological analysis extends our prior conclusions by proposing that such exposures may alter host immunity so as to enhance vulnerability to certain pathogenic microbes that have been implicated in neurodevelopmental disorders, including *Pseudomonas aeruginosa* and *Clostridium difficile*

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Neuro-Oncology. 2018;20:705-15.

ATTENTION-MEDIATED NEUROCOGNITIVE PROFILES IN SURVIVORS OF PEDIATRIC BRAIN TUMORS: COMPARISON TO CHILDREN WITH NEURODEVELOPMENTAL ADHD.

Hardy KK, Willard VW, Gioia A, et al.

Background Attention and working memory symptoms are among the most common late effects in survivors of pediatric brain tumors, and are often associated with academic and psychosocial difficulties. Diagnostic and treatment approaches derived from the literature on attention-deficit hyperactivity disorder (ADHD) have frequently been applied to survivors, yet the extent of overlap in cognitive profiles between these groups is unclear. The objective of the present study is to compare neurocognition in survivors of brain tumors and children with neurodevelopmental ADHD.

Methods Neuropsychological data were abstracted from clinically referred brain tumor survivors (n = 105, M age = 12.0 y, 52.4% male) and children with ADHD (n = 178, M age = 11.1 y, 64.0% male). Data consist of a battery of parent-report questionnaires and performance-based neuropsychological measures.

Results Twenty-five survivors (23.8%) of pediatric brain tumors met symptom criteria for ADHD. Participants with neurodevelopmental ADHD and survivors who met ADHD criteria had significantly greater parent-($P < 0.001$) and teacher-reported ($P < 0.001$) working memory and behavior regulation difficulties than survivors of tumor who did not meet criteria. Children with ADHD symptoms also performed worse on measures of sustained attention than survivors without ADHD symptoms ($P < 0.001$). Additionally, survivors with ADHD symptoms had greater performance-based working memory difficulties than either survivors without attention problems or children with neurodevelopmental ADHD ($P = 0.002$).

Conclusions Nearly a quarter of survivors with attention symptoms have functional profiles that are similar to children with neurodevelopmental ADHD. They also experience more neurocognitive impairments than survivors without attentional difficulties, particularly in working memory. Screening for ADHD symptoms may help providers triage a subset of individuals in need of earlier or additional neuropsychological assessment

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Neuropsychologia. 2018;113:140-49.

COACHING POSITIVELY INFLUENCES THE EFFECTS OF WORKING MEMORY TRAINING ON VISUAL WORKING MEMORY AS WELL AS MATHEMATICAL ABILITY.

Nelwan M, Vissers C, Kroesbergen EH.

The goal of the present study was to test whether the amount of coaching influenced the results of working memory training on both visual and verbal working memory. Additionally, the effects of the working memory training on the amount of progress after specific training in mathematics were evaluated. In this study, 23 children between 9 and 12 years of age with both attentional and mathematical difficulties participated in a working memory training program with a high amount of coaching, while another 25 children received no working memory training. Results of these groups were compared to 21 children who completed the training with a lower amount of coaching. The quality of working memory, as well as mathematic skills, were measured three times using untrained transfer tasks. Bayesian statistics were used to test informative hypotheses. After receiving working memory training, the highly coached group performed better than the group that received less coaching on visual working memory and mathematics, but not on verbal working memory. The highly coached group retained their advantage in mathematics, even though the effect on visual working memory decreased. However, no added effect of working memory training was found on the learning curve during mathematical training. Moreover, the less-coached group was outperformed by the group that did not receive working memory training, both in visual working memory and mathematics. These results suggest that motivation and proper coaching might be crucial for ensuring compliance and effects of working memory training, and that far transfer might be possible

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Neuropsychology. 2018;32:344-55.

NEUROCOGNITIVE AND BEHAVIORAL PREDICTORS OF SOCIAL PROBLEMS IN ADHD: A BAYESIAN FRAMEWORK.

Kofler MJ, Harmon SL, Aduen PA, et al.

Objective: Social problems are a key area of functional impairment for children with attention deficit hyperactivity disorder (ADHD), and converging evidence points to executive dysfunction as a potential mechanism underlying ADHD-related social dysfunction. The evidence is mixed, however, with regard to which neurocognitive abilities account for these relations.

Method: A well-characterized group of 117 children ages 8-13 (M = 10.45, SD = 1.53; 43 girls; 69.5% Caucasian/Non-Hispanic) with ADHD (n = 77) and without ADHD (n = 40) were administered multiple, counterbalanced tests of neurocognitive functioning and assessed for social skills via multi-informant reports.

Results: Bayesian linear regressions revealed strong support for working memory and cross-informant interfering behaviors (inattention, hyperactivity/impulsivity) as predictors of parent-and teacher-reported social problems. Working memory was also implicated in social skills acquisition deficits, performance deficits, and strengths based on parent and/or teacher report; inattention and/or hyperactivity showed strong correspondence with crossinformant social problems in all models. There was no evidence for, and in most models strong evidence against, effects of inhibitory control and processing speed. The ADHD group was impaired relative to the non-ADHD group on social skills (d = 0.82-0.88), visuospatial working memory (d = 0.89), and phonological working memory (d = 0.58). In contrast, the Bayesian ANOVAs indicated that the ADHD and non-ADHD groups were equivalent on processing speed, IQ, age, gender, and socioeconomic status (SES). There was no support for or against group differences in inhibition.

Conclusions: These findings confirm that ADHD is associated with impaired social performance, and implicate working memory and core ADHD symptoms in the acquisition and performance of socially skilled behavior

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NeuroQuantology. 2017;15:32-40.

AN INVESTIGATION INTO PREVALENCE OF NEUROLOGICAL SOFT SIGNS IN CHILDREN WITH ATTENTION DEFICIT-HYPERACTIVITY DISORDER AND THEIR SIBLINGS.

Razjouyan K, Mousavi H, Ashtiani RD, et al.

Attention deficit-hyperactivity disorder (ADHD) is one of the most common psychiatric disorders in children, which is associated with a high level of comorbidity among siblings of individuals with ADHD. Given the strongly hereditary nature of ADHD, it may include a group of neurobehavioral defects that can be seen with a higher prevalence in the patients' siblings due to shared genetic origins. The present study was aimed at examining the prevalence rate and mean scores of neurological soft signs in children with ADHD and their siblings and comparing them with a healthy population. Thirty-two children and adolescents with ADHD and an age range of 7 to 16 years old and 32 siblings of them with the same age range were studied using attention deficit-hyperactivity checklist of DSM-IV-TR and K-SADS Questionnaire, and their neurological soft signs were evaluated using NES questionnaire. Afterwards, the results were compared with those of 32 healthy children and adolescents. The total scores on the test of assessing neurological soft signs were 8.34-14.9, 4.6-13.34, and 3-13.25 in the group with ADHD, the siblings, and the control group, respectively. There was a significant difference between the two groups and the control group ($p < 0.001$). Examining neurological soft signs separately showed that the siblings obtained higher scores than the control group on the tests of fist-edge-palm, right-left separation, and audio-visual separation and coordination. In the present study, prevalence of neurological soft signs was higher among the siblings of the children with ADHD than the control group. These auxiliary signs may help find etiological signs of the disorder and identify individuals at risk

Neurosci Biobehav Rev. 2018;89:1-12.

FACE MEMORY AND FACE RECOGNITION IN CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW.

Romani M, Vigliante M, Faedda N, et al.

This review focuses on facial recognition abilities in children and adolescents with attention deficit hyperactivity disorder (ADHD). A systematic review, using PRISMA guidelines, was conducted to identify original articles published prior to May 2017 pertaining to memory, face recognition, affect recognition, facial expression recognition and recall of faces in children and adolescents with ADHD. The qualitative synthesis based on different studies shows a particular focus of the research on facial affect recognition without paying similar attention to the structural encoding of facial recognition. In this review, we further investigate facial recognition abilities in children and adolescents with ADHD, providing synthesis of the results observed in the literature, while detecting face recognition tasks used on face processing abilities in ADHD and identifying aspects not yet explored

Pediatr Allergy Immunol. 2018.

EARLY FOOD ALLERGY AND RESPIRATORY ALLERGY SYMPTOMS AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN CHINESE CHILDREN: A CROSS-SECTIONAL STUDY.

Jiang X, Shen C, Dai Y, et al.

Background: The relationship between food allergy and respiratory allergy and attention-deficit/hyperactivity disorder (ADHD) in children is rarely investigated. The objective of this study was to determine whether early food allergy and respiratory allergy symptoms are associated with the prevalence of ADHD in Chinese school-age children.

Methods: This cross-sectional study was conducted in school-age children using cluster-stratified methods from 9 cities across China between November and December 2005. A family and social environmental questionnaire including the diagnosis history of ADHD and allergic diseases (food allergy, allergic rhinitis, and bronchial asthma), as well as general information, was completed by parents.

Results: The prevalence of both allergic rhinitis (20.4%) and asthma (11.6%) in the food allergy group was significantly higher than in the non-food allergy group (9.0% and 2.8%, respectively; both $P < .001$). The multivariable analysis showed that single food allergy (OR = 1.53, 95% CI: 1.13-2.05, $P = .005$), food allergy complicated with allergic rhinitis or asthma (OR = 3.36, 95% CI: 2.19-5.14, $P < .001$), and food allergy complicated with allergic rhinitis and asthma simultaneously (OR = 4.08, 95% CI: 2.05-8.11, $P < .001$) were independently associated with the increased risk of ADHD.

Conclusions: Early food allergy is associated with ADHD in school-age children. Early food allergy and respiratory allergy symptoms independently and synergistically contributed to higher risk of ADHD. Monitoring food allergy in early life could help in the early prediction and intervention for the consequent allergy march and ADHD in children

Pediatric Hematology and Oncology. 2018;35:76-89.

IMPACT OF ATTENTION ON SOCIAL FUNCTIONING IN PEDIATRIC MEDULLOBLASTOMA SURVIVORS.

Holland AA, Colaluca B, Bailey L, et al.

Background: Parent-reported attention problems have been associated with social functioning in a broad sample of pediatric cancer survivors.

Objective: The present study focused on a more homogeneous sample (pediatric medulloblastoma survivors), with the novel inclusion of self-reported attention ratings.

Participants/Methods: Thirty-three pediatric medulloblastoma survivors, ages 7-18 years, completed a brief IQ measure and self-report of attentional and social functioning. Parents rated patients' attentional and social functioning.

Results: Mean attention ratings were average based on both parent- and self-report, though parent ratings were significantly discrepant from normative means. No significant demographic or treatment-related predictors of self-reported attention problems were identified, whereas female gender was associated with greater parent-reported attention problems. Canonical correlation analysis revealed a significant association between parent-reported attention difficulties and social functioning in pediatric medulloblastoma survivors, but there was no association between self-reported attention problems and measures of social functioning.

Conclusions: Consistent with existing literature in broader samples of pediatric cancer survivors, the present study further affirms attention deficits as an underlying contributor to social deficits in pediatric medulloblastoma survivors while also finding little relationship between self-reports of attention and social performance. Notably, present findings provide additional support suggesting that attention functioning is a more significant contributor to social outcomes for pediatric medulloblastoma survivors than the level of cognitive ability

Pediatr Neurol. 2018.

PSYCHOPHARMACOTHERAPY OF ATTENTION DEFICIT-HYPERACTIVITY DISORDER IN CHILDREN WITH COMORBID CONDITIONS.

Naguy A.

One or more comorbidities occur in up to 80% of children with attention deficit-hyperactivity disorder. Attention deficit-hyperactivity disorder is also over-represented in several special populations. Pharmacotherapy can be challenging in these individuals with other conditions due to a suboptimal therapeutic response and an increased likelihood of adverse reactions. This article reviews the evidence supporting the psychopharmacologic management attention deficit-hyperactivity disorder when it occurs in individuals with common comorbidities

Pediatr Neurol. 2018;79:69-71.

ASSOCIATIONS BETWEEN SOCIAL FUNCTIONING, ADHD SYMPTOMATOLOGY, AND EMOTION FUNCTIONING IN CHILDREN WITH AUTISM SPECTRUM DISORDER AND WILLIAMS SYNDROME.

Ng PR, Bellugi EU, Trauner MD.

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Pediatrics. 2018;141.

ANXIETY AND MOOD DISORDER IN CHILDREN WITH AUTISM SPECTRUM DISORDER AND ADHD.

Gordon-Lipkin E, Marvin AR, Law JK, et al.

OBJECTIVES: Autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) frequently co-occur. Understanding the endophenotype of children with both ASD and ADHD may impact clinical management. In this study, we compare the comorbidity of anxiety and mood disorders in children with ASD, with and without ADHD.

METHODS: We performed a cross-sectional study of children with ASD who were enrolled in the Interactive Autism Network, an Internet-mediated, parent-report, autism research registry. Children ages 6 to 17 years with a parent-reported, professional, and questionnaire-verified diagnosis of ASD were included. Data were extracted regarding parent-reported diagnosis and/or treatment of ADHD, anxiety disorder, and mood disorder. ASD severity was measured by using Social Responsiveness Scale total raw scores.

RESULTS: There were 3319 children who met inclusion criteria. Of these, 1503 (45.3%) had ADHD. Comorbid ADHD increased with age ($P < .001$) and was associated with increased ASD severity ($P < .001$). A generalized linear model revealed that children with ASD and ADHD had an increased risk of anxiety disorder (adjusted relative risk 2.20; 95% confidence interval 1.97-2.46) and mood disorder (adjusted relative risk 2.72; 95% confidence interval 2.28-3.24) compared with children with ASD alone. Increasing age was the most significant contributor to the presence of anxiety disorder and mood disorder.

CONCLUSIONS: Co-occurrence of ADHD is common in children with ASD. Children with both ASD and ADHD have an increased risk of anxiety and mood disorders. Physicians who care for children with ASD should be aware of the coexistence of these treatable conditions

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Pharmacoepidemiol Drug Saf. 2017 Jul;26:742-51.

PRETERM BIRTHS AND USE OF MEDICATION IN EARLY ADULTHOOD: A POPULATION-BASED REGISTRY STUDY.

Engeland A, Borge T, Klungsoyr K, et al.

PURPOSE: To explore associations between preterm birth and use of medications in young adulthood as a proxy for different diseases.

METHODS: We linked data on birth characteristics from the Medical Birth Registry of Norway (1967-1999) and the Norwegian Prescription Database (2004-2015). Individuals born as singletons during 1974-1984 and alive at the age of 31 were included (main analyses) ($n = 450\,555$). Relative risks (RRs) with 95% confidence intervals (CIs) of using different medications were estimated by log-binomial regression. Population attributable risk and attributable risk percentage (PAR% and AR%) due to preterm birth were calculated.

RESULTS: Individuals born preterm used more specific medications at age 30 than those born at term. The risks of being dispensed psychotropic medications overall and the subgroups antiepileptics, antipsychotics, anxiolytics and hypnotics were elevated in individuals born preterm. For attention-deficit/hyperactivity disorder medications, the risk was elevated in males born extremely preterm (RR 5.8; 95%CI: 2.2-15). The risk of being dispensed antiasthmatics increased by shorter gestational ages. For psychotropic medications, PAR% was 0.6% in males and 0.7% in females at age 30; AR% was 13% in males and 17% in females. For antiasthmatics, the corresponding figures were 1.4, 1.1, 24 and 23%.

CONCLUSION: Individuals born preterm used more psychotropic medications overall and antiasthmatics around age 30 than those born at term. The proportions using these medications increased for those born at earlier gestational ages. Those born preterm, especially before 32 weeks of gestation, should be given special attention during early adulthood regarding development of symptoms and signs of certain diseases

PLoS ONE. 2018;13.

A SERIOUS GAME FOR CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: WHO BENEFITS THE MOST?
Bul KCM, Doove LL, Franken IHA, et al.

Objective: The aim of the current study was to identify which subgroups of children with Attention Deficit Hyperactivity Disorder (ADHD) benefitted the most from playing a Serious Game (SG) intervention shown in a randomized trial to improve behavioral outcomes.

Method: Pre-intervention characteristics [i.e., gender, age, intellectual level of functioning, medication use, computer experience, ADHD subtype, severity of inattention problems, severity of hyperactivity/impulsivity problems, comorbid Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) symptoms] were explored as potential moderators in a Virtual Twins (VT) analysis to identify subgroups for whom the SG intervention was most effective. Primary outcome measures were parent-reported time management, planning/organizing and cooperation skills.

Results: Two subgroups were identified. Girls (n = 26) were identified as the subgroup that was most likely to show greater improvements in planning/organizing skills as compared to the estimated treatment effect of the total group of participants. Furthermore, among the boys, those (n = 47) with lower baseline levels of hyperactivity and higher levels of CD symptoms showed more improvements in their planning/organizing skills when they played the SG intervention as compared to the estimated treatment effect of the total group of participants.

Conclusion: Using a VT analysis two subgroups of children with ADHD, girls, and boys with both higher levels of CD and lower levels of hyperactivity, were identified. These subgroups mostly benefit from playing the SG intervention developed to improve ADHD related behavioral problems. Our results imply that these subgroups have a higher chance of treatment success

Postepy Psychiatrii i Neurologii. 2017;26:57-62.

AFTER-EFFECTS OF HYPERKINETIC DISORDER (HKD) IN PROSPECTIVE LONGITUDINAL (12 YEARS) STUDY.

Kadziela-Olech H.

Purpose: Despite the significant increase in the understanding of the hyperkinetic disorder (HKD), our knowledge of the factors associated with the persistence of the disorder and further development of psychopathology is insufficient. The long-term prospective studies have aimed at identifying factors that may determine the adverse course of HKD.

Methods: The study group 54 patients (95.1% male) with HKD (mean age 8.1, SD -1 1.7 years at the baseline assessment) was covered by a 12-year observation (mean age of participants: 19.1 -1 1.7 years at the end of the study). Subjects were comprehensively assessed with structured diagnostic interviews and assessments of cognitive functions, including the school and family functioning, the treatment as well as internalizing and externalizing problems.

Results: Statistical analysis of the severity of HKD indicated significant reduction in the symptoms after 12 years. The birth complications (OR = 11.187; p = 0.045), chronic conflicts in family (OR = 0.129; p = 0.018) and depression of mother (OR = 6.033; p = 0.045) have proved to be significant risk factors for externalizing disorders in the study group. The single-parent family (OR = 0.099; p = 0.009) and coexistence of mothers' anxiety disorders (OR = 0.318; p = 0.043) were a significant predictors for the model of internalizing disorders. Only 28 (51.9%) of children used regular systematic therapy. Lack of the systematic treatment was a significant risk factor of transition of HKD to antisocial phenotypes (univariate regression model: R = 0.56; SE = 0.12; p < 0.001).

Conclusions: Long-term clinical observation showed that the appropriate systematic treatment until adulthood may significantly reduce undesirable behaviours. Completion of the treatment programme should be monitored systematically for many years, which greatly influences the results of school education and increases the chances for correct psychosocial development. Parents' mental disorders/conflicts considerably decrease in the treatment effects, thereby increasing the risk of social maladjustment in patients with HKD

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Psychiatr Serv. 2017 Aug;68:776-82.

SERVICE RECEIPT AND MENTAL DISORDERS IN CHILD WELFARE AND MENTAL HEALTH SYSTEMS IN LOS ANGELES COUNTY.

He AS, Traube DE, Brimhall KC, et al.

OBJECTIVE: Use of administrative data from child welfare (CW) and mental health systems in Los Angeles County provided a unique opportunity to more closely examine mental health needs of children dually served by these systems. This study examined the presence of mental disorders and correlates of receipt of mental health services by diagnostic classification in this population.

METHODS: Data were obtained for 3,191 children receiving services from Los Angeles County's Department of Children and Family Services and Department of Mental Health (DMH) between July 2011 and July 2012. Multivariate linear and logistic regression models examined the relationship between sociodemographic and CW-related characteristics and receipt of outpatient services by clinician-diagnosed mental disorder.

RESULTS: Of the 3,191 referred children, 68% met criteria for one of the four diagnostic classifications. Mood disorders were the most common diagnosis (30%), followed by anxiety disorders (20%), behavior disorders (9%), and attention-deficit hyperactivity disorder (9%). Children with prior DMH involvement received more services regardless of diagnosis. Older children (ages ≥ 15) received more services than younger children, whereas younger children were more likely to receive family therapy. Race-ethnicity did not play a significant role in predicting service receipt.

CONCLUSIONS: The unique mental health needs of CW-involved children were exemplified by the differences found in the percentages of children with diagnoses of mental disorders between this sample and children in the general population. Because of family and placement disruptions among CW-involved children, it is important that the provision of individual therapy is not overlooked in favor of family therapy

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Psychiatr Invest. 2018;15:306-12.

THE ALPHA-2A ADRENERGIC RECEPTOR GENE -1291C/G SINGLE NUCLEOTIDE POLYMORPHISM IS ASSOCIATED WITH THE EFFICACY OF METHYLPHENIDATE IN TREATING TAIWANESE CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Huang H-C, Wu LSH, Yu S-C, et al.

Objective The therapeutic effect of methylphenidate (MPH) in treating attention-deficit/hyperactivity disorder (ADHD) has been related to the alpha-2A adrenergic receptor (ADRA2A) gene -1291C/G single nucleotide polymorphism (SNP). We investigated the effect of MPH in treating Taiwanese children and adolescent with ADHD and its relation to the ADRA2A gene -1291C/G SNP.

Methods The subjects with DSM-IV ADHD diagnosis underwent a titration period to find out the dose of MPH for maintenance treatment. After 4 weeks maintenance treatment, the effect of MPH was evaluated by the Swanson, Nolan and Pelham version IV total scores. The subjects with more than 25% score reduction were referred to responders and those with 50% improvement were considered as better responders. The -1291C/G variant of the ADRA2A gene was identified by DNA sequencing and what relevance it has to the MPH response was examined by binary logistic regression analysis.

Results Of the 59 subjects, 44 (74.6%) were responsive to MPH treatment and the responsiveness was not shown to be associated with the ADRA2A gene -1291C/G SNP. As the responsive subjects were categorized as moderate responders and better responders and subjected to statistical analysis, the GG homozygotes

showed a greater chance to have a better response to MPH treatment than CC homozygotes ($p=0.02$), with an odds ratio of 32.14 (95% CI=1.64-627.80).

Conclusion The ADRA2A gene -1291C/G SNP is associated with the efficacy of MPH for the treatment of ADHD in Taiwanese children and adolescents. The responsive subjects bearing homozygous -1291G allele are more likely to have a better response to MPH treatment

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Psychiatry Res. 2018;264:231-35.

THE ASSESSMENT OF SERUM LIPID PROFILES OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Ugur C, Uneri OS, Goker Z, et al.

Attention-deficit/hyperactivity disorder (ADHD) is one of the most prevalent psychiatric disorders in children and the pathophysiology remains obscure. Some studies show that lipid imbalances are associated with ADHD etiology. We studied the association of serum total cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglyceride (TG) levels in ADHD. We examined 88 children aged 8-12 years who were diagnosed with ADHD and 88 healthy children. The exclusion criteria were as follows: obesity, any psychotropic use in the last 3 months, presence of a chronic disease and/or malignancy, history of medically treated lipid metabolism disease in family members, intelligence quotient (IQ) < 70, and comorbidities, with the exception of oppositional defiant disorder. The sample was evaluated using a semi-structured clinical assessment interview and Conners' rating scales. Despite controlling for age, sex, and body mass index (BMI) variables, the total cholesterol and LDL levels were significantly higher in the ADHD group than the levels of healthy controls, whereas the TG and HDL cholesterol levels were similar among groups. Conners' rating scales, reflecting symptom severity, and total cholesterol, TG, HDL, and LDL levels of the ADHD group were not correlated. The study results support the difference in serum lipid and lipoprotein profiles of children with ADHD compared with healthy controls. This difference is thought to be related with changes in oxidant/antioxidant balance states in ADHD

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Psychiatry Res. 2018;264:407-11.

MEASURING IMPAIRMENT WHEN DIAGNOSING ADOLESCENT ADHD: DIFFERENTIATING PROBLEMS DUE TO ADHD VERSUS OTHER SOURCES.

Vazquez AL, Sibley H, Campezo M.

The DSM-5 requires clinicians to link ADHD symptoms to clinically meaningful impairments in daily life functioning. Measuring impairment during ADHD assessments may be particularly challenging in adolescence, when ADHD is often not the sole source of a youth's difficulties. Existing impairment rating scales are criticized for not specifying ADHD as the source of impairment in their instructions, leading to potential problems with rating scale specificity. The current study utilized a within subjects design (N = 107) to compare parent report of impairment on two versions of a global impairment measure: one that specified ADHD as the source of impairment (Impairment Rating Scale-ADHD) and a standard version that did not (Impairment Rating Scale). On the standard family impairment item, parents endorsed greater impairment as compared to the IRS-ADHD. This finding was particularly pronounced when parents reported high levels of parenting stress. More severe ADHD symptoms were associated with greater concordance between the two versions. Findings indicate that adolescent family related impairments reported during ADHD assessments may be due to sources other than ADHD symptoms, such as developmental maladjustment. To prevent false positive diagnoses, symptom-specific wording may optimize impairment measures when assessing family functioning in diagnostic assessments for adolescents with ADHD

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Psychiatry Res. 2018.

THE NEUROCOGNITIVE NATURE OF CHILDREN WITH ADHD COMORBID SLUGGISH COGNITIVE TEMPO: MIGHT SCT BE A DISORDER OF VIGILANCE?

Baytunca MB, Inci SB, Ipci M, et al.

Sluggish Cognitive Tempo (SCT) refers to a clinical construct including several symptoms such as sluggishness, absentmindedness, low energy. In the present study, we compared neurocognitive laboratory outcomes of ADHD children with or without SCT. Method: The CNS Vital Signs Battery was utilized to measure neurocognitive measure of the participants. The SCT+ADHD group comprised of 42 subjects, ADHD group was 41 subjects and control group was 24 subjects. Results: The cognitive flexibility score was found to be more severely impaired in ADHD children with SCT in comparison to the ADHD-only. Additionally, greater deficits in the Shifting Attention Test ($p = 0.014$) and the Continuous Performance Test (reaction time score, $p < 0.01$) were found in the SCT+ADHD group relative to ADHD group. Processing speed, visual/auditory memory, psychomotor speed and reaction time were not found to more impaired in those comorbid with SCT. Conclusion: Impairments in the cognitive flexibility and more specifically shifting attention and continuous performance may be indicative of vigilance and orientation problems rather than executive functions for the SCT construct

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Psychosomatic Medicine. 2018;80:A47.

A SELF-REPORT OF SUPPORTIVE PARENTAL BEHAVIORS AND SELF-CONTROL AMONG ADOLESCENTS WITH ADHD.

Kaseda E, Sardoncillo D, Birmingham WC.

Background: It is estimated that between 5-10% of children and adolescents in the United States have been diagnosed with attention-deficit/hyperactivity disorder (ADHD). Adolescents with ADHD may experience increased parent-child conflict. Interpersonal difficulties among family members put children with ADHD at risk for comorbid disorders. Very little research has been done on children's own perception of parental support. Understanding which supportive behaviors are perceived as the most helpful may allow clinicians to target interventions to best improve the resilience of adolescents with ADHD.

Methods: 10 adolescents aged 14-19 (mean age =17; N= 7 female) with a verified diagnosis of ADHD completed surveys on their attitudes towards each of their parents and participated in a semi-structured interview. Participants discussed perceptions of self-control in school and in home settings, how relationships with their parents influence their self-control, and their overall perceptions of their parent-child relationships. Interviews were transcribed and coded for factors that improve adolescents' comfort in confiding in or sharing their feelings with their parents.

Results: Participants were mostly white (50%) or Latino/a (40%) and from middle to high income families. Participants reported low relational distress with their mothers ($M=28.1/100$) and their fathers ($M=32.2/100$). When asked how comfortable they felt confiding in their parents, only 33% of subjects reported feeling very comfortable. Participants reported on specific actions their parents take that make it easier or more difficult to confide in them. Responses included, Putting their words away for a minute to just listen; and If they give me advice that was too judgmental, I'll probably not come back to them.

Conclusions: Understanding adolescents' own perception of parental support and factors that influence confiding in their parents has significant potential for clinicians in creating familybased interventions for adolescents with ADHD. In particular, applying factors that improve adolescent comfort in confiding in parents has the potential to support adolescents with ADHD who are facing problems with self-control both at school and at home. Further research needs to be done on the differences in perceived family functioning between adolescents with ADHD and their typically developing peers

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Res Autism Spectr Disord. 2018;50:22-31.

"COMMUNICATIVE SKILLS IN SPANISH CHILDREN WITH AUTISM SPECTRUM DISORDER AND CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER. ANALYSIS THROUGH PARENTS' PERCEPTIONS AND NARRATIVE PRODUCTION".

Baixauli F, I, Berenguer FC, Colomer C, et al.

Background: Communicative skills are one of the main deficits experienced by children with Autism Spectrum Disorder (ASD). The differential diagnosis is a complex issue that clinicians often face. For this reason, this study has two objectives: 1) to analyze the similarities and differences that children with Attention Deficit Hyperactivity Disorder (ADHD) and children with ASD present in their linguistic and communicative skills, through parent perceptions and narrative production; 2) to identify the relative importance of the skills analyzed in discriminating children with ASD versus children with ADHD, as well as the classification power of each of the two measurement methods used.

Method: Participants were 37 children with typical development (TD), 52 with ASD, and 35 with ADHD. Their communicative competence was assessed through The Children's Communication Checklist Second Edition (CCC-2) (Bishop, 2003) and a narrative task.

Results: The results of the family ratings indicated that the difficulties were not as severe in ADHD as in ASD, where the deficit was much more pronounced in the interpretation of the context, non-verbal communication, and stereotyped language. On the narrative task, both groups displayed difficulties on expressing relevant information and inferential comprehension, and they differed on erroneous interpretations, with the children with ASD presenting worse performance. These variables showed a greater capacity to classify participants in the diagnostic categories studied.

Conclusions: These findings have direct clinical implications for optimizing the assessment process, making it possible to identify which specific language aspects can best differentiate between groups

Res Dev Disabil. 2018;77:60-67.

DETECTION OF NEURODEVELOPMENTAL DIVERSITY IN MEMORY CLINICS: VALIDATION OF A SELF-REPORT MEASURE.

Seifan A, Shih C, Hackett K, et al.

Background: Neurodevelopmental learning and attentional disorders (NLAD) such as dyslexia, dyscalculia and attention deficit hyperactivity disorder (ADHD) affect at least 6% of the adult population or more. They are associated with atypical cognitive patterns in early and adult life. The cognitive patterns of affected individuals in late life have never been described. One main challenge is detecting individuals in clinical settings during which mild cognitive changes could be confounding the clinical presentation. This is a critical research gap because these conditions interact, across the life course, with an individual's risk for dementia. Also, learning disabilities which present in childhood pose persistent cognitive differences in areas involving executive function, reading and math. Clinicians lack tools to detect undiagnosed neurodevelopmental in adults with memory disorders. The majority of patients presenting at memory clinics today come from a generation during which NLAD were not yet clinically recognized. In this study, we hypothesized that a self-report scale can detect NLAD in a memory clinic population.

Methods: We developed a self-report, retrospective childhood cognitive questionnaire including key attributes adapted from prior validated measures. 233 participants were included in the primary analysis.

Results: Confirmatory Factor Analysis resulted in a best-fit model with six labelled factors (Math, Language, Attention, Working Memory, Sequential Processing, and Executive Function) and 15 total question items. The model demonstrated unidimensionality, reliability, convergent validity, discriminant validity, and predictive validity. Using 1.5 standard deviations as the cut-off, subjects were categorized into: Normal (n = 169), Language (n = 10), Math (n = 12), Attention (n = 10) or Other/Mixed (n = 32).

Conclusion: A self-report measure can be a useful tool to elicit childhood cognitive susceptibilities in various domains that could represent NLAD among patients in a memory clinic setting, even in the presence of mild cognitive impairment

Rev Bras Psiquiatr. 2018 Jan;40:48-55.

PREVALENCE, CLINICAL CORRELATES AND MATERNAL PSYCHOPATHOLOGY OF DELIBERATE SELF-HARM IN CHILDREN AND EARLY ADOLESCENTS: RESULTS FROM A LARGE COMMUNITY STUDY.

Simioni AR, Pan PM, Gadelha A, et al.

OBJECTIVES: Little is known about the prevalence and correlates of deliberate self-harm (DSH) in children from low- and middle-income countries. We investigated the prevalence of DSH and its clinical and maternal psychopathological associations in Brazilian children (n=2,508, ages 6-14y) in a community-based study.

METHODS: Participants of the High Risk Cohort Study for the Development of Childhood Psychiatric Disorders (HRC) and their mothers were assessed in structured interviews. Current (last month) and lifetime DSH were estimated, including analysis stratified by age groups. Logistic regressions were performed to investigate the role of the children's clinical diagnoses and maternal psychopathology on DSH prevalence estimates, adjusting for potential confounding factors.

RESULTS: The prevalence of current DSH was 0.8% (children 0.6%, adolescents 1%) and lifetime DSH was 1.6% (1.8% and 1.5%, respectively). Current and lifetime DSH were more frequent in children with depression, attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD), even in multiple models accounting for demographic variables and co-occurring psychiatric disorders. Maternal anxiety disorder was strongly associated with current and lifetime DSH in offspring; whereas current DSH, specifically in young children, was associated with maternal mood disorder.

CONCLUSION: Diagnoses of depression, ADHD and ODD were consistently associated with DSH, as was having a mother with anxiety disorder

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Revista Brasileira de Neurologia e Psiquiatria. 2017;21:162-74.

PREVALENCE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) SYMPTOMS AND COMORBIDITIES IN CHILDREN AND ADOLESCENTS FROM A BRAZILIAN ISOLATED BLACK COMMUNITY.

Naves De Carvalho KC, Caixeta LF, Garcia CS, et al.

Objective: To assess prevalence of attention deficit hyperactivity disorder (ADHD) symptoms and comorbidities in children and adolescents aged 6 to 18 from a Kalunga community in the state of Goiás, Brazil.

Case description: A sample of 204 Kalunga children and adolescents was evaluated based on the responses of their parents/guardians and teachers to the Child Behavior Checklist for ages 6-18 (CBCL/6-18) and the Teacher's Report Form for ages 6-18 (TRF/6-18), respectively. ADHD and attention deficit disorder (ADD) symptoms and comorbidities were detected in 5.9%, 5.4%, 16.2%, and 15.2% of the individuals assessed, by parents and teachers, respectively. Prevalence of ADD was higher than the national average, while ADHD presented prevalence similar to that of the world population. According to the evaluations of parents/guardians and teachers, the estimated prevalences of comorbid disorders in children and adolescents with signs and symptoms of ADHD and ADD were, respectively, 83%, 90%, 60.6%, and 64% with oppositional defiant disorder and 58.3%, 63.6%, 75.7%, and 80.6% with anxiety disorders.

Conclusions: Due to the high prevalence of ADHD comorbidities found herein, further studies are necessary to assess the prevalence of other mental diseases in the studied community. Therefore, deeper knowledge on such a relevant theme can be generated

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Rev Neurol. 2018;66:S121-S126.

A STUDY OF PRIMARY SCHOOL TEACHERS' KNOWLEDGE OF ATTENTION DEFICIT HYPERACTIVITY DISORDER.

López-López A., López-Lafuente A., Eirís-Puñal J. MF, et al.

Introduction. The high prevalence of attention deficit hyperactivity disorder (ADHD), with at least one pupil per classroom, poses a challenge for all the professionals in contact with them, especially for teachers.

Aim. To examine how much primary school teachers know about ADHD in three areas (general information, symptoms and diagnosis, and treatment).

Subjects and methods. 125 primary school teachers from different communities answered the Knowledge of Attention Deficit Hyperactivity Disorder Scale (KADDS).

Results. The teachers answered fewer than half the items correctly, the symptoms and diagnosis subscale being the one where they were seen to be most knowledgeable. Teachers who had had children with ADHD in class displayed greater knowledge in the areas of general information and treatment, but less on the symptoms and diagnosis subscale. 32.8% of the teachers reported feeling somewhat or totally unable to teach children with ADHD in an effective way and recommend special education as a better educational style. Teachers with specific training in ADHD obtained better scores than those who had not received such instruction.

Conclusion. Teachers with training in ADHD are more knowledgeable and more confident about their abilities when it comes to teaching children with ADHD

Rev Neurol. 2018;66:175-81.

ELECTROPHYSIOLOGICAL CORRELATES OF READING IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Gonzalez-Perez PA, Hernandez-Exposito S, Perez J, et al.

Aims. To investigate whether or not the deficits in executive functions in the attention deficit hyperactivity disorder (ADHD) affect reading comprehension and identify a potential biological marker of this neuropsychological endophenotype through event-related potentials (ERP). The phenotypic association between reading comprehension and the specific functions of inhibition and working memory is studied.

Subjects and methods. The sample consisted of 52 children with ADHD (8-13 years) divided in two groups according to the presence (TDAH; n = 27; percentile < 30) or the absence (TDAH+; n = 25; percentile > 50) of reading comprehension deficits and a control group (n = 27). The executive functions were evaluated. The ERPs were assessed during a task in which anaphoric sentences of different lengths were presented, recording the ERP in the last adjective of the sentence that required a gender agreement.

Results. Working memory and inhibition were associated to reading comprehension performance. The ADHD+ group and the control group seem to detect the disagreement at 100 ms, while the ADHD group does not activate its working memory until 250 ms.

Conclusions. The delay in the implementation of the working memory mechanisms helps us to understand the deficits in reading comprehension of the ADHD group

Rev Neurol. 2018;66:S127-S132.

ADAPTIVE BEHAVIOUR AND LEARNING IN CHILDREN WITH NEURODEVELOPMENTAL DISORDERS (AUTISM SPECTRUM DISORDERS AND ATTENTION DEFICIT HYPERACTIVITY DISORDER). EFFECTS OF EXECUTIVE FUNCTIONING.

Rosello-Miranda B, Berenguer-Forner C, Miranda-Casas A.

Introduction. Autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) present difficulties in adaptive functioning and learning, possibly associated with failures in executive functioning characteristic of both disorders.

Aim. To analyze the impact of executive functioning in the adaptive behaviors of socialization and daily life and in learning behaviors in children with ASD and children with ADHD.

Subjects and methods. The participants were 124 children matched in age and intellectual quotient: 37 children with typical development, 52 children with ASD and 35 children with ADHD. Parents reported on their children's adaptive behaviors, while teachers provided information on learning behaviors and executive functioning in daily life.

Results. There are significant differences between the groups with ASD and ADHD with the typical development group in all domains evaluated. In addition, the group with ASD had worse socialization skills while persistence in learning was more affected in children with ADHD. Finally, the metacognitive index of executive functioning predicted the socialization and persistence of children with ASD. On the other hand,

the index of behavioral regulation and the educational level of the parents predicted the socialization skills in children with ADHD.

Conclusions. The results highlight the need to include differentiated executive strategies in the intervention of children with ASD and children with ADHD

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Rev Neurol. 2018;66:S115-S120.

ATTENTION DEFICIT HYPERACTIVITY DISORDER IN PRESCHOOL AGE CHILDREN. ITS EPIDEMIOLOGICAL PREVALENCE IN NAVARRA AND LA RIOJA, SPAIN.

Marin-Mendez JJ, Alvarez-Gomez MJ, Borra-Ruiz MC, et al.

Introduction. There are few studies about preschool attention deficit hyperactivity disorder (ADHD) prevalence.

Aim. To study the prevalence of ADHD in preschoolers using an specific scale (ADHD-RS-IV-P-Es) developed for this age range.

Subjects and methods. We evaluated the prevalence of possible ADHD in a representative sample of preschoolers in Navarra and La Rioja, Spain. Results. We find a range of prevalence between 2.5-4.1% depending on the criteria that was used (more or less strict).

Conclusions. There are specific tools that can be use in preschool ADHD study. The prevalence of preschool ADHD in Spain is similar than in other countries. The frequency of symptoms in this age range is similar to the found in school age children

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Scand J Public Health. 2018 Mar;46:262-71.

SUBJECTIVE HEALTH COMPLAINTS AND EXPOSURE TO PEER VICTIMIZATION AMONG DISABLED AND NON-DISABLED ADOLESCENTS: A POPULATION-BASED STUDY IN SWEDEN.

Fridh M, Kohler M, Moden B, et al.

AIMS: To investigate subjective health complaints (SHCs) (psychological and somatic, respectively) among disabled and non-disabled adolescents, focusing on the impact of traditional bullying and cyber harassment, and furthermore to report psychological and somatic SHCs across different types of disability.

METHODS: Data from the public health survey of children and adolescents in Scania, Sweden, 2012 was used. A questionnaire was answered anonymously in school by 9791 students in the 9th grade (response rate 83%), and 7533 of these with valid answers on key questions were included in this study. Associations with daily SHCs were investigated by multi-adjusted logistic regression analyses.

RESULTS: Any disability was reported by 24.1% of boys and 22.0% of girls. Disabled students were more exposed to cyber harassment (boys: 20.0%; girls: 28.2%) than non-disabled peers (boys: 11.8%; girls: 18.1%). Exposure to traditional bullying showed the same pattern but with a lower prevalence. Disabled students had around doubled odds of both daily psychological SHCs and daily somatic SHCs in the fully adjusted models. In general, the odds increased with exposure to cyber harassment or traditional bullying and the highest odds were seen among disabled students exposed to both cyber harassment and traditional bullying. Students with ADHD/ADD had the highest odds of daily psychological SHCs as well as exposure to traditional bullying across six disability types.

CONCLUSIONS: Disabled adolescents report poorer health and are more exposed to both traditional bullying and cyber harassment. This public health issue needs more attention in schools and in society in general

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Soc Psychiatry Psychiatr Epidemiol. 2017 Sep;52:1135-45.

HOMOTYPIC AND HETEROTYPIC PSYCHOPATHOLOGICAL CONTINUITY: A CHILD COHORT STUDY.

Shevlin M, McElroy E, Murphy J.

BACKGROUND: Heterotypic psychopathological continuity (i.e. one disorder predicting another at a later time point) contradicts the conventional view that psychiatric disorders are discrete, static entities. Studying this phenomenon may help to tease out the complex mechanisms that underpin psychiatric comorbidity. To date, no studies have explicitly compared heterotypic effects within and across higher order dimensions of psychopathology.

METHODS: Patterns of homotypic and heterotypic psychopathological continuity were examined using cohort data from the Avon Longitudinal Study of Parents and Children (ALSPAC, N = 4815). Eight common psychiatric disorders were assessed at age 7.5 and again at age 14 years using the maternal report version of the Development and Well-Being Assessment (DAWBA). Cross-lagged models were used to compare patterns of homotypic and heterotypic continuity within and across three higher order dimensions of psychopathology; internalizing-fear, internalizing-distress, and externalizing.

RESULTS: Homotypic continuity was universal. Considerable heterotypic continuity was observed even after controlling for homotypic continuity and the presence of all disorders at baseline. Heterotypic continuity was more common within higher order dimensions, but a number of significant cross-dimension effects were observed, with ADHD acting as a strong predictor of subsequent internalizing disorders.

CONCLUSIONS: Heterotypic continuity may reflect elements of shared aetiology, or local-level interactions between disorders

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Subst Use Misuse. 2017 Aug;52:1256-65.

PERCEPTIONS OF RISKS AND BENEFITS AMONG NONPRESCRIPTION STIMULANT CONSUMERS, DIVERTERS, AND NON-USERS.

Kinman BA, Armstrong KJ, Hood KB.

BACKGROUND: Few studies have examined perceptions of legal and health risks along with the perceived benefits of nonprescription stimulant (NPS) use in college students (e.g., using stimulants such as Ritalin, Vyvanse, Concerta, or Adderall without a prescription).

OBJECTIVE: This study sought to better understand how college students perceived legal and health risks, as well as motivations associated with NPS use. The perceived risks and benefits were examined between those involved and those uninvolved.

METHOD: The sample comprised 988 undergraduates at a southeastern university. Of the participants, 65.3% (645) were females, 69.1% (682) were freshmen, and 76.5% (756) were Caucasian. Participants from a convenience sample of general psychology students (enrolled August to December 2013) completed an on-line survey regarding behaviors and beliefs about the risks/benefits and motivations related to NPS use. Non-parametric Kruskal-Wallis analyses were conducted to examine perceptions of risks and motivations between those involved and those uninvolved in NPS use.

RESULTS: In the sample, 8.1% (n = 80) had a current prescription, with 30 individuals classified as diverters. Of participants, 23.1% (n = 228) reported that they were consumers of NPS medication. Results of the Kruskal-Wallis analyses showed that, compared with uninvolved students, those involved with stimulant medications perceived significantly greater cognitive benefits but less legal and health risks.

Conclusions/Importance: College students involved in the misuse (using a stimulant without a prescription or diverting stimulant medication to others) of NPS medications may underestimate associated risks and overestimate benefits

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Subst Use Misuse. 2017 Aug;52:1375-86.

SUBSTANCE USE IN UNDERGRADUATE STUDENTS WITH HISTORIES OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): THE ROLE OF IMPULSIVITY.

Egan TE, Dawson AE, Wymbs BT.

BACKGROUND: Emerging adulthood (18-25 years old) is regarded as a time of identity exploration that includes a peak in risky behaviors, such as substance use and misuse. Attention-deficit/hyperactivity disorder (ADHD) is also associated with greater levels of risky behaviors, including substance use and misuse; however, there is a lack of research on substance use by emerging adults with ADHD, in particular the potential mechanisms that may facilitate this risk.

OBJECTIVES: The present study builds on the existing research regarding the association between ADHD and substance use by examining roles of multiple facets of impulsivity in facilitating this association during emerging adulthood.

METHODS: In a sample of 197 undergraduate students (24 students with an ADHD diagnostic history), we assessed for components of impulsivity (e.g., urgency, sensation-seeking) and rates of alcohol abuse, tobacco use, cannabis use, illicit drug use, and stimulant medication misuse within the past year.

RESULTS: Findings indicate that facets of impulsivity, as a whole, explained the association between an ADHD diagnostic history and both illicit drug use and alcohol abuse such that students with ADHD histories tended to report higher levels of impulsivity, which increased risk of alcohol abuse and illicit drug use. Higher levels of specific facets of impulsivity, particularly negative urgency, also facilitated associations between having ADHD and engaging in most forms of substance use tested herein.

Conclusions/Importance: Specific facets of impulsivity appear to be important mediators of the association between ADHD and substance use, and should be considered as potential targets of substance use interventions for this population

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Systems Biology in Reproductive Medicine. 2018;1-9.

A LONG-TERM FOLLOW-UP STUDY OF MEN BORN WITH VERY LOW BIRTH WEIGHT AND THEIR REPRODUCTIVE HORMONE PROFILE.

Hammar M, Larsson E, Bladh M, et al.

Environmental factors during the fetal period may adversely affect reproductive functions in men being born with very low birth weight (VLBW, <1500- μ g). The objective of this prospective, controlled cohort study was to investigate if VLBW men have an altered reproductive hormone profile compared with men born at term. The study group initially consisted of all VLBW boys live-born between 1 February 1987 and 30 April 1988 in the south-east region of Sweden (n=47). A control child was chosen born at term, at the same hospital, with the same parity, without malformations, and next in order after each VLBW child who survived the first four weeks (n=45). The present follow-up was performed when the men were 26 \pm 28-years of age and included measurements of serum hormone levels, hair testosterone concentration, and anthropometric data. Also life-style questionnaires were collected from 26 VLBW men and 19 controls. The VLBW group (n=26) had higher median levels of serum estradiol, 84.5 pmol/L than controls (n=19), 57.5 pmol/L (p=0.008). There was no significant correlation between serum estradiol and BMI (r=0.06, p=0.74). There were no differences in other hormone levels or the reproductive pattern between the groups. In conclusion, even though there was a statistically significant difference in estradiol levels between the groups, both groups had low normal mean levels of questionable clinical significance. The reproductive pattern was similar in the two groups and in this study being born VLBW does not seem to affect these measured aspects of reproduction. Abbreviations: ADHD: attention deficit hyperactive disorder; AGA: average for gestational age; BMI: body mass index; CP: cerebral palsy; DHT: dihydrotestosterone; FSH: follicle stimulating hormone; LBW: low birth weight; LH: luteinizing hormone; SAD: sagittal abdominal diameter; SGA: small for gestational age; SHBG: sex hormone binding globulin; TSH: thyroid stimulating hormone; T3: triiodothyronine; T4: thyroxin; VLBW: very low birth weight

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Maternal anxiety, depression and sleep disorders before and during pregnancy, and preschool ADHD symptoms in the NINFEA birth cohort study

L. Vizzini^{1*}, M. Popovic¹, D. Zugna¹, B. Vitiello², M. Trevisan¹, C. Pizzi¹, F. Rusconi³, L. Gagliardi⁴, F. Merletti¹ and L. Richiardi¹

¹ Cancer Epidemiology Unit, Department of Medical Sciences, University of Turin and CPO-Piemonte, Turin, Italy

² Division of Child and Adolescent Psychiatry, University of Turin, Turin, Italy

³ Epidemiology Unit, Anna Meyer Children's University Hospital, Florence, Italy

⁴ Woman and Child Health Department, Pediatric and Neonatology Division, Ospedale della Versilia, Viareggio, Italy

Aims. Maternal mental disorders have been associated with the risk of attention-deficit/hyperactivity disorder (ADHD) in children. Within the context of a mother–child cohort, we examined whether maternal anxiety, depression and sleep disorders are associated with pre-school ADHD symptoms.

Methods. The study included 3634 singletons from the Italian NINFEA (Nascita e INFanzia: gli Effetti dell'Ambiente') cohort. Maternal doctor-diagnosed anxiety, depression and sleep disorders before and during pregnancy were assessed from the questionnaires completed during pregnancy and 6 months after delivery. Mothers rated child ADHD symptoms at 4 years of age, according to the Diagnostic and Statistical Manual of Mental Disorders. Hyperactive–impulsive (ADHD-H), inattentive (ADHD-I) and total ADHD scores were analysed in the models adjusted for child's gender, first-born status, maternal age, education, alcohol consumption and smoking during pregnancy.

Results. The total ADHD score at age 4 was associated with maternal lifetime anxiety (17.1% percentage difference in score compared with never; 95% CI 7.3–27.9%), sleep disorders (35.7%; 95% CI 10.7–66.5%) and depression (17.5%; 95% CI 3.2–33.8%). Similar positive associations were observed also for ADHD-H and ADHD-I traits, with slightly attenuated associations between maternal sleep disorders and child ADHD-I score, and maternal depression and both ADHD scores. All the estimates were enhanced when the disorders were active during pregnancy and attenuated for disorders active only during the pre-pregnancy period.

Conclusions. Maternal anxiety, depression and sleep disorders are associated with a relative increase in the number of ADHD-H, ADHD-I and total ADHD symptoms in preschoolers.

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Key words: Attention-deficit/hyperactivity disorder, mental health, prospective study, risk factors.

Introduction

Pregnancy represents a particularly vulnerable period for the onset, recurrence and exacerbation of major mental health conditions, including depression, anxiety and mood disorders (Howard *et al.* 2014). It has been reported that approximately 7–15% of women during pregnancy are affected by mental disorders (Gelaye *et al.* 2016; Van den Bergh *et al.* 2017), whose common symptoms, such as disordered appetite, sleep disturbances and mood swings are often difficult to distinguish from physiological changes

occurring during pregnancy, and thus, the reported prevalence is likely underestimated. Sleep disturbances, for example, are among the major symptoms associated with depression, and during pregnancy are considered as both a result of stress and as a stressor *per se* that may contribute to adverse pregnancy outcomes (Palagini *et al.* 2014). Moreover, mental disorders often coexist (Fried *et al.* 2017) increasing the burden of adverse effects on the mother and her child.

A number of studies reported associations of prenatal maternal depression and anxiety with offspring health outcomes, including low birth weight, preterm birth (Grote *et al.* 2010) and respiratory morbidity (van de Loo *et al.* 2016). Also, sleep disorders, such as obstructive sleep apnoea and insomnia have been shown to be associated with pregnancy complications and adverse perinatal outcomes (Bin *et al.* 2016; Felder

* Address for correspondence: L. Vizzini, Cancer Epidemiology Unit, Department of Medical Sciences, University of Turin and CPO-Piemonte, Turin, Italy.

(Email: loredana.vizzini@gmail.com)

et al. 2017). Furthermore, maternal mental disorders during pregnancy influence the child cognitive, emotional, social and behavioural development increasing the risk of emotional (internalising) and behavioural (externalising) difficulties, such as attention-deficit/hyperactivity disorder (ADHD) (Glover, 2011; Stein *et al.* 2014).

ADHD is a childhood-onset neurodevelopmental disorder characterised by symptoms of inattention, hyperactivity and impulsivity. Its aetiology is multifactorial (Thapar & Cooper, 2016), including an important heritability component (heritability estimates ranging from 75 to 90%) (Goodman & Stevenson, 1989; Thapar *et al.* 1999; Thapar *et al.* 2000; Faraone *et al.* 2005), several environmental risk factors (Thapar & Cooper, 2016) and gene–environment interactions (Nigg *et al.* 2010; Harold *et al.* 2013). Parental expectations of the child's behaviour play an important role in the definition of ADHD and are known to differ among populations (Zwirs *et al.* 2006).

Several studies reported an association of maternal anxiety and depression during pregnancy with an increased risk of ADHD in preschool children, but only a few of them had prospectively collected exposure data (Clavarino *et al.* 2010; Van Batenburg-Eddes *et al.* 2013; Bendiksen *et al.* 2015; Wolford *et al.* 2017). Much of the research was focused on maternal depression and anxiety during pregnancy and less attention has been paid to depression and anxiety occurring before pregnancy.

To take into account the parents' cultural context and different exposure time windows, we aimed at examining maternal diagnoses of anxiety and depression before and during pregnancy in association with inattentive and hyperactivity-impulsivity ADHD traits in 4-year-old offspring in a large mother-child cohort carried out in South Europe (Italy). We also analysed doctor-diagnosed maternal sleep disorders before and during pregnancy, which can both contribute to mental health conditions and be a symptom of other mental disorders (Fried *et al.* 2017). Maternal sleep disorders, to our knowledge, have not been studied before in association with child ADHD.

Methods

Study population

Data were collected from the study 'Nascita e INFanzia: gli Effetti dell'Ambiente' (NINFEA), whose protocol was approved by the Ethical Committee of the San Giovanni

Battista Hospital and CTO/CRF/Maria Adelaide Hospital of Turin. The NINFEA cohort study is an internet-based birth cohort with the aim of

investigating prenatal and early life exposures in relation to childhood health and development from a life-course perspective (www.progettoninfea.it) (Richiardi *et al.* 2007).

Approximately 7500 pregnant women who had access to the Internet and enough knowledge of the Italian language to complete online questionnaires were recruited from 2005 until 2016. The women completed the first baseline questionnaire at any time during pregnancy, and the children have been followed-up with additional five questionnaires completed by their mothers 6 months after delivery and when the children turn 1½, 4, 7 and 10 years of age.

For this study, we used the NINFEA database version 11.2017. The outcome was assessed at the age of 4 years where the response rate of the questionnaire is 77% (Pizzi, 2016). A total of 3634 singletons who at the time of the data download had completed the assessment at age 4 years, were included in the study.

Explanatory variables

Maternal mental disorder data were collected with a questionnaire completed during pregnancy (mean gestational age at completion 26.3 weeks, standard deviation (SD) 9.5) in which women were asked to answer a checklist of chronic conditions ever diagnosed by a doctor. The full checklist consisting of 30 different maternal chronic conditions is available online at the study website (Progetto Ninfea, 2005). We selected from the checklist the following maternal mental disorders: (i) diagnosis of depression, (ii) diagnosis of anxiety and (iii) diagnosis of sleep disorders. For each reported condition, participants were further asked to report whether the condition was present only before pregnancy, only during pregnancy or in both periods. Information on the third-trimester exposures was retrieved from the questionnaire completed 6 months after delivery.

We defined three exposure time windows: (i) lifetime diagnosis – a disorder ever diagnosed by a doctor, (ii) pre-pregnancy exposure – a previous diagnosis of a disorder that was not active during the index pregnancy and (iii) during pregnancy exposure – a disorder active during the index pregnancy.

The definitions of sleep disorders were based on any doctor-diagnosed a sleep disorder, as information on specific Diagnostic and Statistical Manual of Mental Disorders (DSM V) (American Psychiatric Association, 2013) subcategories was not available in the NINFEA cohort. In addition, for sleep disorders during pregnancy, we did not consider the third trimester of pregnancy in order to avoid exposure misclassification due to deterioration in sleep quality across pregnancy (Polo-Kantola *et al.* 2017).

Potential confounders were chosen *a priori* and included maternal age at delivery (<30; 30–34; 35+ years), maternal educational level (university degree *vs.* lower level), maternal smoking during pregnancy (ever *vs.* never smoking), maternal alcohol consumption during the first trimester of pregnancy (at least 1 drink/day *vs.* <=6 drinks/week), gender of the child and first-born status.

Outcome variables

When the child turned 4 years, mothers were asked to respond to a list of questions regarding the child's behaviour (mean age at questionnaire completion 4.1 years; SD, 0.2 years). This list is based on the criteria for ADHD diagnosis of the Diagnostic and Statistical Manual of Mental Disorders (DSM IV) (American Psychiatric Association, 1994) that provides a standard assessment of inattentive and hyperactive-impulsive symptoms prior to 7 years of age (Tandon *et al.* 2009). The DSM IV questionnaire consists of 18 dichotomous (yes/no) items that are used to define two behavioural subscales: (i) inattentive score (ADHD-I) and (ii) hyperactive-impulsive score (ADHD-H).

For a clinical diagnosis, the two traits would have to be confirmed in two settings, e.g. at home and at school, showing evidence of interference on social and academic functioning, but for research purposes, we based our outcome definition only on the mothers' report.

As from a population perspective, ADHD can be seen as a continuously distributed risk dimension (Larsson *et al.* 2012; Thapar & Cooper, 2016), we analysed ADHD symptoms as continuous scores. One of the nine items of the inattentive sub-scale ('Often has trouble keeping attention on tasks or play activities') was not included in the NINFEA questionnaire until a later update of the follow-up questionnaires, and, therefore, we considered only eight items for the ADHD-I score.

Given the association of ADHD with Intelligence Quotient (IQ), intellectual disability (Dykens, 2000) and low long-term academic outcomes (Polderman *et al.* 2010; Washbrook *et al.* 2013), we used data from the NINFEA assessment at age 7 years (mean age 7.1 years; SD 0.2 years) in which mothers were asked to indicate their children's final grades in mathematics and reading/writing in the first year of the primary school. We considered that a positive association between ADHD scores reported at age 4-years and lower academic performance at school age would indicate that maternally reported ADHD scores are reliable and valid measures of children's cognitive impairments related to ADHD. Information from the assessment at age 7 years was available for 1392 children

who were born before November 2010 and thus met the age criterion for the assessment at age 7 years. The primary school in Italy uses a grading system that ranges from 1 (impossible to assess) to 10 (excellent). We coded the child's academic achievement in mathematics and reading/writing as low (equal or less of 7) and high (8–10).

Statistical methods

The total ADHD, ADHD-H and ADHD-I scores were treated as continuous variables and analysed using linear regression models. The number of symptoms was log-transformed [$\log(y + 1)$] to satisfy the assumption of normality. After the transformation, visual inspection and tests based on kurtosis and skewness indicated a normal distribution. Model estimates are reported as percentage differences in the number of symptoms (Törnqvist *et al.* 1985). We specified two adjustment models: (i) adjustment for child's gender, first-born status, mother's age and educational level, and (ii) additional adjustment for maternal smoking and alcohol use during pregnancy. Maternal anxiety, depression and sleep disorders were analysed separately and in the following time windows: (i) lifetime diagnosis, (ii) pre-pregnancy only and (iii) during pregnancy.

To take into account comorbidities between the three disorders, we additionally analysed the total number of disorders experienced during pregnancy. We categorised the exposed subjects in the following groups: (i) mothers who never had a diagnosis of any of the three disorders (reference), (ii) mothers with a history of at least one of the disorders before pregnancy but not during pregnancy, (iii) mothers with only one of the disorders during pregnancy, (iv) mothers with the two disorders during pregnancy and (v) mothers with all the three disorders during pregnancy. Finally, to explore the relative importance and contribution of each of the disorders to ADHD symptoms we specified a model where all the three disorders were mutually adjusted (i.e. all variables included in the same model).

Associations of the number of symptoms on the two ADHD subscales with the academic outcomes in mathematics and reading/writing were estimated using logistic regression models adjusted for maternal depression, anxiety and sleep disorders, maternal age and education, child's gender and first-born status. As information on academic outcomes was missing for 9.2% of our sample, we performed multivariate multiple imputations using chained equations (20 imputed data sets) to replace missing values of both outcomes and all confounding factors (Buuren & Groothuis-Oudshoorn, 2011). Statistical analyses were

performed using R software version 3.3.1 (R Core Team, 2016).

Results

The study included 3634 children with the completed assessment at 4 years of age. Children lost to follow-up at age 4 were not significantly different from those included in the study in all the baseline characteristics, including being first-born, maternal age, maternal education and smoking during pregnancy (all p -values > 0.05). The percentage of missing data for maternal and child characteristics was <2.6%.

Maternal characteristics are reported in Table 1, while Table 2 summarises the main child characteristics. Mothers were mostly Italian born (96.5%), highly educated (63.5%) and were aged on average 33.6 (SD 4.2) years at delivery. In our sample, 3.8% of mothers reported a diagnosis of depression, 8.9% anxiety and 1.7% sleep disorders. In total, 402 (11.1%) mothers had at least one of the analysed mental disorders. At 4 years of age, children had a mean total ADHD score of 3.6 (SD 3.0), a mean ADHD-H score of 2.4 (SD 2.1) and a mean ADHD-I score of 1.2 (SD 1.5). The associations of the confounding variables with ADHD-H and ADHD-I are reported in Table S1.

The total ADHD score was associated with maternal lifetime diagnosis of anxiety (ever *vs.* never: 17.1%; 95% CI 7.3–27.9%), sleep disorders (35.7%; 95% CI 10.7–66.5%), and depression (17.5%; 95% CI 3.2–33.8%).

The associations between maternal mental disorders and child ADHD-H and ADHD-I scores at 4 years of age are reported in Table 3. Both maternal anxiety and sleep disorders were associated with an increase in ADHD-H score. A positive association, though weaker in magnitude, was observed also between maternal depression and ADHD-H score. The direction of the effects was similar also for ADHD-I, although the association of maternal sleep disorders with ADHD-I was somewhat weaker. All the estimates were higher when the disorders were active during pregnancy, for both ADHD traits, and were diminished or annulled for disorders active only during the pre-pregnancy period.

Of the 135 (3.7%) mothers with a history of at least one disorder before but not during pregnancy, 84 (62.2%) had anxiety, 12 (8.9%) sleep disorders and 39 (28.9%) depression. Of the 212 (5.8%) mothers with only one disorder active during pregnancy, 172 (81.1%) had anxiety, 19 (9.0%) sleep disorders and 21 (9.9%) depression. Among the 42 (1.2%) mothers with two disorders active during pregnancy, 33 (76.7%) had depression and anxiety without sleep

Table 1. Maternal characteristics ($n = 3634$)

Variable	N	(%)
Country of birth		
Italy	3505	(96.5)
Other country	129	(3.5)
Age at childbirth (years)		
<30	681	(18.7)
30–34	1575	(43.3)
35+	1378	(37.9)
Maternal education ^a		
Low	1322	(36.5)
High	2299	(63.5)
Missing	13	
Smoking during pregnancy		
No	3352	(92.4)
Yes	277	(7.6)
Missing	5	
Alcohol consumption during the first trimester of pregnancy		
≤6 drinks/week	3315	(93.6)
at least 1 drink/day	225	(6.4)
Missing	94	
Anxiety		
Never	3311	(91.1)
Lifetime diagnosis	323	(8.9)
Pre-pregnancy	91	(2.5)
During pregnancy	232	(6.4)
Depression		
Never	3490	(96.2)
Lifetime diagnosis	139	(3.8)
Pre-pregnancy	70	(1.9)
During pregnancy	69	(1.9)
Missing	5	
Sleep disorders		
Never	3567	(98.3)
Lifetime diagnosis	61	(1.7)
Pre-pregnancy	20	(0.6)
During pregnancy ^b	41	(1.1)
Missing	6	
Anxiety and/or depression and/or sleep disorders before or during pregnancy		
Never	3225	(88.9)
At least one condition	402	(11.1)
Missing	7	

^aHigh – University degree, Low – other.

^bSleep disorders during pregnancy do not include the third trimester exposures.

disorders, nine (20.9%) had anxiety and sleep disorders without depression, and only one (2.3%) mother had sleep disorders and depression without anxiety. Twelve mothers (0.3%) had all three disorders during pregnancy. Depression more likely co-occurs with anxiety and sleep disorders and there is also a large overlap between anxiety and sleep disorders (all chi-square test p -values < 0.05).

Table 2. Child characteristics

Variable	N	(%)
Child characteristics at birth and 4 years (<i>n</i> = 3634)		
Gender		
Boys	1854	(51.0)
Girl	1780	(49.0)
First born		
No	944	(26.1)
Yes	2677	(73.9)
Missing	13	
Gestational age (weeks)		
37+	3493	(96.2)
<37	139	(3.8)
Missing	2	
ADHD-H number of symptoms		
0	830	(23.4)
1	612	(17.2)
2	650	(18.3)
3	513	(14.4)
4	378	(10.6)
5	257	(7.2)
6	158	(4.4)
7	84	(2.4)
8	48	(1.4)
9	21	(0.6)
Missing	83	
ADHD-I number of symptoms		
0	1448	(40.9)
1	897	(25.3)
2	596	(16.8)
3	316	(8.9)
4	138	(3.9)
5	77	(2.2)
6	47	(1.3)
7	17	(0.5)
8	5	(0.1)
Missing	93	
Child characteristics at 7 years (<i>n</i> = 1392)		
Academic score in reading/writing		
>7	1011	(80.0)
≤7	253	(20.0)
Missing	128	
Academic score in mathematics		
>7	1035	(81.7)
≤7	232	(18.3)
Missing	125	

ADHD, Attention-deficit/hyperactivity disorder; ADHD-H, = ADHD hyperactive-impulsive score; ADHD-I, ADHD inattentive score, >7 means good academic performance.

The associations between the number of maternal mental disorders during pregnancy and child ADHD-H and ADHD-I scores at 4 years of age are presented in Table 4. Both ADHD-H score and, to a lesser extent, ADHD-I score showed a relative increase with

increasing the number of disorders active during pregnancy. When all the three conditions were included in the same model (i.e. mutually adjusted) lifetime anxiety (11.2%; 95% CI 2.1–21.2%) and sleep disorders (22.4%; 95% CI 1.3–48.1%), but not depression (2.5%; 95% CI –9.7 to 16.4%), remained associated with ADHD-H, while only maternal anxiety was associated with offspring ADHD-I (anxiety: 8.6%; 95% CI 0.7–17.1%; depression: 3.4%; 95% CI –7.6 to 15.6%; sleep disorders 9.5%; 95% CI –7.1 to 29.1%).

Associations between child's ADHD at age of 4 years and their academic achievement at the end of the first year of primary school are reported in Table 5. ADHD-I score was negatively associated with academic performance at age 7 years, while no association was found with the ADHD-H score.

Discussion

Our study found positive associations of maternal lifetime anxiety, depression and sleep disorders with offspring ADHD symptoms at 4 years of age. Although the magnitude of the effects and the width of the confidence intervals varied, the associations were quite consistent for both inattentive and hyperactive-impulsive ADHD subscales. Notably, all the associations were stronger when the disorders were actively symptomatic during pregnancy, and there was an evident increase in the number of ADHD symptoms with increasing the number of disorders active during pregnancy. All the associations were largely attenuated if the disorders were present only during the pre-pregnancy period. Anxiety and sleep disorders contributed uniquely to the ADHD-H symptoms in the mutually adjusted model, while only maternal anxiety contributed to the ADHD-I symptoms. Finally, the ADHD-I score, but not the ADHD-H score, at 4 years of age was associated with lower scores in reading/writing and mathematics.

Our findings are generally consistent with those reported by previous longitudinal birth cohort studies, but with slightly stronger effects of maternal mental disorders during pregnancy on offspring ADHD. In the Norwegian MoBa cohort, an increase in maternal prenatal distress score was associated with an increase in the number of ADHD-H, but not with ADHD-I symptoms (Bendiksen *et al.* 2015). The authors explained that the lack of the association with ADHD-I may be due to lack of power, as only a few children had a clinically significant ADHD-I. Consistently, the PREDO cohort study found an increase in ADHD symptoms in 3–6-year-old children born to mothers with depressive symptoms during pregnancy (Wolford *et al.* 2017). Furthermore,

Table 3. Associations between maternal mental disorders and children's ADHD-H and ADHD-I scores at 4 years of age ($n = 3634$)

	Unadjusted		Model 1		Model 2	
	% difference in number of symptoms (95% CI) ^a		% difference in number of symptoms (95% CI) ^a		% difference in number of symptoms (95% CI) ^a	
ADHD-H						
Anxiety						
Never	0	(Ref)	0	(Ref)	0	(Ref)
Lifetime diagnosis	16.8	(8.0–26.2)	14.6	(6.1–23.8)	13.5	(4.8–22.8)
Pre-pregnancy	2.3	(–11.1–17.7)	0.7	(–12.4–15.6)	1.2	(–12.0–16.4)
During pregnancy	23.2	(12.5–34.9)	20.9	(10.4–33.3)	19.2	(8.6–31.0)
Sleep disorder						
Never	0	(Ref)	0	(Ref)	0	(Ref)
Lifetime diagnosis	30.3	(9.3–55.4)	32.1	(10.7–57.6)	29.8	(8.1–55.9)
Pre-pregnancy	11.0	(–18.1–50.4)	11.9	(–17.0–50.8)	12.6	(–17.2–53.0)
During pregnancy	41.2	(13.9–75.1)	44.2	(16.0–79.2)	40.3	(11.8–76.1)
Depression						
Never	0	(Ref)	0	(Ref)	0	(Ref)
Lifetime diagnosis	15.1	(2.6–29.1)	12.8	(0.6–26.5)	11.9	(–0.5–25.8)
Pre-pregnancy	15.3	(–1.7–35.3)	11.3	(–5.2–30.7)	10.5	(–6.0–30.0)
During pregnancy	14.8	(–2.3–35.0)	14.3	(–2.7–34.1)	13.4	(–4.0–33.9)
ADHD-I						
Anxiety						
Never	0	(Ref)	0	(Ref)	0	(Ref)
Lifetime diagnosis	12.9	(5.4–20.9)	11.8	(4.5–19.6)	11.3	(3.8–19.3)
Pre-pregnancy	8.3	(–4.3–22.6)	8.0	(–4.4–22.0)	8.7	(–3.9–23.0)
During pregnancy	14.8	(5.9–24.3)	13.4	(4.7–22.7)	12.4	(3.5–22.1)
Sleep disorder						
Never	0	(Ref)	0	(Ref)	0	(Ref)
Lifetime diagnosis	15.9	(–0.4–34.9)	18.5	(1.9–37.9)	15.4	(–1.5–35.1)
Pre-pregnancy	6.5	(–18.6–39.3)	5.5	(–18.9–37.2)	3.6	(–20.9–35.6)
During pregnancy	20.6	(0.4–44.8)	25.5	(4.4–50.9)	22.0	(0.5–48.1)
Depression						
Never	0	(Ref)	0	(Ref)	0	(Ref)
Lifetime diagnosis	11.8	(1.0–23.8)	11.9	(1.2–23.8)	10.0	(–0.8–22.0)
Pre-pregnancy	11.7	(–3.1–28.7)	10.5	(–4.1–27.4)	8.7	(–5.8–25.5)
During pregnancy	11.9	(–3.0–29.1)	13.3	(–1.6–30.5)	11.4	(–3.8–29.0)

CI, confidence interval, Model 1: Adjusted for maternal age and education, child gender and first-born status, Model 2: Adjusted as Model 1 and additionally adjusted for maternal smoking and alcohol use during pregnancy; ADHD-H, ADHD hyperactive-impulsive score; ADHD-I, ADHD inattentive score.

^aNegative values indicate a relative decrease in the number of ADHD sub-scale symptoms.

a positive association between maternal anxiety during pregnancy and persistent attention problems in children was found in the Australian MUSP cohort (Clavarino *et al.* 2010), and antenatal maternal anxiety and depression were associated with an increased risk of child inattention at 3 years of age in the UK ALSPAC and Dutch Generation R cohorts (Van Batenburg-Eddes *et al.* 2013).

To our knowledge, this is the first study reporting an association between maternal sleep disorders and offspring ADHD. We observed that doctor-diagnosed maternal sleep disorders, especially if active during

pregnancy, are strongly associated with offspring ADHD. These associations were evident particularly for the ADHD-H trait, where the observed difference was independent of maternal comorbid depression and anxiety. Maternal insomnia and sleep apnoea have been associated with preterm birth (Felder *et al.* 2017) and pregnancy complications, including gestational diabetes and hypertension (Bazalakova, 2017; Bourjeily *et al.* 2017). Chronic sleep deprivation is also known to be related to stress system activation that may influence adverse pregnancy outcomes (Palagini *et al.* 2014). It should be noted that we

Table 4. Associations of the Number of Comorbid maternal mental Disorders with children's ADHD-H and ADHD-I scores at 4 years of age (*n* = 3634)

	Unadjusted		Model 1		Model 2	
	% difference in number of symptoms (95% CI) ^a		% difference in number of symptoms (95% CI) ^a		% difference in number of symptoms (95% CI) ^a	
ADHD-H						
Diagnosis of anxiety, sleep disorders or depression						
Never	0	(Ref)	0	(Ref)	0	(Ref)
History of at least one disorder before but not during pregnancy	1.5	(-9.6-13.9)	-1.2	(-12.0-10.8)	-1.1	(-12.0-11.2)
One disorder in pregnancy	19.2	(8.4-31.1)	17.9	(7.3-29.5)	14.3	(3.7-26.1)
Two disorders in pregnancy	35.1	(10.3-65.4)	29.3	(5.7-58.2)	31.9	(6.4-63.6)
Three disorders in pregnancy	29.3	(-13.1-92.6)	34.2	(-9.2-98.6)	34.7	(-8.9-99.3)
ADHD-I						
Diagnosis of anxiety, sleep disorders or depression						
Never	0	(Ref)	0	(Ref)	0	(Ref)
History of at least one disorder before pregnancy, but not in pregnancy	7.8	(-2.7-19.6)	6.5	(-3.9-18.0)	6.3	(-4.2-17.9)
One disorder in pregnancy	12.3	(3.3-22.1)	12.4	(3.5-22.1)	10.7	(1.6-20.6)
Two disorders in pregnancy	20.2	(0.5-43.8)	16.8	(-2.2-39.6)	14.7	(-5.0-38.6)
Three disorders in pregnancy	12.1	(-20.0-57.0)	17.0	(-15.9-62.8)	17.5	(-15.5-63.4)

CI, confidence interval, Model 1: Adjusted for maternal age and education, child gender and first-born status, Model 2: Adjusted as Model 1 and additionally adjusted for maternal smoking and alcohol use during pregnancy; ADHD-H, ADHD hyperactive-impulsive score; ADHD-I, ADHD inattentive score.

^aNegative values indicate a relative decrease in the number of ADHD sub-scale symptoms.

assessed only doctor-diagnosed disorders and, therefore, the effect of less severe sleep disturbances, which have much higher prevalence in general population and among pregnant women, requires future

Table 5. Associations between ADHD scores at age 4 and poor academic performance in reading/writing and mathematics at age 7 (*n* = 1392)

	Mathematics		Reading/writing	
	OR (95% CI) ^a		OR (95% CI) ^a	
ADHD-H				
Unit of increase	1.04	(0.97-1.11)	1.03	(0.96-1.10)
ADHD-I				
Unit of increase	1.17	(1.06-1.29)	1.20	(1.09-1.31)

OR, odds ratio; CI, confidence interval; ADHD-H, ADHD hyperactive-impulsive score; ADHD-I, ADHD inattentive score.

^aResults from logistic regression analyses adjusted for maternal anxiety, depression or sleep disorders before and during pregnancy, maternal age and education, child gender and first-born status.

research. However, our findings suggest the importance of the sleep disorders assessment in women of reproductive age.

In our analyses, we took into account several important confounding factors, and the associations we found between these confounders and ADHD-H and ADHD-I were consistent with previous research (Sayal *et al.* 2014; Arnett *et al.* 2015; Obel *et al.* 2016), providing indirect support to the validity of our research setting. Preterm birth is a potential mediator of the association between maternal mental health and neurodevelopmental problems (McCoy *et al.* 2014), and was thus not considered as a potential confounder in our study. However, further controlling for gestational age as a continuous variable or restricting analysis to children born at term did not change the results more than marginally (data not shown).

Although the specific mechanism involved in the associations between maternal mental disorders and offspring attention and/or hyperactivity/impulsivity problems are still unclear, several possible explanations have been suggested. First, maternal mental disorders could act by activating the HPA (hypothalamic-pituitary-adrenal) axis, which, through an excessive increase

in cortisol levels, might compromise fetal brain development (Van den Bergh *et al.* 2005; Beijers *et al.* 2014; Glover, 2015). In addition, the observed relationship could also be due to confounding by shared familial characteristics, such as genetics (Thapar & Cooper, 2016), as well as residual confounding by socio-economic status (Foulon *et al.* 2015) and/or lifestyle (Sayal *et al.* 2014; Rijlaarsdam *et al.* 2017). Finally, mental disorders are generally persistent and could affect parenting style and mother–child attachment during postnatal period (Harold *et al.* 2013; Webb & Ayers, 2015; Thapar & Cooper, 2016) – factors that are known to be associated with later ADHD symptoms (Storebo *et al.* 2016).

The main strength of the NINFEA study is that the exposure information was collected prospectively during pregnancy. To the best of our knowledge, this is the first study on prenatal risk factors for ADHD in the Italian population, and thus, serves as a replication of findings from other populations (Zwirs *et al.* 2006). Our findings provide further evidence that maternal anxiety and depression contribute to the onset of offspring ADHD symptoms and extend the existing evidence also to maternal sleep disorders. We were able to evaluate two distinct ADHD subscales and most of the observed associations were evident both for inattentive and for hyperactive–impulsive trait. Finally, the follow-up at 7 years of age on the academic performance supports the clinical significance of the ADHD-I phenotype.

Our study has some limitations that should be considered when interpreting the results. First, the assessment of child’s behavioural problems was entirely based on maternal report, and mothers with mental disorders at the time of the completion of the questionnaire might have overreported child ADHD symptoms (Najman *et al.* 2000). However, the observed associations were qualitatively similar for depression, anxiety and sleep disorders, and it is unlikely that the misreporting of child symptoms would have been driven in the same direction by these three disorders. Moreover, empirical evidence suggests a weak association between maternal mental health and differential reporting of offspring ADHD symptoms. In particular, a study on ADHD children showed that parental ADHD status does not affect maternal reporting of ADHD symptoms in their children (Faraone *et al.* 2003).

Considering that in the NINFEA cohort ADHD score and the academic achievement were assessed prospectively 3 years apart, and that the reported grades at school are not likely to be affected by maternal perception of her own child, our finding of a lower academic achievement among children with ADHD-I further supports the validity of the ADHD assessment in our cohort. Similarly, a previous study reported a

lower academic achievement among children with an inattentive trait, but not among those with hyperactive behaviour (Polderman *et al.* 2011). These associations have been consistently replicated in large sample size studies with information on several potential confounding factors, including intelligence, family income and comorbidities (Polderman *et al.* 2010).

As different functions and structures of the brain develop in different periods of gestation, it has been hypothesised that the effects of prenatal stress on specific offspring neurodevelopmental outcomes may differ according to the pregnancy trimester (Van den Bergh *et al.* 2017). We did not analyse single trimester exposures as the prevalence of these disorders during pregnancy is rather low (e.g. depression prevalence is 2%), and the stratified analyses would have limited power. However, in this study, we used doctor-diagnosed mental disorders capturing, therefore, more serious and chronic conditions that generally do not pass in short time periods, such as pregnancy trimester.

Another limitation of our study is the lack of information on maternal ADHD diagnosis that potentially could act as a confounding factor. It should be noted that ADHD was unrecognised and rarely diagnosed in Italy before the 1990s (Gallucci *et al.* 1993), and therefore, difficult to be assessed in most of the mothers participating in the NINFEA cohort. However, given the relatively low ADHD prevalence in general population (Simon *et al.* 2009) compared with anxiety, depression and sleep disorders, and the relatively strong associations that we found, it is unlikely that confounding by maternal ADHD could entirely explain the findings of our study.

Finally, participants of the NINFEA cohort, like those of many other cohort studies, are a selected population with relatively high education and socio-economic status. However, it has been extensively shown that, although this selective participation might affect prevalence estimates, it does not imply distorted estimates of association in cohort studies (Pizzi *et al.* 2012; Rothman *et al.* 2013).

Conclusions

Our findings indicate that antenatal maternal mental disorders, in particular depression, anxiety and sleep disorders, are associated with higher scores of inattentive and hyperactive–impulsive symptoms in their children at age 4 years and that these associations are stronger if the disorders are active during pregnancy. Antenatal preventive strategies focused on identification and reduction of mental disorders may be important for improving child psychological development.

Supplementary material

The supplementary material for this article can be found at <https://doi.org/10.1017/S2045796018000185>.

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Conflict of interest

The authors declare no competing interests.

Availability of data and materials

Anonymised data are available upon request to qualified researchers who meet the criteria for access to confidential data for the purpose of academic, non-commercial research, as required by the authors' IRB. Data on exposure and outcome variables are available upon request by contacting lorenzo.richiardi@unito.it


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Cognitive Processes in ADHD and Asperger's Disorder: Overlaps and Differences in PASS Profiles

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Stefano Taddei¹ and Bastianina Contena¹

Abstract

Objective: Many studies report on the usefulness of the evaluation of Executive Functions (EF) in the assessment of participants with ADHD, while others underline how deficits of EF in these participants are not consistent and that the same executive deficits are present in many other disorders, particularly in Asperger's disorder. Using the Planning Attention Simultaneous Successive (PASS) theory, the present study explores the cognitive profiles of participants with ADHD or Asperger's disorder and compares the cognitive functioning of these two diagnostic groups. **Method:** Forty-four children, 24 with a diagnosis of ADHD and 20 with a diagnosis of Asperger's disorder, participated and their cognitive processes were evaluated with the Cognitive Assessment System. **Results:** Results underline specific cognitive profiles in ADHD and Asperger's disorder characterized by weaknesses in planning and attention, but with a diverse level of severity. **Conclusion:** Implications of the different cognitive profiles of these diagnostic groups are discussed. (*J. of Att. Dis.* 2017; 21(13) 1087-1093)

Keywords

ADHD, cognitive functioning, Asperger's

Introduction

ADHD is a neurodevelopmental disorder characterized by symptoms of inattention, hyperactivity, and impulsivity (American Psychiatric Association [APA], 2000). Children with ADHD show unpredictable and unsettled behavior both at school and at home and, frequently during adulthood, develop psychiatric, emotional, and social problems (Faraone, Sergeant, Gillberg, & Biederman, 2003).

From a neuropsychological perspective, ADHD is characterized by executive dysfunction that particularly involves inhibition, vigilance, cognitive flexibility, and planning (Wilcutt, Doyle, Nigg, Faraone, & Pennington, 2005). Particularly, the symptoms of ADHD involve inhibition (Nigg, 2001), planning and sustained attention (Solanto et al., 2007), cognitive flexibility (Hill, 2004), response monitoring (Happé & Frith, 2006), and task shifting (Hill & Bird, 2006). The involvement of Executive Functions (EF) in ADHD is explained by two different points of view (Holmes et al., 2010): theories that identify a core inhibitory problem (Barkley, 1997) or theories that highlight the interactive and additive effects of multiple factors as inhibition and working memory (Castellanos & Tannock, 2002; Wilcutt et al., 2005). Many studies report the usefulness of the evaluation of EF in the assessment of participants with ADHD (Holmes et al., 2010), while others underline how the deficits in EF in these participants are not consistent and that the same executive

deficits are presented in many other disorders (Stern & Morris, 2012). Particularly, executive dysfunctions are typical of aging (Kennedy & Raz, 2009), schizophrenia (Groom et al., 2008), bipolar disorder (Torralva et al., 2011), reading disabilities (Marzocchi et al., 2008), mathematical disabilities (DeWeerd, Desoete, & Roeyers, 2013), and autism spectrum disorders (ASD; Johnston, Madden, Bramham, & Russell, 2011). EF involved in reading and mathematical disabilities concern working memory and seems to be different from those involved in ADHD and autism, which concern, most of all, planning and inhibition.

Regarding EF involved in autism, particularly in Asperger's syndrome or High Functioning Autism (HFA), some authors underline the role of error monitoring (Goldberg et al., 2011), cognitive flexibility, planning, and inhibition (Hill, 2004; Kaland, Smith, & Mortensen, 2008; Sanders, Johnson, Garavan, Gill, & Gallagher, 2008). Keehn, Müller, and Townsend (2012) suggest the presence of atypical attentional networks in participants with autism and others attempt to verify the presence of neurological

¹University of Florence, Italy

Corresponding Author:

Stefano Taddei, Department of Health Sciences, University of Florence,
Via di San Salvi, 12, Pad. 26, 50135 Florence, Italy.
Email: Stefano.taddei@psico.unifi.it

correlates for these executive dysfunctions (Solomon et al., 2009). Nevertheless, some authors suggest a high overlapping of these executive dysfunctions between autism and ADHD (Goldberg et al., 2005), disorders that overlap even for early language delay and a similar early cognitive development (Hagberg, Miniscalco, & Gillberg, 2010).

For these reasons, several studies compare EF in participants with ADHD and those with ASD, emphasizing not only their similarities but also their differences. Examining these differences, Happè and Frith (2006) point out the lower severity of impairment in EF of participants with ASD than those with ADHD. Bramham et al. (2009) underline difficulties in knowing when to respond in participants with ADHD and how to respond in participants with ASD. The authors explain these differences as a significant impairment for participants with ADHD in withholding the response and in those with ASD in planning. Other studies suggest, instead, that children with ASD have more impairment in EF than those with ADHD (Corbett, Constantine, Hendren, Rocke, & Ozonoff, 2009; Salcedo-Marin, Moreno-Granados, Ruiz-Veguilla, & Ferrin, 2013).

A factor that could further increase the complexity of these results is the absence of correlation between the measures of attention and impulsivity obtained with traditional instruments (Gualtieri & Johnson, 2005). Therefore, the assessment of EF in ADHD becomes so difficult that some authors suggest a comprehensive evaluation that considers the measurement of specific intellectual processes and explains the neuropsychological impairment of children with ADHD (Frazier et al., 2004) and Inagaki (2011) underlines the necessity to use behavioral, neuropsychological, and neuroimaging studies to understand ADHD. From this point of view, Naglieri and Goldstein (2011) suggest the importance of measuring the cognitive processes of participants with ADHD because a better understanding of cognitive impairments causes a better evaluation and, most of all, a better capability of interventions (Naglieri, 2008; Naglieri, Pickering, Otero, & Moreno, 2010). In this context, the comprehension of neuropsychological processes involved in ADHD is possible through the clinical application of Planning Attention Simultaneous Successive (PASS) theory.

This theory has its origins in Luria's (1966, 1973) work, which identifies three functional units in the human brain responsible for cognitive functioning. Starting from these functional units, Das, Naglieri, and Kirby (1994) and more recently Naglieri, Das, and Goldstein (2012) propose a new way to look at intelligence, identifying four cognitive processes which, interacting with the base of knowledge, determine the cognitive functioning of the participant. Planning is the participant's ability to make a plan to solve problems; attention is the ability to focus on specific stimuli, inhibiting responses to competitive stimuli; simultaneous refers to the ability to understand relationships between things; and successive is the ability to work with information in a specific

order. The operationalization of PASS theory is the Cognitive Assessment System (CAS; Naglieri & Das, 1997), an instrument that allows measuring these cognitive processes and obtaining a cognitive profile of the participant. This instrument highlights the presence of strengths and weaknesses in the four processes within the participant's profile (relative weakness or relative strength) and between the participant and the standardized sample, as well. When a relative weakness or strength is less than 90 or exceeds a score of 110, respectively, it is possible to underline a cognitive weakness or a cognitive strength. The CAS seems to be culture-free (Kroesbergen, Van Luit, Naglieri, Taddei, & Franchi 2010; Naglieri, Otero, DeLauder, & Matto, 2007; Naglieri, Taddei, & Williams, 2012) and is reputed to be an instrument useful for measuring EF in children and adolescents (Chan, Shum, Touloupoulou, & Chen, 2008).

The applications of CAS in the evaluation of children with ADHD have provided interesting results where some authors propose the evaluation of cognitive processes as a diagnostic criterion for ADHD (Goldstein & DeVries, 2011; Naglieri & Das, 2005). In fact, it seems possible to associate a specific cognitive profile with ADHD, characterized by a failure in planning (Dehn, 2000; Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Van Luit, Kroesbergen, & Naglieri, 2005). The presence of a specific cognitive profile allows elaborating remediation programs (Iseman & Naglieri, 2011) and differentiating children with ADHD (Naglieri & Goldstein, 2011) from those with reading disabilities who show difficulties in successive (Naglieri et al., 2004, 2007; Taddei, Venditti, & Cartocci, 2009), or those with autism who have a weakness in Attention (Goldstein & Naglieri, 2009). Comparing participants with ADHD to children with learning disabilities, Taddei, Contena, Caria, Venturini, and Venditti (2011) have underlined a weakness in the successive process in the profile of children with learning disabilities and weaknesses in planning and attention in the profile of children with ADHD. In these studies, the typical cognitive profile of participants with ADHD reveals failures in planning and attention. The shape of these ADHD cognitive profiles is partially congruent with the previous results. In fact, on one hand, it is possible to underline the failure in planning, according to Naglieri and colleagues (2003), but, on the other hand, even attention seems to be a weak process. Probably, the neuropsychiatric context of the collection of data influences the severity of clinical conditions, as underlined in other previous research (Taddei et al., 2009; Taddei & Venditti, 2010). However, these weaknesses in planning and in attention recall the profile of participants with autism highlighted by different studies (Goldstein & Naglieri, 2009; Taddei & Contena, 2013), and require specific attention to the possibility that the PASS evaluation of these children involves an overlapping of profiles, such as the evaluation of EF, particularly in severe clinical conditions.

Table 1. Participants: Gender and Age in Diagnostic Groups.

Diagnostic groups	Gender		n	Age
	Male	Female		M (SD)
ADHD	18	6	24	8.25 (2.27)
Asperger's disorder	14	6	20	12.95 (3.03)
n	32	12	44	10.41 (3.57)

If the EF involved in ADHD and Asperger's disorder overlap, it is possible to think that even the analysis of cognitive profiles could not differentiate between these clinical conditions. However, the first application of PASS theory in the comprehension of these disorders seems to give promising results and it could be interesting to investigate the presence of different PASS cognitive profiles in these clinical situations. From this point of view, it would be interesting to analyze the cognitive processes in children with a diagnosis of ADHD and of Asperger's disorder to explore the contribution of PASS theory to a major understanding of cognitive functioning of these participants. Particularly, it is possible to hypothesize that the PASS profiles of the two diagnostic groups could show weaknesses in Planning and Attention but that these weaknesses could be different in terms of severity. Moreover, the overall PASS profiles of these two diagnostic groups could present differences in the other cognitive processes, even as cognitive strengths.

Method

Participants

We enrolled 44 children from 6 to 18 years, 24 with a diagnosis of ADHD and 20 with a diagnosis of Asperger's disorder; both groups were without comorbidities. As shown in Table 1, the two groups were homogeneous by gender ($F = .06; p = .71$), but not by age ($T = -5.87; p = .000$). All children were tested in the neuropsychiatric units of National Health Service in two Italian regions: Lombardy and Tuscany. They received a diagnosis in accordance with the diagnostic criteria for ADHD and for Asperger's disorder of *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.; *DSM-IV-TR*; APA, 2000). All participants showed an IQ score higher than 70, measured with The Wechsler Intelligence Scale for Children—Third Edition (WISC-III; Wechsler, 1991) in its Italian adaptation (Orsini & Picone, 2006).

Instruments

The CAS (Naglieri & Das, 1997), in its Italian adaptation by Naglieri and Das (2005), was administered to all participants. The CAS is composed of four scales that measure the four cognitive processes: Planning (P), Attention (A), Simultaneous

(Si), and Successive (Su). The score for every scale is determined by three subtests (Table 2) and the CAS offers the possibility to obtain an overall measure of cognitive functioning (Full Scale; FS). The evaluation with CAS reveals relative and cognitive weaknesses and strengths too. A relative weakness (or strength) is a significant weakness (or strength) relative to a specific cognitive profile. A cognitive weakness is a relative weakness that falls below the average range (<90), while a cognitive strength is a relative strength that falls above the average range (>110). The Italian standardization sample has a mean PASS score of 100 with a standard deviation of 10 (Naglieri & Das, 2005).

Statistical Procedures

The data collected were transferred on informatics support and they were analyzed by the Statistical Package for the Social Sciences (SPSS.20; IBM Corp, 2011).

Descriptive statistics were calculated to describe the performance of participants on the CAS and to obtain their cognitive profiles. A one-way MANOVA was calculated to verify the presence of differences in the mean PASS scores between participants with ADHD and those with Asperger's disorder. The effect size was calculated to evaluate the size of differences. The differences between the mean standard scores of these two diagnostic groups and the normative sample were evaluated by computing a *d* ratio with this formula:

$$d = \frac{(\bar{M}1 - \bar{M}2)}{\sqrt{\left[\frac{n1(SD1)^2 + n2(SD2)^2}{n1 + n2} \right]}}$$

Results

The mean PASS scores and standard deviations of the two groups are provided in Table 3. The mean PASS scores of participants with ADHD ranged from 70 (Attention) to 95 (Simultaneous) and those of participants with Asperger's disorder from 56 (Attention) to 96 (Successive).

Both cognitive profiles had a relative weakness in Attention but also two relative strengths in Simultaneous and Successive. A cognitive weakness in Attention emerged in both profiles (Figure 1).

A one-way MANOVA was conducted to compare the mean PASS scores of participants with ADHD and those with Asperger's disorder. The overall effect between the two groups was significant (Wilks's $\lambda = .66; F = 3.92; p < .01$). The two groups differ significantly for Planning ($F = 8.23; p < .01$) and Attention ($F = 17.83; p < .01$). The effect size (Table 4) was large for Planning ($d = .87$) and huge for Attention ($d = 1.28$). The differences between the two groups in Simultaneous and Successive were not significant, but the effect size was small for Simultaneous ($d = .28$).

Table 2. Cognitive Assessment System: Subtests and Scales.

Planning	Simultaneous	Attention	Successive
Matching numbers	Nonverbal matrices	Expressive attention	Words series
Planned codes	Verbal-spatial relations	Numbers detection	Sentence repetition
Planned connections	Figure memory	Receptive attention	Speech rate or sentence questions

Table 3. Mean PASS Standard Scores and Standard Deviations of the Two Diagnostic Groups.

CAS	ADHD		Asperger's disorder	
	M	SD	M	SD
Planning	79.25	15.35	64.85	17.95
Simultaneous	95.00	14.74	90.25	19.71
Attention	70.96	10.15	56.20	13.03
Successive	93.96	14.27	96.10	22.10
Full Scale	80.33	12.08	69.40	19.05

Note. PASS = Planning Attention Simultaneous Successive; CAS = Cognitive Assessment System.

Evaluating the differences between the ADHD group and the Italian standardization sample, a huge effect size for Planning ($d = 1.38$) and for Attention ($d = 1.95$), and small effect size for Simultaneous ($d = .33$) and Successive ($d = .40$) were seen. The comparison between the Asperger's disorder group and the normative sample showed huge effect sizes for Planning ($d = 2.33$) and Attention ($d = 2.93$), medium effect size for Simultaneous ($d = .64$) and small effect size for Successive ($d = .26$).

Discussion

The cognitive profiles of the two groups underline the difficulties in planning and attention processes of these participants. Particularly, participants with a diagnosis of Asperger's disorder seem to have a major difficulty in both attention and planning. According to the studies that underline a major impairment in participants with a diagnosis of ASD than those with ADHD (Corbett et al., 2009; Salcedo-Marin et al., 2013), our data suggest a greater difficulty in processing information using planning and attention for participants with Asperger's disorder. Contrary to Goldstein and DeVries (2011), our data suggest a similar shape of cognitive profiles for these two groups, which seem to be differentiated depending on severity. A possible explanation for the difference between these data could be the fact that our participants were collected in a clinical context and not in an educational one. The processes with higher impairment seem to be planning and attention for both diagnostic groups but in the group with Asperger's disorder, the impairment is more severe than in the group with ADHD.

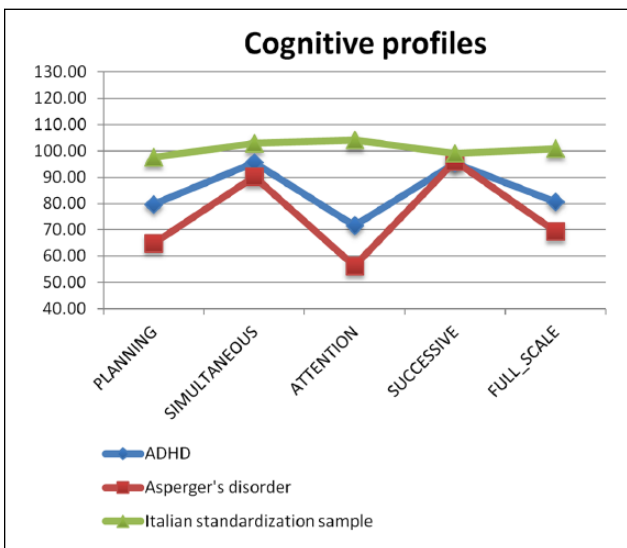


Figure 1. PASS Cognitive profiles of Asperger's disorder group, ADHD group, and Italian normative sample. Note. PASS = Planning Attention Simultaneous Successive.

The cognitive impairments may perhaps explain executive dysfunctioning in terms of difficulties in cognitive flexibility, in planning, and in inhibition (Hill, 2004; Kaland et al., 2008). It is possible to hypothesize that the analysis of cognitive processes can overcome the problem of overlapping present in the studies regarding EF. In fact, the PASS cognitive processes depend on specific functional units, interactively linked, that constitute a neuroanatomical base able to influence the EF (Chan et al., 2008). Therefore, the study of PASS cognitive functioning could improve the comprehension of the basis of executive dysfunctioning.

Results allow us to underline strengths in participants' profiles, particularly in simultaneous and successive processes, which could be resources for intervention and remediation programs. Particularly, the capability to elaborate information in order seems to be a strength in children with ADHD and Asperger's disorder too. The analysis of cognitive profiles allows us to differentiate between these clinical conditions, suggesting a different involvement of the specific functional units, which could be important elements not only for assessment and for diagnosis, but even to design remedial programs (Naglieri, 2008; Naglieri et al., 2010).

Table 4. Effect Size of the Differences of the PASS Mean Standard Scores Between Group With Asperger’s Disorder, Group With ADHD and Normative Sample.

CAS	Asperger’s disorder vs. ADHD	Asperger’s disorder vs. Italian normative sample	ADHD vs. Italian normative sample
Planning	0.87	2.33	1.38
Simultaneous	0.28	0.64	0.33
Attention	1.28	2.93	1.95
Successive	-0.11	0.26	0.40
Full Scale	0.70	2.03	1.32

Note. PASS = Planning Attention Simultaneous Successive; CAS = Cognitive Assessment System.

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Declaration of Conflicting Interests

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Author Biographies

Stefano Taddei is a Psychologist and Assistant Professor at School of Psychology, Department of Health Sciences, University of Florence.

Bastianina Contena is a Psychologist, PhD student and research fellow at Department of Health Sciences, University of Florence.



Face memory and face recognition in children and adolescents with attention deficit hyperactivity disorder: A systematic review

Maria Romani^a, Miriam Vigliante^a, Noemi Faedda^b, Serena Rossetti^c, Lina Pezzuti^c,
Vincenzo Guidetti^a, Francesco Cardona^{a,*}

^a Department of Human Neuroscience, Section of Child and Adolescent Neuropsychiatry, Sapienza - University of Rome, Via dei Sabelli, 108 - 00185, Rome, Italy

^b PhD program in Behavioral Neuroscience, Department of Human Neuroscience, Section of Child and Adolescent Neuropsychiatry, Sapienza - University of Rome, Via dei Sabelli, 108 - 00185, Rome, Italy

^c Department of Dynamic and Clinical Psychology, Sapienza University of Rome, Via degli Apuli, 108 - 00185, Rome, Italy



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ABSTRACT

This review focuses on facial recognition abilities in children and adolescents with attention deficit hyperactivity disorder (ADHD). A systematic review, using PRISMA guidelines, was conducted to identify original articles published prior to May 2017 pertaining to memory, face recognition, affect recognition, facial expression recognition and recall of faces in children and adolescents with ADHD. The qualitative synthesis based on different studies shows a particular focus of the research on facial affect recognition without paying similar attention to the structural encoding of facial recognition. In this review, we further investigate facial recognition abilities in children and adolescents with ADHD, providing synthesis of the results observed in the literature, while detecting face recognition tasks used on face processing abilities in ADHD and identifying aspects not yet explored.

1. Introduction

1.1. ADHD

Attention deficit hyperactivity disorder (ADHD) is a complex neurodevelopment disorder that has a childhood-onset, but it can affect individuals across the lifespan (Matthews et al., 2014; Tarver et al., 2014). It is characterised by symptoms of inattention (e.g., difficulty to organise tasks or activities with high distractibility), impulsivity, hyperactivity (e.g., tap hands or feet and/or talk excessively), and well-known cognitive impairments, such as poor executive functioning, attention and concentration difficulties and poor response inhibition (American Psychiatric Association (APA), 2013). DSM-5 (American Psychiatric Association (APA), 2013) distinguishes between inattentive, hyperactive-impulsive and combined presentations of ADHD. Children under 17 years old must display at least 6 inattentive and/or hyperactive-impulsive symptoms, whereas individuals 17 years old and above must show at least 5 symptoms. These symptoms must be present across more than one setting (e.g., home and school), and they must result in impairment in several areas such as academic, social or daily functioning (American Psychiatric Association (APA), 2013). The prevalence of the disorder is estimated to be around 1.4–3.0%, and it is more

common in boys than girls (Thapar and Cooper, 2016). Although there are a wide number of studies focused on ADHD, it is difficult to establish a precise cause; because symptoms of ADHD likely derive from a complex interaction between emerging neurodevelopment vulnerabilities and aspects of the child's prenatal and postnatal environment (Johnson et al., 2015).

1.2. Facial recognition

The ability of facial recognition is related to the development of different skills, cognitive functions and brain areas; and it seems to be associated with family and social functioning (Collin et al., 2013). According to some studies (Sinzig et al., 2008; Shin et al., 2008; Berggren et al., 2016; Wehmeier et al., 2010; Passarotti et al., 2010), the difficulty in facial emotion recognition could be caused by different mechanism related to cognitive impairments, to a deficit in the processing of social information, to specific alterations in brain systems underlying face processing abilities or to comorbid conditions.

Faces are multidimensional visual stimuli and provide a broad range of information to an individual such as identity, gender, age, race, mood and intentions (Pascalis et al., 2011). They represent a special category of stimuli for our visual system. Research carried out during

* Corresponding author.

E-mail addresses: maria.romani@uniroma1.it (M. Romani), miriam.vigliante@uniroma1.it (M. Vigliante), noemi.faedda@uniroma1.it (N. Faedda), serena.rossetti@uniroma1.it (S. Rossetti), lina.pezzuti@uniroma1.it (L. Pezzuti), vincenzo.guidetti@uniroma1.it (V. Guidetti), francesco.cardona@uniroma1.it (F. Cardona).

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the last years strongly suggests that humans have a face-specific cognitive system from birth (Rivolta, 2014). Three important theories have been elaborated about the maturation of face processing: *face specific perceptual development theory* (Carey and Diamond, 1977) believes that face processing does not mature fully until late in development and that adult levels of expertise are reached only during adolescence; *theory of face recognition* (Bruce and Young, 1986) proposes for a sequential and hierarchical organization of different stages of processing, structural encoding, face recognition units, person-identity nodes and name retrieval; *general cognitive development theory* (Crookes and McKone, 2009) proposes that face processing abilities mature early in development and that the performance of face recognition task measured in childhood also depends on other cognitive abilities like memory, concentration, etc. (He et al., 2015).

It is widely recognised that children show face recognition abilities very early in life. Newborns show a preference for face-like configurations compared to other types of visual stimuli, recognise their mother, discriminate between familiar and unfamiliar faces, prefer faces when presented upright but not when inverted, etc. (Rivolta, 2014; Slater et al., 2000; Crookes and McKone, 2009).

1.3. Neural correlate of facial recognition

In the last years, thanks to advances in the field of neuroscience and the development of more accurate neuroimaging techniques, it has been possible to identify different brain areas that are responsible for facial recognition. Research on patients with developmental prosopagnosia (DP) who have preserved object recognition despite severe face recognition deficits (Dalrymple et al., 2017) and infant research studies (Peykarjou et al., 2013) confirm the existence of distinct neural circuitry and regions within the brain that preferentially process facial stimuli. The key regions of face processing seem to be the fusiform face area (FFA), which responds more strongly to faces than to other visual stimuli such as letter strings, objects and scenes (Kanwisher and Yovel, 2006); the more posterior occipital face area (OFA) that preferentially detects some parts of the face, such as the eyes, nose and mouth (Pitcher et al., 2011); the right anterior temporal lobe (ATL) that is typically activated during the discrimination of familiar and unfamiliar faces and face naming (Collins and Olson, 2014); the right posterior superior temporal sulcus (rpSTS) that seems to be more strongly involved in facial expression recognition tasks (Pitcher, 2014)—the ventromedial prefrontal cortex (VMPFC) that seems to play a critical role in mediating visual attention to the eye region of the face, particularly for fearful expressions (Wolf et al., 2014) and the amygdala that seems to be associated with emotional expressions, including fearful and positive expressions (Pessoa et al., 2006; Todorov, 2012).

1.4. Anomalies of facial recognition in neuropsychiatric disorders

The research about facial memory and recognition in childhood psychiatric disorders focuses mainly on autism spectrum disorder (ASD). Most studies have shown face recognition deficits in children with ASD, and these findings are in line with the fact that children with ASD have great problems in social relationship and eye contact (Tehrani-Doost et al., 2012; Harms et al., 2010). Recent research also reported that youth with bipolar disorder (BD) have a specific difficulty in identifying facial emotion (McClure et al., 2005). It would seem that the ventrolateral prefrontal cortex–striatum–amygdala circuit, involved in the pathophysiology of BD, is crucial to facial emotion processing (Brotman et al., 2008). Schepman et al. (2012) reported that children with depression showed no overall or specific deficits in facial expression recognition accuracy, but they have biases affecting the processing of low-intensity expressions, more often perceiving facial expression as sad. Anxious children with generalised anxiety disorder (GAD) showed an attentional bias toward both angry and happy faces, which according to Waters et al. (2008) may reflect differing threat appraisal

processes or emotion regulation strategies. Seiferth et al. (2009) found a dysfunction in cerebral circuits relevant for emotion and face processing in adolescent patients with schizophrenia. The authors observed in these regions a decrease in activation accompanied by hyperactivation in areas related to emotion regulation and attribution.

Since ADHD and schizophrenia share attentional and social impairments, Marsh and Williams (2006) compared facial affect recognition in an ADHD group and a schizophrenia group, finding different dysfunctions in the perception of facial expressions of emotion. These distinct impairments might help to distinguish these disorders in childhood and adolescence. Castro et al. (2010) showed that discrimination accuracy of sad faces presented for 500 ms was significantly associated with anorexia nervosa and body mass index; and the comorbidity with obsessive-compulsive symptoms was the strongest predictor of a poor discrimination of briefly presented sad faces.

Given that some research has detected specific social deficits in children and adolescents with ADHD (Da Fonseca et al., 2009) and that impaired recognition of facial emotion expressions is a potential cause of poor social competence, peer relationship and interaction with others (Collin et al., 2013; Demirci and Erdogan, 2016). It is very interesting to analyse the face processing abilities of children and adolescents with ADHD.

Few studies have evaluated face processing in children and adolescents with ADHD and, as the face recognition process (and in particular the ability to read and respond in a proper way to the facial expression of others) is critical in social interaction and in everyday social life (Berggren et al., 2016), the majority of the research in this field has focused on the ability to recognize emotional facial expressions (with inconsistent results). On the one hand, these studies have suggested that children with ADHD have similar levels of facial recognition and facial expressions as healthy controls. Moreover, the results of some studies support the hypothesis that not only ADHD but also a comorbid oppositional defiant disorder (ODD) (Noordermeer et al., 2015) or a comorbid conduct disorder (CD) negatively affect empathy skills, emotion recognition and face processing abilities (Gumustas et al., 2017).

On the other hand, the majority of works report a worse performance in children with ADHD than in children with typical development (TD), especially in detecting facial expressions of emotion (Da Fonseca et al., 2009; Demopoulos et al., 2013).

The aim of this study is to explore facial recognition abilities in children and adolescents with ADHD, providing a synthesis of the results observed in the literature, detecting face recognition tasks used on face processing abilities in ADHD and identifying aspects not yet explored. It is important to study face recognition because this ability is related to the development of different skills, cognitive functions, brain areas and it seems to be associated with family and social functioning (Collin et al., 2013). Furthermore, studying facial recognition abilities in children with ADHD it is highly challenging because the difficulty in this competence could be caused by different mechanisms related to core deficit of the disorder, to a deficit in the processing of social information, to specific alterations in brain systems underlying face processing abilities or to comorbid conditions. Therefore, we choose not to include studies on ADHD and comorbidities because the studies about face recognition in complex samples (ADHD + comorbidities) do not allow to circumscribe the neuropsychological profile properly associated with ADHD. Furthermore, the presence of a comorbidity would be unlikely to enable a clear distinction whether the difficulties in facial recognition are due properly to the core deficit of ADHD or to an associated condition.

2. Objective

Following the PRISMA guidelines, in this literature review, we analysed different studies, highlighting the different aspects of face recognition and the instruments used in children and adolescents with

ADHD and without comorbidities.

3. Materials and methods

3.1. Study eligibility criteria

We included academic articles (e.g., reviews, systematic reviews, meta-analyses, original articles and dissertations) pertaining to face memory and face recognition, specifically in children and adolescents with ADHD and without comorbidities. This review considers studies published only between January 1993 and June 2017.

3.2. Information sources

The primary source of literature was the Sapienza Library System (Sistema Bibliotecario Sapienza, SBS) (January 1993–June 2017); more specifically, for this review we used ERIC, PsycArticles, PsycINFO, Medline and PubMed databases. The review also benefited from other widely used search engines, such as Google Scholar, and reference lists from single articles, reviews and editorials.

3.3. Search strategy

The systematic search was conducted on databases of SBS according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to identify all relevant studies published prior to June 2017. The terms included in the search strategy were “Face recognition”, “Facial Recognition”, “Memory Face”, “Facial Memory”, “Face Memory and ADHD”, “Face Recognition and ADHD”, “Psychosocial functioning” and “Social Cognitive Processing”. Only studies in the English language and “human” studies were included. When an article met the eligibility criteria or where there was not sufficient information to definitely exclude the article, we retrieved the full text. We then reviewed these potentially relevant articles and determined when the inclusion criteria were really met.

As regards the exclusion criteria, articles that considered ADHD with comorbidities (e.g., ASD, CD and ODD) or other disorders and syndromes were not included, except for the studies that reported the comparison between ADHD only group and ADHD with comorbidities group. Studies that investigated adult patients and focused on training and pharmacotherapy effects in patients with ADHD were also excluded.

3.4. Risk of bias across studies

Across the studies there was a potential risk of the following bias:

Database bias: only articles within databases in English language such as databases of the Sapienza Library System were used.

4. Results

4.1. Available literature

Using PRISMA guidelines, 105 articles were selected in the initial search. After excluding duplicates, the abstracts of the remaining 91 articles were scanned and 42 further articles were excluded based on exclusion criteria mentioned in Section 3.3. Full texts of 49 articles were examined and 11 articles were considered unsuitable (because they did not meet the eligibility criteria), resulting in 38 studies being included in the review (Fig. 1).

Tables 1 and 2 show the original studies included in this systematic review, excluding the reviews and meta-analyses considered in the article (Marsh and Williams, 2006; Uekermann et al., 2010; Collins and Olson, 2014; Bora and Pantelis, 2016). Table 1 reports the studies that did not find differences between ADHD and TD in face recognition; instead, Table 2 includes the studies that found significant differences.

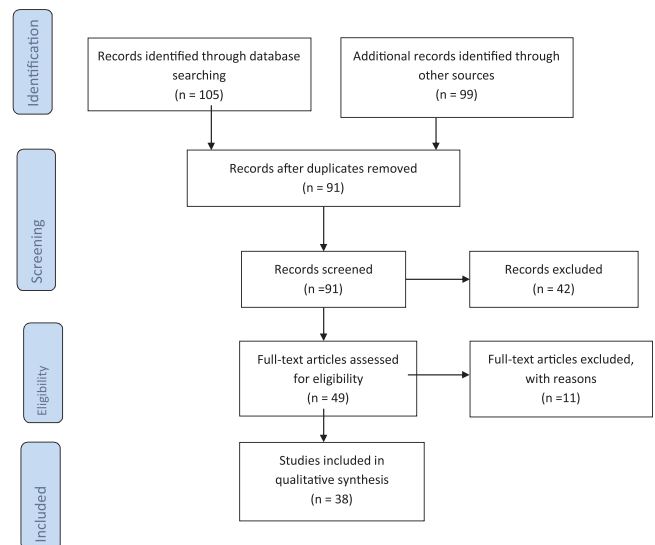


Fig. 1. Prisma flow diagram.

4.2. Face recognition in ADHD

At first, this section reports studies on face recognition that did not find differences between ADHD and TD groups, and then the studies show altered face recognition processes in children and adolescents with ADHD. Shapiro et al. (1993) found no differences between these groups in their ability to process emotional cues, even if a subgroup of younger children with ADHD were found to have modest difficulties on a test of decoding facial affective stimuli. Similarly, Guyer et al. (2007) observed equivalent performance in face-emotion labelling tasks between patients with ADHD/CD and controls. Furthermore, Kibby and Cohen (2008) observed that children with ADHD and controls did not differ in “Faces Immediate and Delayed”.

Greenbaum et al. (2009) in experimental measures of social cognition and emotion found that children with fetal alcohol spectrum disorders performed significantly below children with ADHD and TD on several indices, showing that performance profiles of ADHD children were overlapping with performance profiles of controls. Ahmadi et al. (2011) assessed the initial orientation of attention in ADHD and TD groups and detected similar functioning between two groups. Schwenck et al. (2013) presented some video clips with several faces to assess emotion recognition and identified no differences between the ADHD and control groups.

Noordermeer et al. (2015) suggested that the presence of ODD in comorbidity with ADHD influenced the performance in inhibition, working memory, facial emotion recognition and temporal processing; and observed that children with only ADHD were solely impaired in working memory and time production. Berggren et al. (2016) examined global and specific facial affect recognition accuracy and response times in face and eyes stimuli in children with ASD, ADHD and TD. They found that children with TD outperformed those with ASD for accuracy and response time on the face test. Additionally, children with ADHD outperformed those with ASD for response time on the face test; and no differences were found between children with ADHD and TD, although attentional distractibility showed a significant influence on eye and face test performance in children with ADHD and ASD. Finally, Lee et al. (2016) indicated that children with ADHD displayed intact verbal working memory and long-term memory (LTM), as well as intact performance on most aspects of short-term memory (STM).

On the contrary, Singh et al. (1998) detected that children with ADHD have deficits in their ability to accurately recognise facial expressions of emotion when compared to studies of children in the general population. Pelc et al. (2006) found that children with ADHD

Table 1

Face recognition studies in children and adolescents with ADHD (No differences from Typically Developing-TD- subjects).

Study	Participant groups (groups, sample size, mean age)	Task	Finding
Lee et al. (2016) <i>Child Neuropsychol.</i>	ADHD group (n = 42); TD group (n = 42); Epilepsy group (n = 42); Comorbid ADHD/epilepsy group (n = 23). Aged 6-16 years	WISC; Behavior Assessment for Children, Parent and Teacher forms (BASC or BASC-2). Conner's Parent and Teacher's Rating Scales; Children's Memory Scale to measure STM/learning, LTM, verbal WM, and focused attention/concentration; Dot Locations and Faces to assess visual memory; Stories and Word Pairs as verbal subtests; Numbers Forward and Picture Locations to evaluate focused attention/simple span.	ADHD displayed intact verbal working memory and long-term memory (LTM), as well as intact performance on most aspects of short-term memory (STM).
Berggren et al. (2016) <i>Cogn. Neuropsychiatry</i>	ASD group (n = 35); ADHD group (n = 32) TD group (n = 32) Aged 8.6-15.9 years.	Facial affect recognition (FAR) was examined using the Swedish version of the computer-based Frankfurt Test for Facial Affect Recognition; The computerised Conners' Continuous Performance Test II Version 5 (CPT-II) to assess attention function; Social Responsiveness Scale (SRS) for social communication problems.	The ADHD group responded faster than the ASD group for global FAR. No differences between ADHD and TD were found.
Noordermeer et al. (2015) <i>J. Atten. Disord.</i>	ADHD-only (n = 82), ADHD + ODD (n = 82), TD (n = 82), Mean age 16 years (SD = 3.1).	Kiddie-Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime Version (KSADS-PL); Conners' Teacher Rating Scale–Revised: Long version [CTRS-R:L] or a self-report questionnaire (Conners' Adult ADHD Rating Scales–Self-Report:Long Version [CAARS-S:L]. The Stop task to assess inhibition and working memory; The Temporal Discounting task for temporal discounting of rewards reinforcement processing; The Motor Timing task for the effects of reward and penalty on performance and the accuracy and consecutive variability of time production; The Identification of Facial Emotions (IFE) for recognition of facial affect; the Prosody (PR) task for recognition of vocal intonation.	Individuals with ADHD + ODD showed abnormalities in inhibition, working memory, facial emotion recognition, and temporal processing, whereas individuals with ADHD-only were solely impaired in working memory and time production.
Schwenck et al. (2013) <i>Atten. Defic. Hyperact. Disord.</i>	ADHD children (n = 84); ADHD adolescent (n = 56) TD (n = 28) Age in months: ADHD no medication: 148.43 (28.60) ADHD with medication: 147.75 (32.46) TD group: 149.93 (30.63)	Observer rating scale for ADHD (FBB-ADHD); CBCL; Morphing Task (MT) and video clips with neutral faces developing a basic emotion (happiness, sadness, disgust, fear and anger) were presented in order to assess emotion recognition.	No differences between clinical e control group
Ahmadi et al. (2011) <i>Iran. J. Psychiatry</i>	ADHD boys (n = 35); TD boys (n = 31). Aged 6-11 years.	Raven IQ Test; WISC-R; K-SADS-PL. A compilation of 6 Caucasian faces (3female and 3 male) in jpg format expressing negative emotion (anger, sadness) and neutral expressions was collected from Cohn Kanade AU-coded Facial Expressions Database. Visual orientation data were recorded while participants viewed these face pairs (negative-neutral pairs) shown for 3000 m s.	No difference between ADHD group and TD group in initial orientation of attention.
Greenbaum et al. (2009) <i>Alcohol. Clin. Exp. Res.</i>	Fetal Alcohol Spectrum Disorders (FASDs) (n = 33); ADHD (n = 30); TD (n = 34). Aged 6-13 years	Adults received: Child Behavior Checklist, Teacher Report Form and Social Skills Rating Scale. Children received: Wechsler Abbreviated Scale of Intelligence (WASI); 3 subtests for social cognition and 4 subtests from the Minnesota Test of Affective Processing for emotion processing.	FASD group performed significantly below ADHD and NC on several indices, in social cognition and emotion measures.
Kibby and Cohen (2008) <i>Child Neuropsychol.</i>	Reading Disabilities (RD) (n = 23); ADHD (n = 30); RD/ADHD (n = 30); TD (n = 30). Aged 6–15 years	WISC III and IV; Reading was assessed with a variety of measures (WRAT-3, GORT-3...). BASC or BASC-2; the Conner's Parent and Teacher Rating Scales for ADHD. WISC-III/IV Verbal Comprehension Index (VCI) and NEPSY Phonological Processing. Memory. Children's Memory Scale (CMS) for immediate, short-term and long-term memory	Faces Immediate and Delayed in ADHD group did not differ from controls
Guyer et al. (2007) <i>J. Child. Psychol. Psychiatry</i>	Bipolar disorder (BD) (n = 42); Severe mood dysregulation (SMD) (n = 39); Anxiety and/or major depressive disorders (ANX/MDD) (n = 44); ADHD or CD (n = 35); TD (n = 92). Aged 7-18 years		ADHD/CD patients performed similarly to controls on the face-emotion labelling tasks.

(continued on next page)

Table 1 (continued)

Study	Participant groups (groups, sample size, mean age)	Task	Finding
Shapiro et al. (1993), <i>Dev. Neuropsychol.</i>	ADHD (n = 67) TD (n = 38) ADHD Age (M = 8.94; SD = 1.32) TD Age (M = 8.97; SD = 1.16)	WISC; K-SADS-PL; Pediatric Anxiety Rating Scale (PARS) Children's Depression Rating Scale (CDRS) Children's Global Assessment Scale (CGAS); Young Mania Rating Scale (YMRS). Diagnostic Interview for Children and Adolescents (DICA-R), CBCL, Youth Self-Report, Life History of Aggression, Conners' Rating Scale and Barratt Impulsiveness Scale for ADHD. Child and adult facial expression recognition subtests from the Diagnostic Analysis of Nonverbal Accuracy (DANVA) instrument to assess face-emotion behaviour. Revised Conner Teacher rating Scale; DICA-R; Kaufman Brief Intelligence Scale(K-BIT); Peabody Picture Vocabulary Test (PPVT); Woodcock-Johnson-Psycho-Educational- Battery-Revised; Wide Range Achievement Test-Revised; CBCL; Minnesota Tests of Affective Processing (MNTAP), measures face perception and recognition of affective stimuli	Children with ADHD do not differ from TD children in their ability to process emotional cues, even if a subgroup of younger children with ADHD were found to have modest difficulties on a test of decoding facial affective stimuli.

showed deficits in decoding emotional facial expressions with specific deficits in identifying anger and sadness and a significant correlation between interpersonal problems and emotional facial expression decoding impairment, which was more marked for anger expressions. D'Acromont and Van der Linden (2007) conducted a study to determine whether antisocial behaviour in adolescents was associated with a memory bias for hostile information and concluded that conduct problems and hyperactivity/inattention was related to a memory bias for angry faces.

Yuill and Lyon (2007) found that children with ADHD performed more poorly than the control group in matching faces to situations and showed impairments in the emotion task. Bal (2011) observed that children with ADHD display more errors when recognising emotions compared to children with TD (mainly in recognising anger and disgust). Also, Demopoulos et al. (2013) found similar facial and vocal affect identification abilities between ASD and ADHD groups, showing that both groups performed significantly worse than the normative sample on all measures. Ichikawa et al. (2014) showed that children with ADHD had an increased concentration of oxy-Hb for happy faces but not for angry faces, while children with TD showed increased oxy-Hb for both faces.

Moreover, in this study the individual peak latency of hemodynamic response in the right temporal area showed significantly greater variance in the ADHD group than in the TD group.

4.3. Face recognition and core deficits in ADHD: attention, hyperactivity and impulsiveness

In this section, we briefly report studies focused on face recognition that considers the core deficits of ADHD as the main cause of altered facial recognition. Cadesky et al. (2000) found that children with ADHD and CD were less accurate at interpreting all emotions, except anger and wrongly perceived sadness (mainly because of inattention problems). Corbett and Glidden (2000), in their study on ADHD and processing affective stimuli, observed that the symptom of inattention influenced the perception of affect.

Marsh and Williams (2006), in a study evaluating emotion face recognition in ADHD, observed that failure to correctly interpret affect was due to inattention and/or impulsivity. The study conducted by Sinzig et al. (2008) showed an association between the alterations in

face processing and core symptoms of ADHD, in particular ADHD symptoms that seem to have an impact on facial affect recognition.

Shin et al. (2008) conducted a study to evaluate if attention deficit, measured by a computerised continuous performance test (CPT), was responsible for the errors in facial emotion recognition in boys with ADHD. The study concluded that attention deficits in boys with ADHD seemed to account for their difficulty in recognising facial expressions of emotion. Aspan et al. (2014) found that children with ADHD were more sensitive in the recognition of disgust and had worse performance in the recognition of sadness and fear compared to children with TD. Moreover, hyperactivity measures were positively correlated with the recognition of disgust and inversely correlated with the recognition of fear in the ADHD sample.

Chronaki et al. (2015), in their study conducted on children enriched for risk of behaviour problems, observed a negative correlation between recognition for angry face and hyperactivity problems. Ellis (2016) found a relationship between attention problems of ADHD and social perception abilities, social skills and adaptability. Furthermore, Nazari et al., 2017 found that ADHD symptoms influenced performance in facial emotion recognition tasks (i.e., inattention symptoms had a negative impact on facial recognition ability). Finally, Tehrani-Doost et al. (2017) found a specific association between impairments in emotion and inattention in children with ADHD, showing a considerable effect on detection of both angry and sad targets.

4.4. Social function impairment

In this section, studies focused on face recognition are briefly reported. The studies consider impaired social functioning, reported by ADHD children and adolescents, as the main cause of altered facial recognition. Da Fonseca et al. (2009) revealed that individuals with ADHD are less accurate than controls not only at identifying facial expressions of emotion but also using contextual information to understand emotions, suggesting that children and adolescents with ADHD have an overall deficit in emotion processing. The study conducted by Boakes et al. (2008) highlighted significant impairments for boys with ADHD on two of six emotions (fear and disgust). Furthermore, Mohammadzadeh et al. (2016) found that children with ADHD had poorer performance on understanding intentional behaviours, and they used significantly less mental state words describing feelings and

Table 2

Face recognition studies in children and adolescents with ADHD (Differences from Typically Developing-TD- subjects).

Study	Participant groups (ADHD, sample size, mean age)	Task	Finding
Tehrani-Doost et al. (2017) <i>J. Can. Acad. Child. Adolesc. Psychiatry</i>	ADHD (n = 28) TD (n = 27) Aged 7-12 years	K-SADS- PL-PV; Conners' Parent Rating Scale (CPRS-SV) Raven Colored Matrices; Conners' Continuous Performance Test II (CPT II); Computerized Facial Emotion Recognition Task (FERT).	Children with ADHD suffer from some impairments in recognizing angry, happy and sad faces. This deficit may be related to inattention and hyperactivity-impulsivity.
Nazari et al. (2017), <i>Advances in Cognitive Science</i>	ADHD (n = 23) ADHD + CD (n = 14) TD (N = 18) Aged 8-13 years	Facial emotion recognition task including unfamiliar faces which contain four basic emotions «anger, happiness, sadness, fear and neutral faces» for assessing ability to recognize facial emotion.	Facial emotion recognition deficits in children with ADHD and ADHD + CD occur mostly due to ADHD symptoms such as attention deficit, emotion regulation and executive function deficit. ADHD + CD perform in an exaggerated or reductionist manner in the processing of some facial expressions, which lead to perceptual distortion.
Ellis (2016), <i>Master's Theses.</i>	Preschool children (N = 76) Ranged in age from 3-6 years	BASC-2-PRS and BASC-2-TRS; Nepsy-II (Affect Recognition and Theory of Mind)	An indirect effect of social perception abilities on social skills and adaptability through ADHD symptoms was found.
Chronaki et al. (2015) <i>Child Neuropsychol.</i>	57 children enriched for risk of behaviour problems Aged 3-6 years.	Strengths and Difficulties Questionnaire (SDQ); Standardized pictures of emotional facial expressions (i.e., angry, happy, and sad) of low and high intensity; UK vocal expression stimuli created for the study of low and high intensities.	Vocal and facial emotion recognition accuracy was negatively correlated with externalizing but not internalizing behaviour problems, independent of emotion type.
Aspan et al. (2014) <i>Biomed. Res. Int.</i>	ADHD boys (n = 22); TD boys (n = 22) Aged 13-16 years	Raven's Progressive Matrices; Strengths and Difficulties Questionnaire; Inventory of Callous-Unemotional Traits (ICU); Facial Expressions of Emotion-Stimuli and Tests (FEEST)	Compared to TD group, adolescents with ADHD were more sensitive in the recognition of disgust and worse in the recognition of fear and they have a tendency for impaired recognition of sadness.
Köchel et al. (2014) <i>J. Child. Neurol.</i>	ADHD boys (n = 16) TD boys (n = 16) Aged 8.5 to 11.8 years	Culture Faire Intelligence Test [CFT 20-R]; Assessment of ADHD symptoms (FBB-ADHS33); SDQ34; the Eyberg Child Behavior Inventory; emotional Go/NoGo task with pictures of facial expressions from the from the Karolinska Directed Emotional Faces (KDEF); EEG data and the electro-oculogram (EOG) were recorded.	ADHD group relative to TD group displayed a severe impairment in response inhibition toward anger cues, which was accompanied by a reduced P300 amplitude
Ichikawa et al. (2014) <i>Neuropsychologia</i>	ADHD boys (n = 13) TD boys (n = 13) Mean age = 10	ADHD-Rating Scale; Presentation of Japanese females with different facial expressions, obtained from the Facial Information Norm Database (FIND); Hitachi ETG-4000 system (Hitachi Medical, Chiba, Japan) to measure the hemodynamic changes	ADHD children showed an increased concentration of oxy-Hb for happy faces but not for angry faces, while TD children showed increased oxy-Hb for both faces. Moreover, the individual peak latency of hemodynamic response in the right temporal area showed significantly greater variance in the ADHD group than in the TD group.
Tye et al (2014) <i>Biol. Psychol.</i>	Boys with ASD (n = 19); Boys with ADHD (n = 18); Boys with ASD + ADHD (n = 29); TD (n = 26). Aged 8-13 years	CPRS-3-SV; Social Communication Questionnaire (SCQ); ADI-R; ADOS-G; Parent Account of Childhood Symptoms (PACS); black-and-white pictures of a boy and a girl and five of the basic emotional expressions were selected for presentation. EEG was recorded	ASD group shows alterations at the structural encoding stage, while ADHD group displays abnormality at the contextual processing stage. ASD + ADHD group presents as an additive condition with the unique deficits of both disorders.
Tye et al. (2013) <i>Dev. Cogn. Neurosci.</i>	ASD (n = 19); ADHD (n = 18); comorbid ASD + ADHD (n = 29); TD (n = 26). Aged 8-13 years	CPRS-3-SV; WASI; Social Communication Questionnaire (SCQ); Autism Diagnostic Interview-Revised (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS-G); Parent Account of Childhood Symptoms (PACS) for ADHD. Upright/inverted faces with direct/averted gaze, with concurrent EEG recording of the P1 and N170 components.	Children with ADHD (ADHD/ASD + ADHD) exhibited a reduced face inversion effect on P1 latency compared to TD and ASD. Children with ADHD show abnormalities at early visual attention stages.
Demopoulos et al. (2013) <i>J. Autism Dev. Disord.</i>	ASD (n = 137); ADHD (n = 436); Aged 6-17 years old	ADHD Rating Scale; Childhood Autism Rating Scale (CARS); SCQ; ADOS; WISC-IV; DANVA2 to measure facial and vocal affect identification abilities; The Test of Problem Solving 3-Elementary (TOPS-3E) and Adolescent (TOPS-2A), for Social Problem-Solving; The pragmatic judgment subtest of the Comprehensive Assessment of Spoken Language (CASL); Behavior Assessment Scale for Children-2ndEdition(BASC2)	Both groups performed significantly worse than the normative sample on all measures. Although the ASD group had more severe deficits, the pattern of deficits was surprisingly similar between groups.

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Table 2 (continued)

Study	Participant groups (ADHD, sample size, mean age)	Task	Finding
	ADHD (n = 33) TD (n = 38) Aged 7-12 years	CPRS-R:L; CPT-II; CBCL; WISC-IV; Social Skills Rating System (SSRS); heart Rate and RSA; eye-tracking system; Dynamic Affect Recognition Evaluation (DARE) for the presentation of the emotional expressions.	ADHD display more errors when recognizing emotions compared to TD children, mainly in recognizing anger and disgust.
Brotman et al. (2010) <i>Am. J. Psychiatry</i>	Bipolar disorder (n = 43); ADHD (n = 18); severe mood dysregulation (n = 29) TD (n = 37). Aged 8-17 years	WASI; K-SADS-PL; Children's Depression Rating Scale; the Young Mania Rating Scale; During functional magnetic resonance imaging (fMRI), participants attended to emotional and nonemotional aspects of neutral faces and Blood-oxygen-level-dependent (BOLD) signal in the amygdala was examined.	While rating subjective fear of neutral faces, youths with ADHD demonstrated left amygdala hyperactivity relative to the other three groups.
Passarotti et al. (2010) <i>J. Am. Acad. Child Adolesc. Psychiatry</i>	PBD (n = 23); ADHD (n = 14); TD (n = 19); Mean age 13.36 ± 2.55 years	KSADS; Parent ADHD Rating Scale IV Revised; Young Mania Rating Scale; the Child Depression Rating Scale Revised; Affective, two-back fMRI task with blocks of happy, angry, and neutral faces.	For angry versus neutral faces relative to TD, the ADHD patients exhibited greater activation in the DLPFC and reduced activation in the ventral and medial PFC, pregenual ACC, striatum, and temporo-parietal regions. For happy versus neutral faces, relative to the TD group the ADHD group showed increased activation in the DLPFC, striatal, and parietal regions, and no reduced activation. The ADHD group, compared with the TD group, showed no reduced activation and increased activation in regions that were underactive for the angry face condition.
Da Fonseca et al. (2009) <i>Child Psychiatry Hum. Dev.</i>	ADHD (n = 27); TD (n = 27) Aged 5–15 years	K-SADS-PL; Conner's Parent and Teacher Rating Scale; WISC-III; Facial emotion recognition (picture faces displaying an emotion) and emotion recognition on the basis of contextual cues (photographs in which either a face expressing an emotion or an object was masked)	Emotion-processing difficulties in children with ADHD extend beyond facial emotion and also affect the recognition of emotions on the basis of contextual information, showing that they have an overall emotion-processing deficit.
Krauel et al. (2009) <i>J. Neural Transm.</i>	ADHD boys (n = 14); ADHD + ODD boys (n = 8); ADHD + CD boys (n = 8); TD boys (25) Mean age = 13	Revised Schedule for Affective Disorders and Schizophrenia for School-Age Children: Present and Lifetime Version; Youth Self Report; Pictures from the International Affective Picture System (neutral, positive and negative content) to assess emotional memory	In ADHD only patients, memory performance was enhanced to the level of healthy control subjects both by positive and negative pictures, whereas in ADHD patients with comorbid ODD/CD, memory performance was only normalized by negative pictures
Boakes et al. (2008) <i>Child Neuropsychol.</i>	ADHD (n = 24); TD (n = 24) Aged 7-12 years	WISC-III; CBCL; SNAP IV; 72-trial task that included facial expressions of happiness, sadness, fear, anger, surprise, and disgust, in three versions: static, dynamic and a dynamic version presented within a relevant situational context. Expressions were also presented in cartoon versus real-life.	Significant impairments for boys with ADHD on two of the six emotions (fear and disgust).
Shin et al. (2008) <i>Neuropediatrics</i>	ADHD boys (n = 42) TD boys (n = 27) Aged 6-10 years	K-SADS-PL WISC-III ADS = Continuous performance test (CPT) to evaluate attention. A revised emotional recognition test (ERT) to assess the ability to recognize emotions.	Subjects with ADHD showed significantly lower scores of contextual understanding than the controls. Attention deficits in boys with ADHD seemed to be correlated to difficulty in recognizing facial expressions of emotion.
Sinzig et al. (2008) <i>Eur. Child Adolesc. Psychiatry.</i>	ADHD (n = 30); ASD (n = 19); ADHD + ASD (n = 21); TD (29) Aged 6-18 years	ADI-R; ADOS; Diagnosis Checklist for Pervasive Developmental Disorders (DCL-TESS); Diagnosis Checklist for Hyperkinetic Disorders (DCL-HKS); K-SADS-PL; Frankfurt Test and Training of Social Affect (FEFA) to assess facial affect recognition using faces and eye-pairs as target material. Three attention-tasks (Sustained attention, Inhibition, Set-Shifting) were administered	Significant difference in the recognition of faces and eye pairs between the ADHD and TD group. Children with autism and ADHD also differed significantly TD in the recognition of eye-pairs. Sustained attention and inhibition deficits had an impact on emotion recognition in children with ADHD.
Williams et al. (2008) <i>Biol. Psychiatry</i>	ADHD (n = 51); TD (n = 51) Aged 8-17 years	WISC-III; CPRS-R-LV Patient Health Questionnaire; Depression, Anxiety and Stress Scale (DASS). Evoked expressions of facial emotion were presented and participants selected the verbal label corresponding. Brain function was recorded using event-related potentials (ERPs) while subjects viewed these expressions. ADHD subjects were retested after 4 weeks, following treatment with methylphenidate (MPH).	ADHD subjects showed a profile of emotion-related impairment: higher depression and anxiety, deficits in identifying threat-related emotional expressions and alterations in ERPs. Methylphenidate normalized neural activity and produced some improvement of emotion recognition
Yuill and Lyon (2007) <i>J. Eur. Child Adolesc. Psychiatry.</i>	ADHD boys (n = 36) TD (n = 32) Aged 5-11 years		

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Table 2 (continued)

Study	Participant groups (ADHD, sample size, mean age)	Task	Finding
		Children, already diagnosed with ADHD; WISC; 1)Set of six photographs for the emotion task, and a further set of six photographs for the non-emotional task. 2)Same tasks, but with an 'inhibitory scaffolding' procedure to prevent impulsive responding.	1)ADHD performed more poorly than the control group in matching faces to situations. 2)ADHD performed as well as the younger controls on the non-emotional task, but still showed impairments in the emotion task.
D'Acromont and Van der Linden (2007) <i>J. Abnorm. Child Psychol.</i>	Students (n = 86) Aged 13-17 years	The UPPS Impulsive Behavior Scale to assess impulsivity traits; Strengths and difficulties questionnaire; Emotional face memory task from the Karolinska Directed Emotional Faces set.	A better recognition of angry faces than happy faces predicted conduct problems and hyperactivity/inattention. The memory bias effect was more pronounced for impulsive adolescents.
Pelc et al. (2006) <i>Pediatr. Neurol.</i>	ADHD (n = 30); TD (n = 30) Aged 7-12 years	16 validated photographs representing four emotions in varying intensities by Hess and Blairy.	Children with ADHD exhibited a general deficit in decoding emotional facial expressions, with specific deficit in identifying anger and sadness.
Cadesky et al. (2000) <i>J. Am. Acad. Child Adolesc. Psychiatry</i>	ADHD (n = 86); CD (n = 25); ADHD + CD (n = 36); TD (n = 27) Aged 7-13 years	WISC-III; Parent Interview for Child Symptoms; Teacher Telephone Interview; Children's Depression Inventory (CDI) and the Revised Children's Manifest Anxiety Scale (RCMAS); Ontario Child Health Survey (Impairment); Diagnostic Analysis of Nonverbal Accuracy (DANVA)	Children with ADHD and CD were less accurate at interpreting all emotions except anger and wrongly perceived sadness.
Corbett and Glidden (2000), <i>Child Neuropsychology</i>	ADHD (n = 37); TD (n = 37) Aged 7-12 years	WISC-III; WIAT; Sentence Memory Test; Knox Cube Test; The Prosody Test; Pictures of Facial Affect; Go No-Go Test; Matching Familiar Figures Test	ADHD children demonstrate mild-to-moderate deficits in the perception of affect.
Singh et al. (1998) <i>Behav. Modif.</i>	ADHD group (n = 50) Aged 5-13 years	Sets of 6 photographs of faces, each representing a different basic emotion. Stories regarding those emotions were read to children and they must choose the photograph representing the emotion described.	Children with ADHD have deficits in their ability to accurately recognize facial expressions of emotion when compared to studies of children in general population.

social interactions compared to children with TD, confirming the hypothesis that theory of mind (ToM) deficits are present in ADHD.

4.5. Neural correlate of facial recognition in ADHD

In this section, studies that considered the neural correlate of facial recognition in ADHD are briefly reported. Marsh and Williams (2006) found that amygdala activation was reduced in children and adolescents with callous unemotional (CU) traits and ODD/ADHD when processing fearful expressions, and there was a negative correlation between the severity of the child's symptoms and amygdala and VMPFC connectivity. In another study, Williams et al. (2008) found that there was a pronounced reduction in occipital activity during the early perceptual analysis of emotional expression (within 120 ms), followed by an exaggeration of activity associated with structural encoding (120–220 ms) and subsequent reduction and slowing of temporal brain activity subserving context processing (300–400 ms) in adolescents with ADHD.

Passarotti et al. (2010) observed ADHD patients exhibited greater activation in the dorsolateral prefrontal cortex (DLPFC) and reduced activation in the VMPFC, pregenual anterior cingulate cortex (ACC), striatum and temporoparietal regions than TD patients for angry versus neutral faces. For happy versus neutral faces, relative to the TD group, the ADHD group showed increased activation in the DLPFC, striatal and parietal regions and no reduction in activation. In this study, ADHD patients showed reduced cortical/subcortical activity under negative emotional challenge and increased activity under positive emotional challenge.

Brotman et al. (2010) examined the blood-oxygen-level-dependent (BOLD) signal in the amygdala in children with ADHD, bipolar disorder (BP), severe mood dysregulation (SMD) and TD, while they attended to emotional and non-emotional aspects of neutral faces. Participants with ADHD demonstrated left amygdala hyperactivity relative to the other three groups. Tye et al. (2013) presented upright/inverted faces with direct/averted gaze and with concurrent recording of the P1 and N170 components to children with ADHD and found they exhibited a reduced

face inversion effect on P1 latency compared to children with TD and ASD. Furthermore, in a subsequent study, Tye et al. (2014) found that the ASD group showed alterations at the structural encoding stage, while the ADHD group displayed abnormality in the contextual processing stage. The ASD + ADHD group presents as an additive condition with the unique deficits of both disorders.

Köchel et al. (2014) observed that children with ADHD, relative to controls, displayed a severe impairment in response inhibition toward anger cues, which was accompanied by reduced P300 amplitudes (positive voltage deflection about 300 ms after picture onset).

Posner et al. (2011) used functional magnetic resonance imaging (fMRI) to assess neural activity in adolescents with ADHD and TD while they performed a task involving the subliminal presentation of fearful faces. Additionally, the imaging was used to examine the connectivity of the amygdala and lateral prefrontal cortex (LPFC), areas associated with emotional reactivity. They demonstrated an atypical neural substrate of fear processing in adolescents with ADHD—the activity in the right amygdala and connectivity between the amygdala and LPFC was greater in children with ADHD than in children with TD.

4.6. Comorbid conditions

In this review, we did not take in account studies assessing ADHD with comorbidities, except the research that reported the comparison between ADHD only group and ADHD with comorbidities group. Krauel et al. (2009) assessed emotional memory in children and adolescents with ADHD with and without comorbid CD/ODD, showing that ADHD patients with and without ODD/CD showed lower recognition memory for neutral pictures than healthy control subjects, but while ADHD only patients reached normal recognition rates both by positive and negative pictures, ADHD patients with comorbid ODD/CD only reached normal recognition rates for negative pictures. Aspan et al. (2014) observed that high parent-reported conduct scores and Callous Unemotional traits (e.g., lack of guilt and absence of empathy) (Frick and White, 2008) in the ADHD group were associated with a marginal impairment in the recognition of fear.

Noordermeer et al. (2015) investigated the effects of comorbid ODD in subjects with ADHD on neurocognitive functioning, which also involved facial affect recognition. They found abnormalities in angry facial emotion recognition for the ADHD + ODD group but not in the ADHD only group, supporting the hypothesis that comorbid ODD, and not ADHD, is associated with abnormalities in emotion recognition. Berggren et al. (2016) found significant general and specific facial affect recognition difficulties in children with ASD compared to children with TD for different stimuli regarding accuracy and response time, only few differences between the ASD and ADHD groups and no differences between the ADHD and TD groups. Autistic symptomatology would seem to be the cause of reported alteration in facial recognition in ADHD.

5. Discussion

5.1. Available literature

Studies on facial memory and recognition in children and adolescents with ADHD focused mainly on the ability to recognise emotional facial expressions, showing inconsistent results and a heterogeneous use of assessment tasks. Furthermore, the majority of the studies that we did not take into account in this review assessed ADHD and ASD in comorbidity and not ADHD only. To the best of our knowledge, in literature there are not studies that assess face recognition only as face memory ability, i.e. span memory. Instead, several studies have indicated difficulties in emotional face recognition both in ADHD and other disorders mainly autism spectrum disorder. For these reasons it is difficult to understand if these altered abilities are related more to a difficulty in information processing or in a more complex socio-emotional construct. In the discussion section we comment on the studies that have been reported in the results section following the same subdivision of paragraphs based on the possible putative hypothesis (clinical or neurobiological) supporting the relationship between ADHD and face recognition.

5.2. Facial recognition

Between studies selected for this review, some research observed no significant differences between ADHD and TD groups (Shapiro et al., 1993; Guyer et al., 2007; Kibby and Cohen, 2008; Greenbaum et al., 2009; Ahmadi et al., 2011; Schwenck et al., 2013; Noordermeer et al., 2015; Berggren et al., 2016; Lee et al., 2016). However to date, a large amount of studies have shown that performance of children with ADHD on emotion recognition tasks is worse than children with TD, especially in detecting emotional expressions of faces, (Pelc et al., 2006; Yuill and Lyon, 2007; D'Acremont and Van der Linden, 2007; Bal, 2011; Demopoulos et al., 2013; Ichikawa et al., 2014; Chronaki et al., 2015; Ellis, 2016; Nazari et al., 2017). Moreover, Demopoulos et al. (2013) suggest that social cognitive deficit patterns may be more similar in patients with ASD and ADHD than in patients with ADHD and TD.

To the best of our knowledge, there are only three studies that assessed a different process of face processing in ADHD children and adolescents and not only the ability of emotion facial recognition (Kibby and Cohen 2008; Lee et al., 2016; D'Acremont and Van der Linden, 2007). Indeed, another very important process among the abilities of face processing is memory and recall for faces. This argument did not receive much attention in the literature, but it is of great interest (mainly in children and adolescents with ADHD that report impairments in executive function (EF), working memory and social interactions).

In the first study, Kibby and Cohen (2008) used tasks with faces to measure visual memory and found that children with ADHD demonstrated similar performance to controls on "Faces Immediate" and "Face Delayed", suggesting that visual STM and LMT is intact when spatial demands are low. In the second study, consistent with this hypothesis,

Lee et al. (2016) found that the ADHD group did not differ from those without it on "Faces Immediate" (Lee et al., 2016). In the third study, on the contrary, D'Acremont and Van der Linden (2007), detecting a memory bias for angry faces in children with conduct problems and hyperactivity/inattention deficit, suggested that these problems were due to the fact that ADHD subjects allocate more attention to angry faces rather than to happy faces during the encoding phase of the memory task and this attentional bias leads to a memory bias.

5.3. Face recognition and core deficit in ADHD: Attention, hyperactivity and impulsiveness

It is widely recognised that EF is compromised in children with ADHD, including the capacity for inhibition, interference control, working memory, cognitive flexibility and self-regulation of emotion (Diamond, 2013). Probably because of these cognitive impairments, children and adolescents with ADHD feel or show more impulsive and stronger emotional reactions toward events compared to their peers, and they are less able to moderate or control the emotional reactions they experience (Wehmeier et al., 2010).

Children's difficulties in interpreting emotional cues from pictures of facial expressions seem to be due to difficulties in encoding stimuli related to inattention and other general regulatory processes and not to specific distortions in interpreting emotions (Cadesky et al., 2000). Corbett and Glidden (2000) provided a further explanation for the deficit showed by ADHD children in recognising faces. According to these authors, ADHD children show deficits in verbal and nonverbal attention, because they may only attend to the most salient stimuli or the most salient features of the stimulus in the environment. The consequence of this process, in this type of experiment, is that the child can discriminate between vastly different emotions but is not able to distinguish the more refined differences between emotions like fear and surprise (Corbett and Glidden, 2000). Moreover, according to Nazari et al. (2017), facial emotion recognition deficits in the ADHD group with or without comorbidities were due not only to emotion regulation and EF deficit but also to attention deficit. Furthermore, the social difficulties reported by children with ADHD seem to be related to social perception deficits. In particular, core symptoms of ADHD, mainly inattention problems, seem to influence social perception abilities and have negative outcomes such as deficits in social skills and adaptability (Ellis, 2016).

5.4. Social function impairment

The ability to extract information from a face is important for proper social abilities, and it probably plays a critical role for survival (Kanwisher and Yovel, 2006). Indeed, face processing abilities are important for social interactions, peer relationships, social behaviour and for the development of the perceptual components of ToM (Korkmaz, 2011; Collin et al., 2013). Since it is widely recognised that ADHD children with ADHD have emotional and social impairment, (Barkley et al., 2008; Swanson, 2003; Wehmeier et al., 2010; Bora and Pantelis, 2016) such as peer relationship problems, difficulty making and keeping friends and difficulties in maintaining proper social behaviour (Piffner and McBurnett, 1997), these impairments could be an additional possible cause of altered face recognition found in children with ADHD.

Furthermore, children with ADHD seem to be less sensitive in recognising positive and negative emotions expressed by others, in particular happy and angry faces (Köchel et al., 2014; Aspan et al., 2014; Passarotti et al., 2010). This low attention to facial expressions could limit ADHD children's ability to modify their behaviour and emotions in response to the context (Tehrani-Doost et al., 2017). Deficits in emotion facial recognition found in children with ADHD may also be explained by impairments in ToM (Korkmaz, 2011; Collin et al., 2013). The results of several studies suggest that children and adolescents with

ADHD show difficulties in recognising certain emotions (i.e., anger and disgust) (Aspan et al., 2014; Boakes et al., 2008; Passarotti et al., 2010), and this may be related more to problems in social perception rather than cognitive or executive functions (Bal, 2011).

5.5. Neural correlate of facial recognition in ADHD

Functional neuroimaging techniques and event-related potential (ERP) studies have identified alterations in the activation and inhibition of several brain areas and neurotransmitter systems in children and adolescents with ADHD during the execution of tasks requiring facial emotion recognition. Neuroimaging techniques such as MRI and fMRI have allowed us to detect several morphological alterations and atypical brain activity (Ichikawa et al., 2014) in the brain of children with ADHD. Identified abnormalities include reduced grey matter in the fronto-striatal circuits (Nakao et al., 2011), reduced global brain volume (Castellanos, 2002) and cortical thinning (Tarver et al., 2014; Batty et al., 2010).

Furthermore, neuropsychological measures and neuroimaging techniques have shown that ADHD is associated with alterations in the prefrontal cortex (PFC) and its connections to the striatum and cerebellum. This area in particular is critical for the regulation of behaviour, attention and affect using representational knowledge (Arnsten, 2006; Brennan and Arnsten, 2008). Indeed, several neuropsychological studies found social cognitive impairments in individuals after PFC lesions and in neurodegenerative and neuropsychiatric disorders affecting the PFC (Uekermann et al., 2010).

Neuroimaging evidence has also suggested that face processing may rely on different brain circuits involving the PFC (Renzi et al., 2013), in particular the VMPFC would seem to play a critical role in mediating visual attention to the eye region of the face, particularly for fearful expressions (Wolf et al., 2014). Evidence from longitudinal structural imaging studies has shown that ADHD is characterised by a delay in structural brain maturation from the PFC to amygdala (Rubia et al., 2014) that might be one of the causes for altered face processing of children with ADHD. The amygdala is another important area associated with face processing. Many studies have observed the amygdala's responses to face evaluation and emotional expressions, including fearful and positive expressions (Pessoa et al., 2006; Todorov, 2012).

5.6. Comorbid conditions

The literature suggests the presence of comorbid conditions as one of the possible causes of impairment in face recognition. Indeed, according to the literature, rarely this disorder occurs in isolation, but it is frequently associated with several psychiatric disorders, many of which involve difficulties with emotion. Research shows high concurrent comorbidity with ASD, communication disorders, specific learning or motor disorders, intellectual disability, tic disorders and behavioural problems (Thapar and Cooper, 2016; Jensen and Steinhausen, 2015; Keresztény et al., 2012). In particular, ADHD displays high comorbidity rates with ASD (two-thirds of individuals with ADHD show features of ASD) (Davis and Kollins, 2012), with ODD (a comorbidity reaching 60%) and with CD (a prevalence of 16–20%) (Maughan et al., 2004; Biederman et al., 2002; Villodas et al., 2012). Since ASD have been associated with facial recognition alterations in several studies (Williams et al., 2005), the majority of the research on facial emotion recognition in children and adolescents with psychiatric disorders focused on ADHD in comorbidity with ASD.

Some studies on facial recognition found that although the ASD group had more severe deficits, the pattern of deficits was surprisingly similar between the ADHD and ASD groups compared with the ADHD and TD groups (Demopoulos et al., 2013). Therefore, another possible explanation for the reported difficulties in face processing in children and adolescents with ADHD could be the presence of comorbid disorders.

5.7. Clinical relevance of findings

According to literature, children with ADHD show difficulties in facial recognition, but to date it is difficult to understand if this impairment could be caused by a different mechanism related to the core deficits in ADHD, to a deficit in the processing of social information, to specific alterations in brain systems underlying the face processing abilities or to comorbid conditions. A more thorough knowledge of the relationship between facial recognition and ADHD could provide important clinical information for a preventive, targeted and efficacious treatment program. Indeed, facial recognition seems to play a critical role for social interactions, peer relationships, social behaviour and for the development of the perceptual components of ToM (Korkmaz, 2011; Collin et al., 2013).

5.8. Gaps in the literature & recommendations for future research

The available literature focused on this topic showed little interest in neuropsychological elaboration of face structural units, that are not related to emotional content and little interest in abilities of memory and recall for faces in children and adolescents with ADHD. Despite studies focusing on face recognition, in particular emotional and expression recognition in complex samples (ADHD + comorbidities, especially ASD), it is difficult to circumscribe the neuropsychological profile properly associated with ADHD and with the presence of a comorbidity and it is unlikely to distinguish whether the difficulties in facial recognition are due properly to the core deficit of ADHD or to an associated condition.

This work could be a starting point in order to deep a topic that has not been explored but in our opinion it is relevant in a promising way, that is to say the assessment of face recognition only as face memory ability (i.e. span memory) in children and adolescents with ADHD.

5.9. Strengths and limitations of the current literature

Face recognition in children and adolescents seems to be a relevant and important topic in literature. Several authors investigated this issue trying to detect the underlying causes of a possible altered facial recognition and several tools have been developed. Despite the high levels of interest on this theme, limitations of the current literature can be summarized as follows:

- a heterogeneous use of tasks to evaluate face recognition.
- a specific focus on ADHD and ASD in comorbidity.
- a specific interest in emotion recognition and facial expressions.
- little interest in neuropsychological elaboration of face structural units and in cold aspect of face recognition.

6. Conclusion

The difficulties in facial recognition in children with ADHD, according to literature that reported different profiles between the ADHD and TD groups, could be caused by a different mechanism related to the core deficits in ADHD (inattention, hyperactivity and impulsiveness), to a deficit in the processing of social information, to specific alterations in brain systems underlying the face processing abilities or to comorbid conditions. The finding from the studies included in this systematic review show that the literature on this argument focused mainly on “hot aspects” (e.g., emotion recognition, ToM) of face recognition. However, according to the main theories on face processing (Carey and Diamond, 1977; Bruce and Young, 1986; Crookes and McKone, 2009), the processes of face recognition are also based on neuropsychological and cognitive elaboration that are not related to emotional content. Furthermore, findings presented in this paper highlight a wide and heterogeneous use of tasks to assess emotion recognition and facial expressions. With respect to the abilities of memory and recall for faces,

we observed that this argument did not receive much attention in the literature. Given that the children and adolescents with ADHD report impairment of EF, working memory and social interactions, it could be of clinical relevance to assess the ability of memory and recall for faces and to explore the relationship between face memory and EF. Further studies are required to understand what level and skills of face processing are compromised in ADHD patients and how these difficulties are associated to social cognition and psychosocial functioning in children and adolescents with ADHD.

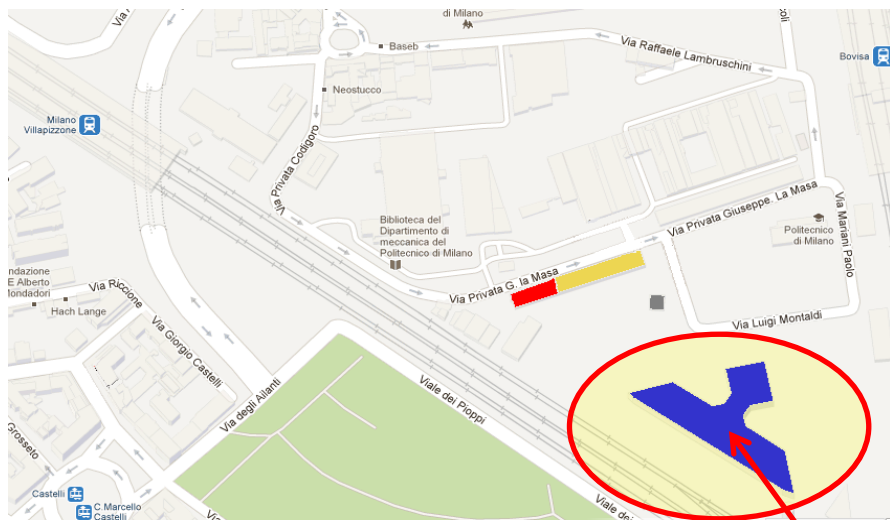
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M. Antonella Costantino – Direttore UONPIA*

Segreteria organizzativa:

Jessica Babboni – Centro ADHD – UONPIA*

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Regione
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L'andamento dei Follow up nell'ambito del Progetto Regionale ADHD



Milano, 16 maggio, 2018
Ore 9.00-13.30 - AULA GUASTI

IRCCS
Istituto di Ricerche Farmacologiche Mario Negri
Via G. La Masa 19 - 20156 Milano



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PRESENTAZIONE

Il nuovo Progetto *Percorsi diagnostico-terapeutici in rete per l'ADHD* si è posto un nuovo importante obiettivo per rafforzare il lavoro e l'impegno degli ultimi anni: consolidare la struttura della rete curante per l'ADHD in Lombardia, ampliarla alla partecipazione di nuovi servizi e garantire risposte terapeutiche e interventi formativi e informativi omogenei ed appropriati in tutto il territorio regionale. Nello specifico si prefigge di implementare l'adesione dei Centri al monitoraggio strutturato e programmato dei percorsi di cura e diffondere modalità di audit clinico. I Centri ADHD nell'ambito del Progetto dovranno assumere un ruolo attivo all'interno della rete UONPIA per implementare e diffondere e coordinare gli obiettivi previsti a livello regionale e garantire un percorso di audit ad essi relativi.

Relativamente al Follow up il percorso si focalizzerà sul confronto formalizzato tra i Centri relativo alle modalità con le quali vengono programmati e strutturati i monitoraggi, e con i dati che emergono dal Registro.

RELATORI

Umberto Balottin

UONPIA IRCCS Mondino, Pavia

Antonella Costantino

UONPIA IRCCS Fondazione Policlinico

Paola Effedri

UONPIA ASST Spedali Civili di Brescia

Ottaviano Martinelli

UONPIA, ASST di Lecco

Massimo Molteni

IRCCS, Istituto Scientifico Eugenio Medea di Bosisio Parini

Monica Saccani

UONPIA ASST SS Paolo e Carlo

Referenti dei Centri ADHD

PROGRAMMA

08:30 – 09:00 Registrazione

09:00 – 10:00

Il Follow up nell'ambito del registro regionale ADHD

Monica Saccani

10:00 – 12:00

**TAVOLA ROTONDA CON DISCUSSIONE CON IL PUBBLICO:
I PERCORSI DI FOLLOW UP: MODELLI E APPLICAZIONI NEI CENTRI PER ADHD
LOMBARDI**

*Coordinano: Ottaviano Martinelli, Umberto Balottin, Paola Effedri
Presentano: i Referenti dei Centri ADHD*

12:00 – 13:30

**TAVOLA ROTONDA CON DISCUSSIONE CON IL PUBBLICO:
STRUTTURAZIONE DI PRATICHE COLLABORATIVE TRA I CENTRI PER IL FOLLOW
UP**

*Coordinano: Antonella Costantino, Massimo Molteni, Monica Saccani
Presentano: i Referenti dei Centri ADHD*

13:30 Conclusioni

*Umberto Balottin, Antonella Costantino, Paola Effedri, Ottaviano Martinelli,
Massimo Molteni, Monica Saccani,*



Regione Lombardia

Il Progetto "Condivisione dei percorsi diagnostico-terapeutici per l'ADHD in Lombardia" è stato finanziato dalla Regione Lombardia con Decreto della Dg Welfare N. 1077 del 02 febbraio 2017. Il progetto coinvolge 18 Centri di Riferimento per l'ADHD e il Laboratorio per la Salute Materno Infantile dell'IRCCS - Istituto di Ricerche Farmacologiche Mario Negri. Coordinatore del Progetto è la UONPIA dell'ASST di Brescia.

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5954 del 05/12/2016 e N. 1077 del 02/02/2017) Capofila Progetto: UONPIA Azienda
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DIPARTIMENTO DI SALUTE PUBBLICA
Laboratorio per la Salute Materno Infantile
Via Giuseppe La Masa, 19 - 20156 Milano MI - Italia - www.marionegri.it tel
+39 02 39014.511 - fax +39 02 3550924 - mother_child@marionegri.it