

## INDICE:

1. Dalle banche dati bibliografiche pag. 2
  
2. Documenti  
  
Re AM, Lovero F, Cornoldi C, et al.  
**DIFFICULTIES OF CHILDREN WITH ADHD SYMPTOMS IN SOLVING  
MATHEMATICAL PROBLEMS WHEN INFORMATION MUST BE UPDATED.**  
*Res Dev Disabil. 2016;59:186-93.* pag. 54
  
3. Segnalazioni  
  
**MEETING**  
**AUDIT CLINICO IN NEUROPSICHIATRIA DELL'INFANZIA E DELL'ADOLESCENZA  
(IL CASO ADHD)**  
*c/o IRCCS Istituto di Ricerche Farmacologiche Mario Negri, Milano 26 ottobre 2016* pag. 62  
  
**INTERNATIONAL CONGRESS [DRAFT]**  
**ADHD CENTRE IN EUROPE**  
**LE COMORBIDITÀ NELL'ADHD**  
*c/o IRCCS Istituto di Ricerche Farmacologiche Mario Negri, Milano 14-15 dicembre 2016* pag. 64  
  
**QUESTIONARIO PER LA VALUTAZIONE DELLA NEWSLETTER ADHD**  
*<http://www.adhd.marionegri.it/index.php/newsletter/valutazione-newsletter>* pag. 66

## BIBLIOGRAFIA ADHD settembre 2016

Addiction. 2016 Sep;111:1582-89.

**THE INDIRECT EFFECTS OF CHILDHOOD ATTENTION DEFICIT HYPERACTIVITY DISORDER ON ALCOHOL PROBLEMS IN ADULTHOOD THROUGH UNIQUE FACETS OF IMPULSIVITY.**

***Pedersen SL, Walther CAP, Harty SC, et al.***

**Background and aims:** Research has not studied unique impulsivity dimensions as prospective links between childhood attention deficit hyperactivity disorder (ADHD) and alcohol problems. We examined the association between childhood ADHD, five facets of impulsivity and alcohol problems in adulthood and the indirect effects of childhood ADHD-to-impulsivity-to-alcohol problems.

**Design, Setting and Participants:** Participants were from a longitudinal study (n = 289, mean age = 28.67) of individuals with (n = 170) and without (n = 119) childhood ADHD. The ADHD sample, as part of an ADHD summer treatment program, was diagnosed initially in childhood (1987–96, Pittsburgh, PA, USA) via structured parent interview and standardized parent/teacher ratings. The ADHD sample and demographically similar individuals without ADHD (living in the greater Pittsburgh area) were recruited to participate in the Pittsburgh ADHD Longitudinal Study (PALS) between 1999 and 2003.

**Measurements:** Self-reported impulsivity (UPPS-P) and alcohol-related problems were assessed in adulthood (2011–14).

**Findings:** Adults with, compared with those without, childhood ADHD had more alcohol problems ( $\beta = 0.34$ ,  $P < 0.05$ ) and higher levels of negative urgency, positive urgency, lack of perseverance and lack of planning ( $\beta$ s = 0.24–0.31,  $P$ s < 0.001). Impulsivity facets (except sensation-seeking) were related to number of alcohol problems ( $\beta$ s = 0.34–0.61,  $P$ s < 0.05). Negative ( $\beta = 0.26$ ,  $P < 0.01$ ) and positive ( $\beta = 0.27$ ,  $P < 0.01$ ) urgency mediated the association between childhood ADHD and number of adult alcohol problems.

**Conclusions:** Elevated levels of emotional impulsivity (negative/positive urgency) may place children with attention deficit hyperactivity disorder at increased risk for alcohol problems in adulthood

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

ADHD Atten Deficit Hyperact Disord. 2016;8:121-30.

**TRAJECTORIES OF ADHD SEVERITY OVER 10-YEARS FROM CHILDHOOD INTO ADULTHOOD.**

**Tandon M, Tillman R, Agrawal A, et al.**

The study examined unique trajectories of ADHD severity from childhood (7-16 yo at baseline) through adulthood in a sample of ADHD, bipolar and healthy subjects. Comorbid disorders and temperament were examined as correlates of course of ADHD. N = 81 participants with an ADHD diagnosis, ascertained as a comparison group in a study of bipolar disorder (BP-I), were followed over a 10-year period. Growth mixture modeling (GMM) of ADHD severity was used to investigate trajectories of ADHD severity over 10 years. GMM revealed four trajectories in the N = 251 participants included in these analyses. A persisting high ADHD trajectory had the highest rates of comorbid major depressive disorder and oppositional defiant disorder. This persisting high ADHD group also had higher fantasy and lower persistence and self-directedness compared with those who displayed a pattern of decreasing ADHD symptoms over time. Psychopathologic features that characterize divergent trajectories of ADHD into adulthood are elucidated, and additional, larger studies are warranted

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Aggress Behav. 2016 Sep;42:455-70.

**PSYCHOPATHIC TRAITS MEDIATE THE ASSOCIATION OF SEROTONIN TRANSPORTER GENOTYPE AND CHILD EXTERNALIZING BEHAVIOR.**

**Brammer WA, Jezior KL, Lee SS.**

Although the promoter polymorphism of the serotonin transporter (5-HTTLPR) gene is associated with externalizing behavior, its mediating pathways are unknown. Given their sensitivity to serotonin neurotransmission and unique association with attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD), we tested callous-unemotional (CU) traits and narcissism as separate mediators of the association of 5-HTTLPR with ADHD and ODD. We evaluated 209 5–9 year-old children with and without ADHD at baseline; approximately 2 years later (i.e., Wave 2), parents and teachers separately rated ADHD and ODD symptoms and youth self-reported antisocial behavior. Controlling for race-ethnicity and baseline ADHD/ODD, narcissism uniquely mediated predictions of multi-informant rated Wave 2 ADHD and ODD from variation in 5-HTTLPR; CU traits mediated predictions of Wave 2 ADHD from variations in 5-HTTLPR, but did not mediate the associations of 5-HTTLPR with ODD or youth self-reported antisocial behavior. Specifically, the number of 5-HTTLPR long alleles positively predicted CU traits and narcissism; narcissism was positively associated with Wave 2 ADHD and ODD symptoms, whereas CU traits were positively associated with Wave 2 ADHD. Child sex also moderated indirect effects of CU traits and narcissism, such that narcissism mediated predictions of ADHD/ODD in girls but not boys. Psychopathic traits may represent a relevant pathway underlying predictions of prospective change in ADHD and ODD from 5-HTTLPR, particularly in girls. We consider the role of psychopathic traits as a potential intermediate phenotype in genetically sensitive studies of child psychopathology

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Am J Med Genet B Neuropsychiatr Genet. 2016 Sep;171:815-26.

**PATHWAY ANALYSIS IN ATTENTION DEFICIT HYPERACTIVITY DISORDER: AN ENSEMBLE APPROACH.**

**Mooney MA, McWeeney SK, Faraone SV, et al.**

Despite a wealth of evidence for the role of genetics in attention deficit hyperactivity disorder (ADHD), specific and definitive genetic mechanisms have not been identified. Pathway analyses, a subset of gene-set analyses, extend the knowledge gained from genome-wide association studies (GWAS) by providing functional context for genetic associations. However, there are numerous methods for association testing of gene sets and no real consensus regarding the best approach. The present study applied six pathway analysis methods to identify pathways associated with ADHD in two GWAS datasets from the Psychiatric Genomics Consortium. Methods that utilize genotypes to model pathway-level effects identified more replicable pathway associations than methods using summary statistics. In addition, pathways implicated by more than one method were significantly more likely to replicate. A number of brain-relevant pathways, such

as RhoA signaling, glycosaminoglycan biosynthesis, fibroblast growth factor receptor activity, and pathways containing potassium channel genes, were nominally significant by multiple methods in both datasets. These results support previous hypotheses about the role of regulation of neurotransmitter release, neurite outgrowth and axon guidance in contributing to the ADHD phenotype and suggest the value of cross-method convergence in evaluating pathway analysis results

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Am J Med Genet Part B Neuropsychiatr Genet. 2016;171:971-81.

**SMOKING DURING PREGNANCY AND ADHD RISK: A GENETICALLY INFORMED, MULTIPLE-RATER APPROACH.**

**Knopik VS, Marceau K, Bidwell LC, et al.**

Maternal smoking during pregnancy (SDP) is a significant public health concern with adverse consequences to the health and well-being of the developing child, including behavioral outcomes such as Attention Deficit Hyperactivity Disorder (ADHD). There is substantial interest in understanding the nature of this reported association, particularly in light of more recent genetically informed studies that suggest that the SDP-ADHD link is less clear than once thought. In a sample of families (N = 173) specifically selected for sibling pairs discordant for prenatal smoking exposure, we use a sibling-comparison approach that controls for shared genetic and familial influences to assess the effects of SDP on ADHD symptom dimensions. ADHD was measured by both parent and teacher report on the Conners report forms and the Child Behavior Checklist/Teacher Report Form (CBCL/TRF). Results for the CBCL/TRF Total ADHD score are consistent with prior genetically informed approaches and suggest that previously reported associations between SDP and ADHD are largely due to familial confounding rather than causal teratogenic effects. However, results from the Conners parent report suggest a potentially causal effect of SDP on hyperactive/impulsive and, to a lesser extent, total ADHD symptoms; SDP results in increased parent-reported hyperactive/impulsive and total ADHD symptoms even after accounting for genetic and familial confounding factors. This suggests that the Conners assessment (parent-report) may provide a sensitive measure for use in studies examining child specific SDP effects on continuous and dimensional aspects of ADHD

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Arch Dis Child. 2016;101:A354.

**THE USE OF WEIGHTED BLANKETS TO MODIFY SLEEP IN ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD).**

**Furnell C, Finlay F.**

**Aims** There are many websites accessible to parents recommending weighted blankets as a treatment for ADHD. They make a range of claims and some charge considerable amounts for their products. It is claimed the blankets provide sensory feedback which helps to calm the child and improve sleep. The aims of this study were to discover if there is evidence to support the use of weighted blankets to improve sleep in children with ADHD.

**Methods** A literature review was undertaken using the terms, ADHD, sleep, weighted and or blankets. Pubmed ERIC and CINHAL were used.

**Results** Despite the large number of websites offering weighted blankets with promises of improvement and their extensive discussion on parents forums only 1 study was identified looking at this subject. Hvolby in 2010 performed a study on 21 children diagnosed with ADHD and 21 controls using the "Ball Blanket". This is a type of weighted blanket. The study showed that the time it takes to fall asleep is shortened when using a ball blanket back to the level of healthy control subjects. This also had an impact in the classroom with a 10% improvement in attention and activity levels.

**Conclusion** There is currently only 1 study looking at weighted blankets in ADHD for sleep. This study did show an improvement in time to fall asleep and subsequent behaviour in school however the study was small and the blanket was only used for a short length of time. We do not know the long term effects of using the

blanket, how well tolerated it would be over time or if any adverse effects were reported. The authors feel further research is needed before recommending weighted blankets to children with ADHD and sleep issues

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Aust N Z J Psychiatry. 2016 Jan;50:82-93.

**TOURETTE SYNDROME, CO-MORBIDITIES AND QUALITY OF LIFE.**

**Eapen V, Snedden C, Crncec R, et al.**

**OBJECTIVE:** Tourette syndrome is often associated with attention deficit hyperactivity disorder, obsessive compulsive disorder and other co-morbidities, the presence of which can reduce health-related quality of life. The relationship between the number and type of co-morbidities and tic severity upon health-related quality of life has been insufficiently examined in Tourette syndrome populations and not at all in the Australian context. We hypothesised that an increased number of co-morbid diagnoses would be inversely related to health-related quality of life and that the presence of attention deficit hyperactivity disorder and obsessive compulsive disorder in particular would negatively impact health-related quality of life.

**METHOD:** In all, 83 people with a previously established diagnosis of Tourette syndrome, who responded to a letter of invitation sent to the Tourette Syndrome Association of Australia past-member database, formed the study sample. Participants completed the Gilles de la Tourette Syndrome-Quality of Life Scale and a short form of the National Hospital Interview Schedule to assess tics and related behaviours.

**RESULTS:** Participants with pure-Tourette syndrome had significantly better health-related quality of life than those with Tourette syndrome and three or more co-morbid diagnoses. Few differences were observed between the pure-Tourette syndrome and Tourette syndrome and one or two co-morbid diagnoses groups. Analysis of the impact of individual co-morbid disorders and Tourette syndrome symptoms on health-related quality of life indicated that attention deficit hyperactivity disorder exerted a significant negative effect, as did the presence of complex tics, especially coprolalia and copropraxia. When these variables were examined in multiple regression analysis, number of co-morbidities and the presence of coprophenomena emerged as significant predictors of health-related quality of life.

**CONCLUSION:** While tics are the defining feature of Tourette syndrome, it appears to be the presence of co-morbidities, attention deficit hyperactivity disorder, in particular, and coprophenomena that have the greater impact on health-related quality of life. This has implications for symptom-targeting in the treatment of Tourette syndrome since all available treatments are symptomatic and not disease modifying

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Behav Sleep Med. 2016 Sep;14:550-64.

**ASSOCIATION BETWEEN SLEEP PROBLEMS AND SYMPTOMS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER IN ADOLESCENCE: RESULTS FROM A LARGE POPULATION-BASED STUDY.**

**Hysing M, Lundervold AJ, Posserud MB, et al.**

Sleep problems and symptoms of ADHD are common in adolescence, but detailed epidemiological assessment of their association is lacking. Using data from a recent population-based study, 9,846 adolescents aged 16 to 19 provided detailed information on sleep and symptoms of ADHD. Results confirmed a large overlap between self-reported symptoms of ADHD and all sleep variables studied. Symptoms of ADHD were linked to shorter sleep duration, longer sleep latency, and nocturnal wake time, as well as larger sleep deficiency. ADHD symptoms also increased the odds of insomnia and delayed sleep phase syndrome. The associations were only partially explained by confounders (mainly depression). The findings suggest that sleep problems should be included as a treatment target in efforts to reduce symptoms of ADHD in adolescence

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BMC Health Serv Res. 2016 Jan;15:584.

**USING VIGNETTES TO ASSESS CONTRIBUTIONS TO THE WORK OF ADDRESSING CHILD MENTAL HEALTH PROBLEMS IN PRIMARY CARE.**

**Wissow LS, Zafar W, Fothergill K, et al.**

**BACKGROUND:** To further efforts to integrate mental health and primary care, this study develops a novel approach to quantifying the amount and sources of work involved in shifting care for common mental health problems to pediatric primary care providers.

**METHODS:** Email/web-based survey of a convenience sample (n = 58) of Maryland pediatricians (77% female, 58% at their site 10 or more years; 44% in private practice, 52 % urban, 48 % practicing with a co-located mental health provider). Participants were asked to review 11 vignettes, which described primary care management of child/youth mental health problems, and rate them on an integer-based ordinal scale for the overall amount of work involved compared to a 12th reference vignette describing an uncomplicated case of ADHD. Respondents were also asked to indicate factors (time, effort, stress) accounting for their ratings. Vignettes presented combinations of three diagnoses (ADHD, anxiety, and depression) and three factors (medical co-morbidity, psychiatric co-morbidity, and difficult families) reported to complicate mental health care. The reference case was pre-assigned a work value of 2. Estimates of the relationship of diagnosis and complicating factors with workload were obtained using linear regression, with random effects at the respondent level.

**RESULTS:** The 58 pediatricians gave 593 vignette responses. Depression was associated with a 1.09 unit (about 50%) increase in work (95% CL .94, 1.25), while anxiety did not differ significantly from the reference case of uncomplicated ADHD (p = .28). Although all three complicating factors increased work ratings compared with the reference case, family complexity and psychiatric co-morbidity did so the most (.87 and 1.07 units, respectively, P < .001) while medical co-morbidity increased it the least (.44 units, p < .001). Factors most strongly associated with increased overall work were physician time, physician mental effort, and stress; those least strongly associated were staff time, physician physical effort, and malpractice risk. Pediatricians working with co-located mental health providers gave higher work ratings than did those without co-located staff.

**CONCLUSIONS:** Both diagnosis and cross-diagnosis complicating factors contribute to the work involved in providing mental health services in primary care. Vignette studies may facilitate understanding which mental health services can be most readily incorporated into primary care as it is presently structured and help guide the design of training programs and other implementation strategies

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BMC Psychiatry. 2016;16.

**PRENATAL SMOKING EXPOSURE AND NEUROPSYCHIATRIC COMORBIDITY OF ADHD: A FINNISH NATIONWIDE POPULATION-BASED COHORT STUDY.**

**Joelsson P, Chudal R, Talati A, et al.**

**Background:** Prenatal smoking exposure has been associated with attention-deficit/hyperactivity disorder (ADHD). ADHD is commonly associated with a wide spectrum of psychiatric comorbidity. The association between smoking and neuropsychiatric comorbidity of ADHD has remained understudied. The aim of this study is to examine the association between prenatal exposure to maternal smoking and offspring ADHD, and test whether the smoking-ADHD associations are stronger when ADHD is accompanied by other lifetime neuropsychiatric comorbidities.

**Methods:** The study is based on a nested case-control design and includes all Finnish singletons born between 1991 and 2005 and diagnosed with ADHD by 2011 (n = 10,132), matched with four controls (n = 38,811) on date of birth, sex and residence in Finland.

**Results:** The risk for ADHD with or without comorbidity was significantly increased among offspring exposed to maternal smoking on adjusting for potential confounders (OR = 1.75, CI 95 % = 1.65-1.86). Compared to the only ADHD cases, subjects with comorbid conduct disorder or oppositional defiant disorder had a significantly stronger association with smoking exposure (OR = 1.80, CI 95 % = 1.55-2.11).

**Conclusions:** Prenatal smoking represents an important risk factor for the ADHD comorbid with CD/ODD. Further research on the association between prenatal smoking exposure and neuropsychiatric comorbidity of ADHD is needed considering the increased risk among these subjects of an overall poor health outcome

as compared to only ADHD. In particular, studies utilizing biomarkers or including subjects with neuropsychiatric conditions with and without comorbid ADHD are needed

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BMC Psychiatry. 2016;16.

**MEDITATION OR MEDICATION? MINDFULNESS TRAINING VERSUS MEDICATION IN THE TREATMENT OF CHILDHOOD ADHD: A RANDOMIZED CONTROLLED TRIAL.**

**Meppelink R, de Bruin EI, B+Âgels SM.**

**Background:** Attention-Deficit-Hyperactivity-Disorder (ADHD) is, with a prevalence of 5 %, a highly common childhood disorder, and has severe impact on the lives of youngsters and their families. Medication is often the treatment of choice, as it currently is most effective. However, medication has only short-term effects, treatment adherence is often low and most importantly; medication has serious side effects. Therefore, there is a need for other interventions for youngsters with ADHD. Mindfulness training is emerging as a potentially effective training for children and adolescents with ADHD. The aim of this study is to compare the (cost) effectiveness of mindfulness training to the (cost) effectiveness of methylphenidate in children with ADHD on measures of attention and hyperactivity/impulsivity.

**Methods/design:** A multicenter randomized controlled trial with 2 follow-up measurements will be used to measure the effects of mindfulness training versus the effects of methylphenidate. Participants will be youngsters (aged 9 to 18) of both sexes diagnosed with ADHD, referred to urban and rural mental healthcare centers. We aim to include 120 families. The mindfulness training, using the MYmind protocol, will be conducted in small groups, and consists of 8 weekly 1.5-h sessions. Youngsters learn to focus and enhance their attention, awareness, and self-control by doing mindfulness exercises. Parents will follow a parallel mindful parenting training in which they learn to be fully present in the here and now with their child in a non-judgmental way, to take care of themselves, and to respond rather than react to difficult behavior of their child. Short-acting methylphenidate will be administered individually and monitored by a child psychiatrist. Assessments will take place at pre-test, post-test, and at follow-up 1 and 2 (respectively 4 and 10 months after the start of treatment). Informants are parents, children, teachers, and researchers.

**Discussion:** This study will inform mental health care professionals and health insurance companies about the clinical and cost effectiveness of mindfulness training for children and adolescents with ADHD and their parents compared to the effectiveness of methylphenidate. Limitations and several types of bias that are anticipated for this study are discussed.

**Trial registration:** Dutch Trial Register: NTR4206. Registered 11 October 2013

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Brain Behav. 2016;6.

**ORGANIZATIONAL TOPOLOGY OF BRAIN AND ITS RELATIONSHIP TO ADHD IN ADOLESCENTS WITH D-TRANSPOSITION OF THE GREAT ARTERIES.**

**Schmithorst VJ, Panigrahy A, Gaynor JW, et al.**

**OBJECTIVE:** Little is currently known about the impact of congenital heart disease (CHD) on the organization of large-scale brain networks in relation to neurobehavioral outcome. We investigated whether CHD might impact ADHD symptoms via changes in brain structural network topology in a cohort of adolescents with d-transposition of the great arteries (d-TGA) repaired with the arterial switch operation in early infancy and referent subjects. We also explored whether these effects might be modified by apolipoprotein E (APOE) genotype, as the APOE  $\epsilon$ 2 allele has been associated with worse neurodevelopmental outcomes after repair of d-TGA in infancy.

**METHODS:** We applied graph analysis techniques to diffusion tensor imaging (DTI) data obtained from 47 d-TGA adolescents and 29 healthy referents to construct measures of structural topology at the global and regional levels. We developed statistical mediation models revealing the respective contributions of d-TGA, APOE genotype, and structural network topology on ADHD outcome as measured by the Connors ADHD/DSM-IV Scales (CADS).

**RESULTS:** Changes in overall network connectivity, integration, and segregation mediated worse ADHD outcomes in d-TGA patients compared to healthy referents; these changes were predominantly in the left and right intrahemispheric regional subnetworks. Exploratory analysis revealed that network topology also mediated detrimental effects of the APOE  $\epsilon$ 4 allele but improved neurobehavioral outcomes for the APOE  $\epsilon$ 2 allele.

**CONCLUSION:** Our results suggest that disruption of organization of large-scale networks may contribute to neurobehavioral dysfunction in adolescents with CHD and that this effect may interact with APOE genotype

Brain Imaging Behav. 2016 Sep;10:880-92.

**Go/No Go TASK PERFORMANCE PREDICTS CORTICAL THICKNESS IN THE CAUDAL INFERIOR FRONTAL GYRUS IN YOUNG ADULTS WITH AND WITHOUT ADHD.**

**Newman E, Jernigan TL, Lisdahl KM, et al.**

Response inhibition deficits are widely believed to be at the core of Attention-Deficit Hyperactivity Disorder (ADHD). Several studies have examined neural architectural correlates of ADHD, but research directly examining structural correlates of response inhibition is lacking. Here we examine the relationship between response inhibition as measured by a Go/No Go task, and cortical surface area and thickness of the caudal inferior frontal gyrus (cIFG), a region implicated in functional imaging studies of response inhibition, in a sample of 114 young adults with and without ADHD diagnosed initially during childhood. We used multiple linear regression models to test the hypothesis that Go/No Go performance would be associated with cIFG surface area or thickness. Results showed that poorer Go/No Go performance was associated with thicker cIFG cortex, and this effect was not mediated by ADHD status or history of substance use. However, independent of Go/No Go performance, persistence of ADHD symptoms and more frequent cannabis use were associated with thinner cIFG. Go/No Go performance was not associated with cortical surface area. The association between poor inhibitory functioning and thicker cIFG suggests that maturation of this region may differ in low performing participants. An independent association of persistent ADHD symptoms and frequent cannabis use with thinner cIFG cortex suggests that distinct neural mechanisms within this region may play a role in inhibitory function, broader ADHD symptomatology, and cannabis use. These results contribute to Research Domain Criteria (RDoC) by revealing novel associations between neural architectural phenotypes and basic neurobehavioral processes measured dimensionally

Brain Struct Funct. 2016 Jan;221:277-86.

**CAUDATE ASYMMETRY IS RELATED TO ATTENTIONAL IMPULSIVITY AND AN OBJECTIVE MEASURE OF ADHD-LIKE ATTENTIONAL PROBLEMS IN HEALTHY ADULTS.**

**Dang LC, Samanez-Larkin GR, Young JS, et al.**

Case-control studies comparing ADHD with typically developing individuals suggest that anatomical asymmetry of the caudate nucleus is a marker of attention deficit hyperactivity disorder (ADHD). However, there is no consensus on whether the asymmetry favors the right or left caudate nucleus in ADHD, or whether the asymmetry is increased or decreased in ADHD. The current study aimed to clarify this relationship by applying a dimensional approach to assessing ADHD symptoms that, instead of relying on clinical classification, utilizes the natural behavioral continuum of traits related to ADHD. Structural T1-weighted MRI was collected from 71 adults between 18 and 35 years and analyzed for caudate asymmetry. ADHD-like attentional symptoms were assessed with an objective measure of attentional problems, the ADHD score from the Test of Variables of Attention (TOVA). Impulsivity, a core feature in ADHD, was measured using the Barratt Impulsiveness Scale, a self-report measure that assesses attentional, non-planning, and motor features of impulsivity. We found that larger right relative to left caudate volumes correlated with both higher attentional impulsiveness and worse ADHD scores on the TOVA. Higher attentional impulsiveness also correlated with worse ADHD scores, establishing coherence between the objective measure and the self-report measure of attentional problems. These results suggest that a differential passage of information

through frontal-striatal networks may produce instability leading to attentional problems. The findings also demonstrate the utility of a dimensional approach to understanding structural correlates of ADHD symptoms

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Brain Struct Funct. 2016 Jan;221:103-14.

**OPPOSITIONAL COMT VAL158MET EFFECTS ON RESTING STATE FUNCTIONAL CONNECTIVITY IN ADOLESCENTS AND ADULTS.**

**Meyer BM, Huemer J, Rabl U, et al.**

Prefrontal dopamine levels are relatively increased in adolescence compared to adulthood. Genetic variation of COMT (COMT Val158Met) results in lower enzymatic activity and higher dopamine availability in Met carriers. Given the dramatic changes of synaptic dopamine during adolescence, it has been suggested that effects of COMT Val158Met genotypes might have oppositional effects in adolescents and adults. The present study aims to identify such oppositional COMT Val158Met effects in adolescents and adults in prefrontal brain networks at rest. Resting state functional connectivity data were collected from cross-sectional and multicenter study sites involving 106 healthy young adults (mean age 24 +/- 2.6 years), gender matched to 106 randomly chosen 14-year-olds. We selected the anterior medial prefrontal cortex (amPFC) as seed due to its important role as nexus of the executive control and default mode network. We observed a significant age-dependent reversal of COMT Val158Met effects on resting state functional connectivity between amPFC and ventrolateral as well as dorsolateral prefrontal cortex, and parahippocampal gyrus. Val homozygous adults exhibited increased and adolescents decreased connectivity compared to Met homozygotes for all reported regions. Network analyses underscored the importance of the parahippocampal gyrus as mediator of observed effects. Results of this study demonstrate that adolescent and adult resting state networks are dose-dependently and diametrically affected by COMT genotypes following a hypothetical model of dopamine function that follows an inverted U-shaped curve. This study might provide cues for the understanding of disease onset or dopaminergic treatment mechanisms in major neuropsychiatric disorders such as schizophrenia and attention deficit hyperactivity disorder

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Brazilian Neurosurgery. 2016.

**ADHD AND CEREBELLAR VERMIS TUMOR: DTI ANALYSIS OF AN INCIDENTAL FINDING.**

**Baldissin MM, Souza EMD.**

The increase in number of magnetic resonance imaging (MRI) scans for investigation of neurological diseases in childhood and adolescence leads to increase of incidental findings of central nervous system (CNS) tumors in these stages of life. Among MRI techniques, diffusion-weighted imaging (DWI) and diffusion tensor imaging (DTI) have been increasingly used in brain studies. These images are based on random motion of water molecules in the body, which can change depending on constitution and geometry of biological tissues, as well as the existence of pathologies. This paper reports the use of DTI and DWI to evaluation of a CNS tumor incidentally detected in a patient diagnosed previously with Attention Deficit Hyperactivity Disorder (ADHD). He was diagnosed at age 9 and has been treated with medicines and psycho-pedagogical therapies. At age 15 a MRI detected a cerebellar vermis tumor with a volume of 2 cm<sup>3</sup>. Due to parental decision, the patient did not undergo any surgical intervention. During the follow-up period we did not observe significant changes in tumor size or diffusion directions in the tumor and surrounding brain tissues. The main brain tracts presented normal diffusion patterns, both in terms of size and geometry. The DTI analysis showed that lesion was quite homogeneous and isotropic, with no significant restriction of diffusion. There also were no significant diffusion pattern changes in other regions of the brain which possibly could be related to ADHD. So, given the characteristics of lesion and the patient's clinical symptoms, it cannot be directly related to ADHD

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British Journal of Dermatology. 2016.

**ASSOCIATION BETWEEN ATOPIC DERMATITIS AND ATTENTION DEFICIT HYPERACTIVITY DISORDER IN U.S. CHILDREN AND ADULTS.**

**Strom MA, Fishbein AB, Paller AS, et al.**

**BACKGROUND:** Atopic dermatitis (AD) is associated with chronic itch, allergic disease and sleep disturbance, all of which might increase the risk of attention deficit (hyperactivity) disorder (ADD/ADHD). Previous analyses have found a consistent association between AD and ADD/ADHD, although the underlying factors contributing to such an association remain underexplored. Additionally, the relationship has been underexplored in adults.

**OBJECTIVES:** To determine if childhood and adult AD and AD severity are associated with ADD/ADHD and to delineate the factors contributing to such an association.

**METHODS:** We analysed data on 354 416 children aged 2-17 years and 34 613 adults age 18+ years from 19 U.S. population-based surveys, including the National Health Interview Survey 1997-2013 and the National Survey of Children's Health 2003/4 and 2007/8.

**RESULTS:** In multivariate models adjusting for age, sex, sociodemographics, allergic disease and healthcare utilization, AD was associated with ADD/ADHD in both children [adjusted odds ratio (95% confidence interval), 1.14 (1.03-1.26)] and adults [1.61 (1.25-2.06)]. Children with both severe AD and only 0-3 nights of adequate sleep per week had much higher odds of ADD/ADHD [16.83 (7.02-40.33)] than those with 0-3 nights of adequate sleep per week [1.83 (1.47-2.26)] or mild-moderate AD alone [1.56 (1.22-1.99)]. AD was most strongly associated with severe ADHD. AD unaccompanied by other allergic disease was also associated with increased risk of ADD/ADHD in children. Among children with AD, history of anaemia, headaches and obesity were associated with even higher odds of ADD/ADHD. Asthma, insomnia and headaches increased the odds of ADHD in adults with AD, although underweight body mass index was protective.

**CONCLUSIONS:** Atopic dermatitis is associated with increased odds of ADD/ADHD in adults and children. Several factors increase the risk of ADHD in adults and children with AD

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Cardiol Young. 2016 Jan;26:216-19.

**ELECTROCARDIOGRAM BEFORE STARTING STIMULANT MEDICATIONS: TO ORDER OR NOT?**

**Aggarwal V, Aggarwal A, Khan D.**

D is an 8-year-old boy brought to his paediatrician for evaluation. His mother is concerned as his teacher has been frequently complaining that he is very restless and often disturbs the rest of the class by getting up on some pretext or the other. He is unable to concentrate on his work and gets distracted very easily. He makes many careless mistakes and can hardly finish his tasks on time. He is frequently reprimanded for talking during class. He often answers out of turn or before the question has been completed; however, so far, he has been managing to get passing grades. At home, he is constantly on the go while he is awake. If he is forced to sit, like at mealtimes, he fidgets a lot. He also needs to be constantly nagged to do everything, even his daily activities such as brushing his teeth, or he forgets to do them or leaves them incomplete. He takes ages to finish his food. It is a major job to get him to do his homework. His mother says that at home he has been like that since the last 2 to 3 years, but now she is concerned because of the difficulties he is experiencing at school as well. After obtaining his medical history, examination, and getting response from parents and teachers--using Vanderbilt Assessment Scales--the paediatrician diagnoses him to have attention deficit hyperactivity disorder. Besides behavioural interventions, he considers medications for his management. The paediatrician is debating the merits of performing electrocardiogram and/or referring the boy to a cardiologist before starting stimulant medications. If you were caring for this patient, how would you proceed?

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Chemosphere. 2016 Apr;148:408-15.

**CHILDREN WITH HEALTH IMPAIRMENTS BY HEAVY METALS IN AN E-WASTE RECYCLING AREA.**

**Zeng X, Xu X, Boezen HM, et al.**

E-waste recycling has become a global environmental health issue. Pernicious chemicals escape into the environment due to informal and nonstandard e-waste recycling activities involving manual dismantling, open burning to recover heavy metals and open dumping of residual fractions. Heavy metals derived from electronic waste (e-waste), such as, lead (Pb), cadmium (Cd), chromium (Cr), manganese (Mn), nickel (Ni), mercury (Hg), arsenic (As), copper (Cu), zinc (Zn), aluminum (Al) and cobalt (Co), differ in their chemical composition, reaction properties, distribution, metabolism, excretion and biological transmission. Our previous studies showed that heavy metal exposure have adverse effects on children's health including lower birth weight, lower anogenital distance, lower Apgar scores, lower current weight, lower lung function, lower hepatitis B surface antibody levels, higher prevalence of attention-deficit/hyperactivity disorder, and higher DNA and chromosome damage. Heavy metals influence a number of diverse systems and organs, resulting in both acute and chronic effects on children's health, ranging from minor upper respiratory irritation to chronic respiratory, cardiovascular, nervous, urinary and reproductive disease, as well as aggravation of pre-existing symptoms and disease. These effects of heavy metals on children's health are briefly discussed

Child's Nerv Syst. 2016;1-5.

**MILD HEAD INJURY AND ATTENTION DEFICIT HYPERACTIVITY DISORDER IN CHILDREN.**

**Chasle V, Riffaud L, Longuet R, et al.**

**PURPOSE:** Post-concussion syndrome is a well-described complication following moderate and severe head trauma but whether it occurs after mild head injury in children remains unclear. The aim of this study was to evaluate whether exposure to mild head injury with potential additional risk factors (non-surgical lesion on computed tomographic, high kinetic trauma, or Glasgow Coma Scale <15) is associated with attention deficit hyperactivity disorder (ADHD) after the head trauma.

**METHODS:** This study was performed in an emergency department on children admitted between 2009 and 2013. It compared victims of mild head injury aged 6-16 years with matched children presenting isolated non-surgical forearm fracture (ratio 1/2). ADHD was assessed using Conners' Global Index-Parent short version 3-40 months after the trauma. The patients were compared using chi-square test or Fisher's exact test, t test or u-test as appropriate with a p value set at 0.05.

**RESULTS:** During the study period, 676 patients were admitted for mild head injury. Among them, 34 (5 %) fulfilled the inclusion criteria and were compared with 64 matched patients admitted for a forearm fracture. The groups were comparable. ADHD was observed in both groups (18 % in the mild head injury group, 11 % in the control group) with no significant differences between groups. The prevalence was high when compared to an expected frequency of 3.5-5.6 % in children aged 6-12 years in the general population.

**CONCLUSIONS:** These results suggest that pre-existing ADHD may have contributed to injury proneness in both groups and does not argue for a specific risk of ADHD induced by mild head injury. The diagnosis of ADHD should be evoked at admission of children aged 6-16 years presenting with a trauma

Child Adolesc Psychiatry Ment Health. 2016;10.

**A BOY WITH CONDUCT DISORDER (CD), ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD), BORDERLINE INTELLECTUAL DISABILITY, AND 47,XXY SYNDROME IN COMBINATION WITH A 7Q11.23 DUPLICATION, 11P15.5 DELETION, AND 20Q13.33 DELETION.**

**Kolaitis G, Bouwkamp CG, Papakonstantinou A, et al.**

**Background:** This is a case with multiple chromosomal aberrations which are likely etiological for the observed psychiatric phenotype consisting of attention deficit hyperactivity and conduct disorders.

**Case presentation:** We report on an 11 year-old boy, admitted to the pediatric hospital for behavioral difficulties and a delayed neurodevelopmental trajectory. A cytogenetic analysis and high-resolution microarray comparative genomic hybridization (CGH) analysis was performed. The cytogenetic analysis

revealed 47, XYY syndrome, while CGH analysis revealed an additional duplication and two deletions. The 7q11.23 duplication is associated with speech and language delay and behavioral symptoms, a 20q13.33 deletion is associated with autism and early onset schizophrenia and the 11p15.5 microdeletion is associated with developmental delay, autism, and epilepsy. The patient underwent a psychiatric history, physical examination, laboratory testing, and a detailed cognitive, psychiatric, and occupational therapy evaluation which are reported here in detail.

**Conclusions:** In the case of psychiatric patients presenting with complex genetic aberrations and additional psychosocial problems, traditional psychiatric and psychological approaches can lead to significantly improved functioning. Genetic diagnostic testing can be highly informative in the diagnostic process and may be applied to patients in psychiatry in case of complex clinical presentations

Child Neuropsychol. 2016;1-18.

**ATTENTION AND EXECUTIVE FUNCTIONING PROFILES IN CHILDREN FOLLOWING PERINATAL ARTERIAL ISCHEMIC STROKE.**

**Bosenbark DD, Krivitzky L, Ichord R, et al.**

Perinatal arterial ischemic stroke (PAIS) is a form of childhood stroke; the majority of those affected experience neurologic sequelae, including motor, language and neurocognitive impairments. This study examines the attention and executive functioning (EF) profiles of children following PAIS, as well as the impact of age and sex. In this single-center cross-sectional study, 40 children aged 3 to 16 years (median age 7.2 years; 58% male) who have suffered a PAIS underwent a comprehensive neuropsychological battery to assess attention and EF. Parents completed behavioral questionnaires regarding real-world functioning. Composite scores were calculated for seven attention and EF domains (Attention, Working Memory, Verbal Retrieval, Inhibitory Control, Flexibility/Shifting, Planning/Organization, and Processing Speed). The results for all measured domains of attention and EF are significantly lower in the participants compared to the normative samples ( $p < .001$ ), with the exception of Working Memory. However, increasing difficulty with Working Memory is associated with developing age. Older age at time of testing is also associated with a higher incidence of clinically-elevated attention deficit hyperactivity disorder (ADHD) symptoms. Sex is not associated with performance measures or parental report of functioning. The participants demonstrate mild-to-moderate attention and EF impairment compared to the normative population. Clinicians, families, and educators should be informed about the neurocognitive sequelae of PAIS and the need for close developmental surveillance in this population to identify vulnerable children and initiate appropriate therapeutic interventions in a timely fashion

Child Neuropsychol. 2016;1-19.

**EXECUTIVE FUNCTIONING AND ITS RELATION TO ASD AND ADHD SYMPTOMATOLOGY IN 22Q11.2 DELETION SYNDROME\*.**

**De Sonneville LMJ, Hidding E, Van Engeland H, et al.**

Children with 22q11.2 deletion syndrome (22q11DS; velo-cardio-facial-syndrome) are at risk for the developmental disorders, attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). In this study, the relation between executive functioning (EF) and the severity of ADHD and ASD symptoms is examined, since EF is known to be important in relation to emotional and behavioral problems. The participants consist of 58 children (38 females) with a mean age of 13.5 years (SD 2.6). Standardized assessment was used to evaluate the severity of ASD and ADHD symptomatology. The major aspects of EF, i.e., cognitive flexibility, inhibition, sustained attention, distractibility, working memory and reaction speed, were evaluated. The profile of EF in 22q11DS was found to be characterized by weaker performance compared to the norms on all subdomains of EF. Poor cognitive flexibility and inhibition, as well as high distractibility, were found to be related to more severe ASD symptoms, while poor quality of sustained attention and high distractibility were found to be related to more severe ADHD symptoms. It is concluded that children with 22q11DS experience impairments in EF, and that the degree of impairment on specific EF

subdomains is related to the severity of ASD and/or ADHD symptomatology. These results may help in defining the mediating role of neurocognitive dysfunctions in the development of social and behavioral problems in 22q11DS

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Child Care Health Dev. 2016 Sep;42:718-24.

**CHILDREN REFERRED FOR EVALUATION FOR ADHD: COMORBIDITY PROFILES AND CHARACTERISTICS ASSOCIATED WITH A POSITIVE DIAGNOSIS.**

**Efron D, Bryson H, Lycett K, et al.**

**Background:** The symptoms of attention-deficit/hyperactivity disorder (ADHD) are non-specific, and a range of possible causes and comorbidities need to be considered in children referred for assessment.

**Objective:** To examine the factors associated with ADHD diagnosis following multidisciplinary assessment.

**Methods:** Children underwent multidisciplinary evaluation including parent and teacher questionnaires; semi-structured interview to screen for internalizing and externalizing diagnoses; paediatric, psychology and special education assessments; and case conference. Predictors of ADHD diagnosis were examined in univariable and multivariable logistic regression models.

**Results:** Data from 190 assessments (82% male, mean age 6.8 years) were included. ADHD was diagnosed in 132 (70%) cases, of which 77% had one or more comorbidities. In children not diagnosed with ADHD, 60% had one or more alternate diagnosis made. Teacher-reported ADHD symptom severity and learning difficulties were the strongest predictors of ADHD diagnosis. The pattern of comorbid/alternative diagnoses was similar between those diagnosed with ADHD and those not diagnosed with ADHD.

**Conclusions:** Direct report from teachers is the most critical element of the clinical dataset for the evaluation for ADHD. These findings emphasize the importance of cross-situational impairment to ADHD diagnosis. The frequency and similarity of diagnoses in both groups highlight the overlapping nature of childhood developmental disorders, and the importance of evaluating for comorbid disorders regardless of the primary diagnosis

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Child Care Health Dev. 2016 Sep;42:709-17.

**HEALTH-RELATED IMPAIRMENTS IN YOUNG CHILDREN WITH ADHD: A COMMUNITY-BASED STUDY.**

**Sciberras E, Bisset M, Hazell P, et al.**

**Background:** We aimed to examine health-related impairments in young children with attention-deficit/hyperactivity disorder (ADHD) and non-ADHD controls and explore differences in children with ADHD by gender, ADHD subtype and mental health co-morbidity status.

**Methods:** Children with ADHD (n = 177) and controls (n = 212) aged 6–8 years were recruited across 43 schools in Melbourne, Australia following a screening (Conners 3 ADHD Index) and case confirmation procedure (Diagnostic Interview Schedule for Children IV). Direct and blinded assessments of height and weight were used to calculate body mass index z-score and to identify overweight/obesity. Parents reported on child global health, sleep problems and physical injuries. Unadjusted and adjusted (socio-demographic factors and co-morbidities) logistic and linear regression were conducted to compare health-related impairments between (1) children with and without ADHD; (2) boys and girls with ADHD; (3) children with ADHD-inattentive and ADHD-combined types; and (4) children with ADHD by internalizing and externalizing disorder status.

**Results:** Children with ADHD had poorer global health than controls when adjusted for socio-demographic characteristics (OR: 2.0; 95% CI 1.1, 3.9); however, this attenuated after adjusting for co-morbidities. In adjusted analyses, children with ADHD had increased odds of moderate/large sleep problems (OR: 3.1; 95% CI 1.4, 6.8), compared with controls. There were no differences between children with and without ADHD in terms of physical injuries or overweight/obesity. Findings were similar when excluding children taking ADHD medication, and health-related impairments did not differ between boys and girls with ADHD. Children with ADHD-combined type had higher BMI z-scores than controls in adjusted analyses (P = 0.04). Children with

ADHD and co-occurring internalizing and externalizing co-morbidities were particularly vulnerable to health-related impairments.

**Conclusion:** Young children with ADHD experience a number of health-related impairments, which are exacerbated by the presence of internalizing and externalizing co-morbidities. Clinicians should consider the broader health of children with ADHD in clinical consultations

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Clin Neuropharmacol. 2016 Jul;39:212-13.

**INCREASED FREQUENCY OF ENCOPIRESIS IN A CHILD DIAGNOSED WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER AND ENCOPIRESIS AFTER ATOMOXETINE USE: A CASE REPORT.**

**Yektas Ç, Cansiz MA, Tufan AE.**

Attention deficit hyperactivity disorder (ADHD) is among the most frequently reported coexisting psychiatric conditions in children with encopresis. Some case reports state that atomoxetine—a selective presynaptic norepinephrine reuptake inhibitor—approved for treatment of ADHD is also effective in the treatment of coexisting encopresis. Contrasting those reports, here we present a case diagnosed with ADHD and secondary encopresis without constipation whose encopretic symptoms increased after atomoxetine treatment and discuss possible mechanisms

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Clin Neurophysiol. 2016;127:3277-87.

**SINGLE-DOSE EFFECTS ON THE P3NO-GO ERP COMPONENT PREDICT CLINICAL RESPONSE TO STIMULANTS IN PEDIATRIC ADHD.**

**Ogrim G, Aasen IE, Brunner JF.**

**OBJECTIVE:** Approximately 30% of children and adolescents diagnosed with attention-deficit/hyperactivity disorder (ADHD) and treated with stimulants are considered non-responders (non-REs). Reliable predictors of response are missing. We examined changes in Event-Related Potentials (ERPs) induced by a single dose of stimulant medication in order to predict later clinical response.

**METHODS:** ERPs were registered twice during performance of a visual cued go/no-go task in 87 ADHD patients (27 girls) aged 8-18years; the second recording on a single dose of stimulant medication, followed by a systematic medication trial lasting 4weeks. Based on the four-week trial, participants were categorized as responders (REs, N=62) or non-REs (N=25). Changes among REs and non-REs in ERP components (cueP3, CNV, P3go, N2no-go, P3no-go) and behavioral-test variables were then compared.

**RESULTS:** REs and non-REs differed significantly in medication-induced changes in P3no-go, cue-P3, CNV, omission errors, reaction time, and reaction-time variability. The largest effect size was found for P3no-go amplitude ( $p < .001$ ;  $d = 1.76$ ). Changes in P3no-go and omission errors correctly classified 90% of the REs and 76% of the non-REs, when controlling for the age of the participants.

**CONCLUSION:** Clinical response to stimulants can be predicted by assessing single-dose changes in the P3no-go ERP component amplitude.

**SIGNIFICANCE:** Changes in P3no-go may be a clinically useful marker of response to stimulants

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Clin Ther. 2016;38:1789-802.

**MEDICATION PERSISTENCE, DURATION OF TREATMENT, AND TREATMENT-SWITCHING PATTERNS AMONG CANADIAN PATIENTS TAKING ONCE-DAILY EXTENDED-RELEASE METHYLPHENIDATE MEDICATIONS FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A POPULATION-BASED RETROSPECTIVE COHORT STUDY.**

**Park-Wyllie L, van Stralen J, Almagor D, et al.**

**PURPOSE:** We conducted a retrospective cohort study to compare medication use patterns of a long-acting extended-release methylphenidate (Osmotic Release Oral System [OROS®] methylphenidate, CONCERTA®) and Teva-methylphenidate (methylphenidate ER-C), a generic drug determined by the Canadian regulatory authority, Health Canada, to be bioequivalent to OROS® methylphenidate.

**METHODS:** We established an OROS(®) methylphenidate-experienced and new-user population cohort to compare medication use patterns, including medication persistence, duration of therapy, and treatment-switching patterns. Multivariable log-binomial regression was used to adjust for confounders of the associations with persistence.

**FINDINGS:** In the OROS(®) methylphenidate-experienced cohort (n = 21,940), OROS(®) methylphenidate was associated with a 70% higher rate of medication persistence at 12 months relative to methylphenidate ER-C (adjusted relative risk = 1.70; 95% CI, 1.64-1.77). In the new-user cohort (n = 20,410), OROS(®) methylphenidate had a 58% higher rate of medication persistence relative to methylphenidate ER-C (adjusted relative risk = 1.58; 95% CI, 1.51-1.65). Median duration of therapy was significantly longer in patients taking OROS(®) methylphenidate compared with those taking methylphenidate ER-C, and treatment-switching occurred significantly more frequently in patients taking methylphenidate ER-C compared with those taking OROS(®) methylphenidate.

**IMPLICATIONS:** Significant differences were observed in how the medications were used by patients in the real-world setting. Because the data sources were administrative databases, it was not possible to control for all potentially important confounding variables. Although differences in medication persistence may not directly reflect differences in treatment efficacy, the findings are important because these products are used interchangeably in a number of Canadian provinces

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CNS Spectr. 2016;1-10.

**ESTIMATING MINIMAL IMPORTANT DIFFERENCES FOR SEVERAL SCALES ASSESSING FUNCTION AND QUALITY OF LIFE IN PATIENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.**

**Hodgkins P, Lloyd A, Erder MH, et al.**

**OBJECTIVE:** Defining minimal important difference (MID) is critical to interpreting patient-reported outcomes data and treatment efficacy in clinical trials. This study estimates the MID for the Weiss Functional Impairment Rating Scale-Parent Report (WFIRS-P) and the Child Health and Illness Profile-Parent Report (CHIP-CE-PRF76) among parents of young people with attention-deficit/hyperactivity disorder (ADHD) in the UK.

**METHODS:** Parents of children (6-12 years; n=100) and adolescents (13-17 years; n=117) with ADHD completed a socio-demographic form, the CHIP-CE-PRF76, the WFIRS-P, and the Pediatric Quality of Life scale at baseline and 4 weeks later. At follow-up, a subset of parents completed anchor questions measuring change in the child/adolescent from baseline. MIDs were estimated using anchor-based and distribution-based methods, and separately for children and adolescents.

**RESULTS:** The MID estimates for overall change in the WFIRS-P total score ranged from 11.31 (standard error of measurement) to 13.47 (anchor) for the total sample. The range of MID estimates for the CHIP-CE-PRF76 varied by domain: 6.80-7.41 (satisfaction), 6.18-7.34 (comfort), 5.60-6.72 (resilience), 6.06-7.57 (risk avoidance), and 4.00-5.63 (achievement) for the total sample. Overall, MID estimates for WFIRS-P MID and CHIP-CE-PRF76 were slightly higher for adolescents than for children.

**CONCLUSION:** This study estimated MIDs for these instruments using several methods. The observed convergence of the MID estimates increases confidence in their reliability and could assist clinicians and decision makers in deriving meaningful interpretations of observed changes in the WFIRS-P and CHIP-CE in clinical trials and practice

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Conscious Cogn. 2016 Jan;39:77-91.

**DEVELOPMENT AND VALIDATION OF THE MALADAPTIVE DAYDREAMING SCALE (MDS).**

**Somer E, Lehrfeld J, Bigelsen J, et al.**

This study describes the development of the Maladaptive Daydreaming Scale (MDS), a 14-item self-report instrument designed to gauge abnormal fantasizing. Our sample consisted of 447 English-speaking individuals from 45 different countries. A 3-correlated-factors model best presented the underlying dimensions Yearning, Kinesthesia and Impairment, capturing related rewarding experiences as well as psychological impairment of maladaptive daydreaming. MDS scores were associated with obsessive-

compulsive behavior and thoughts, dissociative absorption, attention deficit, and high sense of presence during daydreaming, but less with psychotic symptoms. The MDS and its subscale demonstrated good validity, sound internal consistency and temporal stability and discriminated well between self-identified individuals with and without maladaptive daydreaming. Considering the instrument's high sensitivity and specificity levels, it seems an excellent measure for future investigation of MD that will, hopefully, shed light on the etiology and psycho-biological mechanisms involved in this mental condition, as well as on the development of effective MD treatment methods

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Cortex: A Journal Devoted to the Study of the Nervous System and Behavior. 2016 Sep;82:225-36.

**VENTRAL STRIATAL HYPERCONNECTIVITY DURING REWARDED INTERFERENCE CONTROL IN ADOLESCENTS WITH ADHD.**

**Ma I, van Holstein M, Mies GW, et al.**

**Objective:** Attention-deficit/hyperactivity disorder (ADHD) is characterized by cognitive deficits (e.g., interference control) and altered reward processing. Cognitive control is influenced by incentive motivation and according to current theoretical models, ADHD is associated with abnormal interactions between incentive motivation and cognitive control. However, the neural mechanisms by which reward modulates cognitive control in individuals with ADHD are unknown.

**Method:** We used event-related functional resonance imaging (fMRI) to study neural responses during a rewarded Stroop color-word task in adolescents (14–17 years) with ADHD (n = 25; 19 boys) and healthy controls (n = 33; 22 boys).

**Results:** Adolescents with ADHD showed increased reward signaling within the superior frontal gyrus and ventral striatum (VS) relative to controls. Importantly, functional connectivity analyses revealed a hyperconnectivity between VS and motor control regions in the ADHD group, as a function of reward-cognitive control integration. Connectivity was associated with performance improvement in controls but not in the ADHD group, suggesting inefficient connectivity.

**Conclusion:** Adolescents with ADHD show increased neural sensitivity to rewards and its interactions with interference control in VS and motor regions, respectively. The findings support theoretical models of altered reward-cognitive control integration in individuals with ADHD

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Curr Psychiatry Rep. 2016 Apr;18:35.

**IS THERE A BIPOLAR PRODROME AMONG CHILDREN AND ADOLESCENTS?**

**Hunt J, Schwarz CM, Nye P, et al.**

Bipolar disorder in youth substantially impairs behavior, family, and social functioning and interferes with developmental course. There is increasing interest in defining a bipolar prodrome similar to that reported in early-onset psychosis that will allow for earlier intervention and reduction in overall morbidity and mortality. Several lines of research have addressed this important issue including studies of offspring of bipolar parents, high-risk cohorts, and longitudinal follow-up of subjects with major depressive disorder (MDD), ADHD, and bipolar spectrum disorder. The development and validation of bipolar prodrome rating scales also shows promise. Recent attempts to intervene at earlier stages of bipolar disorder have led to some positive outcomes. However, a controversy remains concerning the identification and management of the earliest symptoms. Further research is needed to fully validate a bipolar prodrome and to determine the optimal course of action at various stages of illness

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Current Pediatric Reviews. 2016;12:230-38.

**ATTENTION DEFICIT HYPERACTIVE DISORDER AND OCCURRENCE OF TIC DISORDERS IN CHILDREN AND ADOLESCENTS □ WHAT IS THE VERDICT.**

**Cooke T, So TY.**

The United States Food and Drug Administration currently states that the use of stimulants in patients with tic disorders and/or family history of tic disorders including Tourette's syndrome is contraindicated. Patients with attention deficit hyperactivity disorder (ADHD), however, are at increased risk of tics regardless of stimulants use. After evaluating the most recent literature on the incidence of tic disorders in pediatric patients treated with stimulants for ADHD, it is reasonable to say that the incidence of tics and the severity of tics are not increased by the use of these medications. For patients with pre-existing tic disorders, the usual recommended dosing of stimulants should be used because suprathreshold doses of this class of medications, specifically dextroamphetamine, have shown to exacerbate tic disorders

Dev Neurorehabilitation. 2016;1-15.

**TIME-FREQUENCY ANALYSES OF REACTION TIMES AND THETA/BETA EEG RATIO IN PEDIATRIC PATIENTS WITH TRAUMATIC BRAIN INJURY: A PRELIMINARY STUDY.**

**Gazzellini S, Napolitano A, Bauleo G, et al.**

**Purpose:** The literature on patients with attention deficit reports peculiar reaction time (RT) oscillation at very low frequencies (VLFO=0.06-0.2 Hz). The data were explained as default mode network (DMN) intrusion in goal-oriented activity. The present study investigates whether a pattern of recurrent lapses in attention can be detected in TBI patients and whether VLFO can be generalized to the sustained attention deficit, regardless of etiology.

**Methods:** Groups of pediatric TBIs and healthy controls performed four attentional tasks. RT and theta/beta timeseries were subjected to wavelet analyses.

**Results:** Significant high-power VLFOs were recorded in patient group performances but not in those of controls, both for RTs and theta/beta in all the tasks.

**Conclusion:** This preliminary study suggests that central-midline theta/beta ratio could be considered a neurophysiological correlate of RT variability and that the general continuous goal-oriented activity can be cross-etiological affected by recurrent lapses in attention regardless of the specific cognitive component involved

Developmental Psychology. 2016 Sep;52:1445-56.

**THE ASSOCIATION OF ADHD SYMPTOMS AND READING ACQUISITION DURING ELEMENTARY SCHOOL YEARS.**

**Ehm JH, Kerner auch Koerner J, Gawrilow C, et al.**

Diabetes Technol Ther. 2016 Jan;18:34-38.

**INSULIN PUMPS IN TYPE 1 DIABETES WITH MENTAL DISORDERS: REAL-LIFE CLINICAL DATA INDICATE DISCREPANCIES TO RECOMMENDATIONS.**

**Prinz N, Bachle C, Becker M, et al.**

**BACKGROUND:** The latest American Association of Clinical Endocrinologists/American College of Endocrinologists consensus statement published in 2014 does not recommend continuous subcutaneous insulin infusion (CSII) in patients with mental health problems. This study investigated the use and discontinuation of CSII in daily routine care of type 1 diabetes (T1D) patients with or without comorbid mental disorders.

**MATERIALS AND METHODS:** Insulin-treated T1D patients (n = 48,700) between 5 and 30 years of age (median [interquartile range], 15.6 [12.0-17.7] years) from the German/Austrian diabetes patient follow-up registry (DPV) were studied. A comorbid diagnosis and/or specific treatment of mental disorder was

documented in 3,158 (6.5%) patients: attention-deficit hyperactivity disorder (ADHD), n = 1,352; depression, n = 692; eating disorders, n = 395; needle phobia, n = 319; anxiety/obsessive compulsive disorder (OCD), n = 231; and psychosis and/or neuroleptic medication, n = 169. Multivariable logistic regression with age, sex, diabetes duration, and migration background as independent variables was used to compare groups.

**RESULTS:** After adjustment for confounders, use of CSII was more common in patients with depression (41.5%), anxiety/OCD (41.4%), or needle phobia (75.8%) compared with patients without mental disorders (34.6%) (each  $P < 0.05$ ). By contrast, psychotic patients (26.2%,  $P < 0.05$ ) used CSII less often, and patients with ADHD (36.3%) or eating disorders (33.9%) used it with a similar frequency. Compared with patients without mental disorders (5.1%), the rate of CSII discontinuation was higher in patients with ADHD (9.7%), depression (8.2%), or eating disorders (10.0%) ( $P < 0.05$ , respectively) but similar in patients with anxiety/OCD (6.0%), psychosis (4.2%), or needle phobia (5.3%).

**CONCLUSIONS:** In routine diabetes care, CSII use and discontinuation vary widely among T1D patients with mental disorders and indicate clear differences from the latest recommendations

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Duodecim. 2016;132:943-50.

**DRUG THERAPY AND THE MOST COMMON DRUGS FOR CHILDHOOD PSYCHIATRIC DISORDERS.**

**Puustjarvi A, Raunio H, Lecklin A, et al.**

Psychotropic drugs are more commonly prescribed for children, although scientific evidence about psychotropic medication and long-term effects thereof in children is scarce. The drugs are often used off-label. ADHD drugs, antipsychotics and antidepressants and melatonin are the most commonly used drugs. ADHD medication possesses the most established status. Antipsychotic drugs are utilized for the treatment of psychoses, bipolar disorder, and conduct disorder symptoms in particular. Antidepressants are utilized for the treatment of childhood depression and anxiety disorders, melatonin for the treatment of children's sleep problems. Drug therapy should always be carried out as part of other psychiatric therapy

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Educ Treat Children. 2016 Aug;39:283-300.

**USING ACTIVITY SCHEDULES TO INCREASE ON-TASK BEHAVIOR IN CHILDREN AT RISK FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.**

**Cirelli CA, Sidener TM, Reeve KF, et al.**

The effects of activity schedules on on-task and on-schedule behavior were assessed with two boys at risk for attention-deficit/hyperactivity disorder (ADHD) and referred by their public school teachers as having difficulty during independent work time. On-task behavior increased for both participants after two training sessions. Teachers, peers, and participants reported high acceptability of the use and outcomes of the activity schedules. These findings replicate previous research with activity schedules with individuals with developmental disabilities and provide a novel classroom intervention for teachers of students at risk for and/or diagnosed with ADHD. Future research on activity schedules with these populations is discussed

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Epilepsy Behav. 2016 Mar;56:88-94.

**PSYCHIATRIC COMORBIDITY IN CHILDREN AND YOUTH WITH EPILEPSY: AN ASSOCIATION WITH EXECUTIVE DYSFUNCTION?**

**Alfstad KA, Torgersen H, Van RB, et al.**

**OBJECTIVES:** Psychopathology in children and youth with epilepsy has previously been related to executive dysfunction, but the nature of the association is uncertain. We sought to explore risk factors for psychiatric disorders in children and youth with epilepsy, with emphasis on executive dysfunction, along with seizure-related and psychosocial factors.

**METHODS:** The cohort consisted of one hundred and one consecutive patients aged 10-19 years with focal (n=52) or genetic generalized (n=49) epilepsy. All were screened for psychiatric symptoms, using part of an

extensive questionnaire, the Strengths and Difficulties Questionnaire (SDQ) for both patients and their parents. Participants scoring in the borderline or abnormal range on the SDQ received a psychiatric interview (Kiddie-SADS-PL). All participants underwent a neuropsychological examination, and those with general cognitive abilities (IQ)<70 were excluded.

**RESULTS:** Forty-seven of 101 participants (46.5%) had a SDQ score in the borderline or abnormal range and underwent a psychiatric evaluation. Of these, 44 (93.6%) met the criteria for a psychiatric diagnosis, the most common being ADHD and anxiety. An executive deficit was identified in 26.8% of the participants with a psychiatric diagnosis, but in only 5.4% of those without such a diagnosis ( $p=0.003$ ). Multivariate logistic regression analysis showed that executive dysfunction was an independent risk factor for having a psychiatric disorder (OR 8.2, CI 1.8-37.2,  $p=0.006$ ), along with male gender (OR 2.9, CI 1.2-7.3,  $p=0.02$ ), and early seizure onset (0.86-that is one year older equals risk of psychiatric disorder reduced by 14%-CI 0.77-0.96,  $p=0.01$ ). Other epilepsy-related or psychosocial factors were not significantly associated with psychiatric disorders.

**CONCLUSIONS:** Multiple factors are associated with psychiatric problems in children and youth with epilepsy. In this study, executive dysfunction, male gender, and early epilepsy onset were independent risk factors for having a psychiatric disorder. An evaluation of psychiatric and cognitive problems is important to enable a positive long-term outcome in childhood epilepsy

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Eur Child Adolesc Psychiatry. 2016;1-11.

**ASSOCIATIONS OF ATTENTION-DEFICIT/HYPERACTIVITY AND OTHER CHILDHOOD DISORDERS WITH PSYCHOTIC EXPERIENCES AND DISORDERS IN ADOLESCENCE.**

**Hennig T, Jaya ES, Koglin U, et al.**

Prodromal symptoms of psychosis are associated with an increased risk of transition, functional impairment, poor mental health, and unfavorable developmental prospects. Existing interventions targeting the prodrome are non-satisfactory. It may thus be more promising to attempt to identify risk factors in the premorbid phase preceding the prodrome to increase the chances of successful preventive approaches. Here, we investigate whether childhood mental disorders in general and attention-deficit/hyperactivity disorder (ADHD) specifically indicate a risk for subsequent psychotic experiences and disorders. We used a sample from the prospective Avon Longitudinal Study of Parents and Children (N = 5528). When the participants were 7 years old, mental disorders were assigned according to the DSM-IV. In standardized interviews, psychotic experiences were assessed at age 12 and psychotic disorders at age 18. We examined the associations of each of the childhood mental disorders alone and in combination with psychotic experiences at age 12 and psychotic disorders at age 18 using logistic regression. Compared to participants without a disorder, participants with a mental disorder had a higher risk of psychotic experiences at age 12 (OR 1.70, 95 % CI 1.28-2.27) and of psychotic disorders at age 18 (OR 2.31, 95 % CI 1.03-5.15). Particularly, the ADHD combined subtype at age 7 was strongly associated with psychotic experiences at age 12 (OR 3.26, 95 % CI 1.74-6.10). As expected, childhood mental disorders are risk indicators of psychotic experiences and disorders. To improve prevention, health care professionals need to screen for psychotic experiences in children with non-psychotic disorders

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Eur Child Adolesc Psychiatry. 2016;25:1007-17.

**A 6-YEAR FOLLOW-UP OF A LARGE EUROPEAN COHORT OF CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER-COMBINED SUBTYPE: OUTCOMES IN LATE ADOLESCENCE AND YOUNG ADULTHOOD.**

**van Lieshout M, Luman M, Twisk JWR, et al.**

There are very few studies on the long-term outcome of children and adolescents with ADHD-combined type in Europe. The objective of the present study is to assess the 6-year outcome (including pharmacological treatment) of a large cohort of participants with ADHD-combined type (N = 347, mean age 11.4 years) in late adolescence and early adulthood. At study entry and follow-up (mean age 17.4 years), participants were comprehensively assessed on ADHD and comorbid disorders by structured psychiatric interviews and multi-

informant questionnaires. Overall functioning was assessed by the Children's Global Assessment Scale. The retention rate was 75.6 %. The majority of participants (86.5 %) persisted in a DSM-5 ADHD diagnosis, 8.4 % had a subthreshold diagnosis, and 5.1 % remitted from the disorder at follow-up. Comorbidities decreased strongly; oppositional defiant disorder: 58 > 31 %, conduct disorder: 19 > 7 %. At follow-up, mood- and anxiety disorders were virtually non-existent following strict criteria (1-3 %). Percentage of children having had pharmacological treatment at any time increased from 79 to 91 %. On the Children's Global Assessment Scale, 48.5 % of participants were still functionally impaired at follow-up. Parental ADHD, higher ADHD symptom severity at baseline and higher parent-reported impairment at baseline positively predicted current ADHD symptom severity ( $R^2 = 20.9\%$ ). Younger baseline age, higher ADHD symptom severity at baseline and higher parent-reported impairment at baseline were positively associated with poorer overall functioning ( $R^2 = 17.8\%$ ). Pharmacological treatment had no (beneficial) impact on either ADHD symptom severity or overall functioning. Results confirm that ADHD is largely persistent into late adolescence with severity and family history for the disorder as important risk factors

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Eur Child Adolesc Psychiatry. 2016;1-12.

**PREDICTORS OF DISCREPANCIES BETWEEN FATHERS AND MOTHERS IN RATING BEHAVIORS OF PRESCHOOL CHILDREN WITH AND WITHOUT ADHD.**

**Veen-Mulders L, Nauta MH, Timmerman ME, et al.**

To examine child factors and parental characteristics as predictors of discrepancies between parents' ratings of externalizing and internalizing behavior problems in a sample of preschool children with ADHD and behavior problems and in a nonclinical sample. We investigated correspondence and discrepancies between parents' ratings on the externalizing and internalizing behavior problems broadband scales of the Child Behavior Checklist version for preschool children (CBCL/1.5-5). Parents of 152 preschool children, with ADHD and behavior problems ( $n = 72$ ) and nonclinical children ( $n = 80$ ), aged between 28 and 72 months ( $M = 47.26$ ,  $SD = 12.7$ ), completed the CBCL/1.5-5. Candidate predictors of discrepancy included the child's age and sex, and parents' levels of parenting stress, depressive mood, attention-deficit and disruptive behavior. Hierarchical multiple regression analyses were conducted. Correspondence between parents, both for ratings on internalizing and externalizing behavior problems, was high ( $r = .63-.77$ ). In the clinical sample, mothers rated the severity of externalizing behavior problems significantly higher than did fathers ( $p < .001$ ). Discrepancy between fathers and mothers on externalizing behavior problems was not predicted by child factors or interparental differences in psychopathology, but it was predicted by interparental differences in parenting stress ( $R^2 = .25$ ,  $p < .001$ ). This effect was significantly larger in the nonclinical sample ( $\Delta R^2 = .06$ ,  $p < .001$ ). When parents disagree on the severity level of preschool children's externalizing behavior problems, the clinician should take into consideration that differences in parenting stress might be involved

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European Thyroid Journal. 2016;5:59.

**CONTROLLED ANTENATAL THYROID SCREENING (CATS) II; EFFECT OF TREATMENT FOR UNDERACTIVE THYROID FUNCTION DURING PREGNANCY ON CHILDREN'S BEHAVIOUR AT AGE 9.**

**Hales C, Taylor P, Channon S, et al.**

**Objectives:** The Controlled Antenatal Thyroid Screening (CATS) study was the first randomised controlled trial to explore the effect of treatment for suboptimal gestational thyroid function (SGTF, i.e. TSH in the highest 2.5% and/or fT4 in the lowest 2.5%); many studies have investigated the effect on childhood cognition, but little is known about childhood behaviour.

**Methods:** A total of 452 were recruited into CATS II (treated SGTF = 118, untreated SGTF = 101, and those with normal GTF = 233). Mothers completed questionnaires about their children at age 9; The Strengths and Difficulties Questionnaire (SDQ), Child ADHD Questionnaire, and the Social Communication Questionnaire (SCQ); higher scores indicated less favourable behaviour. Primary analysis used a MANCOVA, firstly with SGTF groups merged, and secondly by individual group. Secondary analysis explored fT4 during pregnancy and offspring behaviour; all analyses were Bonferroni corrected.

**Results:** The merged SGTF group had fewer peer problems (SDQ) ( $p = 0.008$ , mean difference = 0.416 (95% CI 0.111-0.720)), but more ADHD overactivity problems ( $p = 0.020$ , mean difference = 0.545 (0.085-1.005)) than the normal GTF group. The analysis of the three groups revealed that treated SGTF scored higher than normal GTF (for ADHD overactivity,  $p = 0.024$ , mean difference = 0.751 (0.072-1.430)), and the untreated SGTF (for SCQ,  $p = 0.047$ , mean difference = 1.212 (0.013-2.411)). ADHD overactivity was positively correlated to maternal fT4 at six weeks post initiation of therapy. Children of over-treated mothers ( $T4 > 17.7$  pmol/l) had higher scores for ADHD overactivity compared to the rest of the study group ( $p = 0.008$ , mean difference = 1.212 (0.322-2.103)). At 30 weeks gestation, ADHD overactivity was also positively correlated to fT4, with sustained higher scores compared to the rest of the study group ( $p = 0.004$ , mean difference = 1.644 (0.542, 2.746)).

**Conclusion:** Treatment of SGTF may exacerbate ADHD overactivity difficulties e.g. 11% of treated had scores  $> 2$  SDs above the mean compared with 4% in normal and untreated. The analysis supports recent literature that SGTF over-treatment may have a negative effect and requires close monitoring throughout pregnancy

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**FRONT HUMAN NEUROSCI. 2016;10.**

**IMPROVING DORSAL STREAM FUNCTION IN DYSLEXICS BY TRAINING FIGURE/GROUND MOTION DISCRIMINATION IMPROVES ATTENTION, READING FLUENCY, AND WORKING MEMORY.**

**Lawton T.**

There is an ongoing debate about whether the cause of dyslexia is based on linguistic, auditory, or visual timing deficits. To investigate this issue three interventions were compared in 58 dyslexics in second grade (7 years on average), two targeting the temporal dynamics (timing) of either the auditory or visual pathways with a third reading intervention (control group) targeting linguistic word building. Visual pathway training in dyslexics to improve direction-discrimination of moving test patterns relative to a stationary background (figure/ground discrimination) significantly improved attention, reading fluency, both speed and comprehension, phonological processing, and both auditory and visual working memory relative to controls, whereas auditory training to improve phonological processing did not improve these academic skills significantly more than found for controls. This study supports the hypothesis that faulty timing in synchronizing the activity of magnocellular with parvocellular visual pathways is a fundamental cause of dyslexia, and argues against the assumption that reading deficiencies in dyslexia are caused by phonological deficits. This study demonstrates that visual movement direction-discrimination can be used to not only detect dyslexia early, but also for its successful treatment, so that reading problems do not prevent children from readily learning

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Frontiers in Neuroscience. 2016;10.

**NEURAL BIOMARKERS FOR DYSLEXIA, ADHD, AND ADD IN THE AUDITORY CORTEX OF CHILDREN .**

**Serrallach B, Gro+ f C, Bernhofs V, et al.**

Dyslexia, attention deficit hyperactivity disorder (ADHD), and attention deficit disorder (ADD) show distinct clinical profiles that may include auditory and language-related impairments. Currently, an objective brain-based diagnosis of these developmental disorders is still unavailable. We investigated the neuro-auditory systems of dyslexic, ADHD, ADD, and age-matched control children ( $N = 147$ ) using neuroimaging, magnetencephalography and psychoacoustics. All disorder subgroups exhibited an oversized left planum temporale and an abnormal interhemispheric asynchrony (10-40 ms) of the primary auditory evoked P1-response. Considering right auditory cortex morphology, bilateral P1 source waveform shapes, and auditory performance, the three disorder subgroups could be reliably differentiated with outstanding accuracies of 89-98%. We therefore for the first time provide differential biomarkers for a brain-based diagnosis of dyslexia, ADHD, and ADD. The method allowed not only allowed for clear discrimination between two subtypes of attentional disorders (ADHD and ADD), a topic controversially discussed for decades in the scientific community, but also revealed the potential for objectively identifying comorbid cases. Noteworthy, in children

playing a musical instrument, after three and a half years of training the observed interhemispheric asynchronies were reduced by about 2/3, thus suggesting a strong beneficial influence of music experience on brain development. These findings might have far-reaching implications for both research and practice and enable a profound understanding of the brain-related etiology, diagnosis, and musically based therapy of common auditory-related developmental disorders and learning disabilities

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Int J Inj Contr Saf Promot. 2016;23:93-98.

**FACTORS RELATED WITH UNINTENTIONAL INJURIES IN CHILDREN WITH NEWLY DIAGNOSED ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.**

**Ayaz AB, Ayaz M, Senturk E, et al.**

The aim of the present study was to investigate the factors associated with unintentional injury in children newly diagnosed with attention-deficit/hyperactivity disorder (ADHD). One thousand four hundred and thirty children between the ages of 6 and 18 who were diagnosed with ADHD for the first time in child psychiatry outpatient clinics were included in the present study. The socio-demographic information of the children, their developmental histories, chronic physical health conditions, comorbid psychiatric disorders, and information obtained via the Turgay DSM-IV-based Child and Adolescent Disorders Screening and Rating Scale were examined retrospectively. It was determined that 12.8% of the children (n D 183) experienced unintentional injury. It was established that age, male gender, disruptive behavioural problems, and low education levels among mothers were predictive of unintentional injuries. The results of the present study suggest that behavioural problems accompanying ADHD and comorbid psychiatric disorders are important in terms of unintentional injuries

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Int J Neuropsychopharmacol. 2015;18.

**PREDICTING METHYLPHENIDATE RESPONSE IN ADHD USING MACHINE LEARNING APPROACHES.**

**Kim JW, Sharma V, Ryan ND.**

**Background:** There are no objective, biological markers that can robustly predict methylphenidate response in attention deficit hyperactivity disorder. This study aimed to examine whether applying machine learning approaches to pretreatment demographic, clinical questionnaire, environmental, neuropsychological, neuroimaging, and genetic information can predict therapeutic response following methylphenidate administration.

**Methods:** The present study included 83 attention deficit hyperactivity disorder youth. At baseline, parents completed the ADHD Rating Scale-IV and Disruptive Behavior Disorder rating scale, and participants undertook the continuous performance test, Stroop color word test, and resting-state functional MRI scans. The dopamine transporter gene, dopamine D4 receptor gene, alpha-2A adrenergic receptor gene (ADRA2A) and norepinephrine transporter gene polymorphisms, and blood lead and urine cotinine levels were also measured. The participants were enrolled in an 8-week, open-label trial of methylphenidate. Four different machine learning algorithms were used for data analysis.

**Results:** Support vector machine classification accuracy was 84.6% (area under receiver operating characteristic curve 0.84) for predicting methylphenidate response. The age, weight, ADRA2A MspI and Dral polymorphisms, lead level, Stroop color word test performance, and oppositional symptoms of Disruptive Behavior Disorder rating scale were identified as the most differentiating subset of features.

**Conclusions:** Our results provide preliminary support to the translational development of support vector machine as an informative method that can assist in predicting treatment response in attention deficit hyperactivity disorder, though further work is required to provide enhanced levels of classification performance

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Iran J Psychiatr Behav Sci. 2016;10.

**KNOWLEDGE AND ATTITUDE OF PARENTS OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER TOWARDS THE ILLNESS.**

**Amiri S, Shafiee-Kandjani AR, Noorazar SG, et al.**

**Background:** The knowledge and attitude of parents about attention deficit hyperactivity disorder (ADHD) is a public health issue in which management and rehabilitation approaches may be influenced.

**Objectives:** The current study aimed to evaluate the knowledge and attitude of the parents of children with ADHD towards this disorder in Tabriz, Iran.

**Materials and Methods:** The current cross-sectional study evaluated 295 parents of children and adolescents with ADHD referred to psychiatric clinics of Tabriz University of Medical Sciences. The subjects were diagnosed based on Kiddie schedule for affective disorders and schizophrenia for school-aged children (K-SADS) and recruited according to a convenience sampling method in the first five months of 2014. The parents' knowledge and attitude towards ADHD was studied by a researcher-made questionnaire.

**Results:** The overall knowledge of parents was 66% in which 76.72% were aware of related signs and symptoms and 43.38% were able to identify the aberrations. Meanwhile, 44.62% of the parents knew the etiology and 54.75% had information about treatment strategies. In addition, 33.55%, 37.91%, 25.52% were aware of ADHD consequences, diagnosis and prevalence dimensions, respectively. Moreover, 82.72% of the parents had a positive attitude towards ADHD. A positive correlation was found between parents' attitude towards ADHD and their overall knowledge (identification, etiology, treatment, consequences and prevalence dimensions), ranging from 0.12 to 0.36 ( $P < 0.50$ ). Age, gender, and place of residence did not have a correlation with parents' knowledge and attitude towards ADHD. Parent's education level only had a positive correlation with the knowledge of symptoms, with a value of 0.19 ( $P < 0.01$ ). Parents with a higher overall knowledge, knowledge of ADHD symptoms, and prevalence rates accepted combination therapy ( $P < 0.05$ ).

**Conclusions:** While the overall knowledge of parents regarding ADHD was favorable, they were mostly unable to identify the aberrations in children with ADHD. These results may help practitioners address pitfalls in parent management training programs

Iran J Psychiatr Behav Sci. 2016;10.

**ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND MARTIAL SATISFACTION: THE PRELIMINARY ROLES OF EMPLOYMENT AND INCOME.**

**Kachooei H, Daneshmand R, Dolatshahi B, et al.**

To explore the components of marital satisfaction in a group of 35 Iranian mothers of six to twelve years old children with attention-deficit/hyperactivity disorder (ADHD) in comparison with 35 mothers of normal children in Tehran, Iran, during year 2013, all mothers completed the demographic checklist and Golombok Rust inventory of marital satisfaction. Data were analyzed by performing descriptive statistics and independent t-test using the SPSS software version 21. There was no statistically significant difference between scores of marital satisfaction ( $P = 0.162$ ) yet further data analysis revealed that marital satisfaction of employed mothers ( $22.27 \pm 10.71$  vs.  $28.73 \pm 12.3$ ,  $P = 0.42$ ) and those mothers who had a monthly income of more than 6,000,000 Rials ( $22.95 \pm 12.31$  vs.  $22.21 \pm 11.67$ ,  $P = 0.04$ ) was significantly better compared with the comparison group. It may be concluded that employment and reasonable income may contribute to a lower level of stress and improved relationship among mothers with ADHD children

J Atten Disord. 2016 Feb;20:163-67.

**OVERESTIMATION OF PHYSICAL ABILITIES AMONG BOYS WITH AND WITHOUT ADHD.**

**Helseth SA, Bruce BS, Waschbusch DA.**

**OBJECTIVE:** Children with ADHD have been widely reported to overestimate their abilities in social and academic domains, but a similar overestimation of physical abilities has not been examined.

**METHOD:** Twenty-four elementary school-age boys with ADHD and fifteen boys without ADHD were compared on their ability to accurately estimate their ability to complete four lab-based physical tasks, varying on three levels of difficulty: (a) within their ability, (b) 8% beyond their ability, and (c) 13% beyond their ability.  
**RESULTS:** Children with ADHD were significantly more likely than controls to overestimate their physical ability at difficult levels of the task.  
**CONCLUSION:** Implications of these results for preventing risky behaviors in children with ADHD are discussed

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J Atten Disord. 2016 Feb;20:168-77.

**THE RELATION OF POOR EMOTIONAL AWARENESS AND EXTERNALIZING BEHAVIOR AMONG CHILDREN WITH ADHD. Factor PI, Rosen PJ, Reyes RA.**

**OBJECTIVE:** Children with ADHD often demonstrate poor emotional self-awareness and higher levels of externalizing behavior problems relative to unaffected children. This study examined the relation of deficient emotional self-awareness to externalizing behavior problems in children with ADHD, and the role of emotional reactivity in this relationship.

**METHOD:** Fifty-one 8- to 12-year-old children with ADHD and their parents completed measures of the children's emotional and behavioral functioning, as well as a diagnostic structured interview.

**RESULTS:** Logistic regression suggested that more impaired emotional self-awareness was strongly associated with the diagnosis of a comorbid externalizing disorder. Hierarchical regression analyses strongly supported the relation of poor emotional awareness to reactivity-driven externalizing behavior, but not to proactive externalizing behavior. These effects were evident across reporters.

**CONCLUSION:** This study suggested that poor emotional self-awareness is significantly linked to externalizing problems in children with ADHD, and that dysregulated emotional reactivity plays an important role in this relationship

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J Atten Disord. 2016 Apr;20:353-67.

**NO EVIDENCE FOR INHIBITORY DEFICITS OR ALTERED REWARD PROCESSING IN ADHD: DATA FROM A NEW INTEGRATED MONETARY INCENTIVE DELAY GO/NO-GO TASK.**

**Demurie E, Roeyers H, Wiersema JR, et al.**

**OBJECTIVE:** Cognitive and motivational factors differentially affect individuals with mental health problems such as ADHD. Here we introduce a new task to disentangle the relative contribution of inhibitory control and reward anticipation on task performance in children with ADHD and/or autism spectrum disorders (ASD).

**METHOD:** Typically developing children, children with ADHD, ASD, or both disorders worked during separate sessions for monetary or social rewards in go/no-go tasks with varying inhibitory load levels. Participants also completed a monetary temporal discounting (TD) task.

**RESULTS:** As predicted, task performance was sensitive to both the effects of anticipated reward amount and inhibitory load. Reward amount had different effects depending on inhibitory load level. TD correlated with inhibitory control in the ADHD group.

**CONCLUSION:** The integration of the monetary incentive delay and go/no-go paradigms was successful. Surprisingly, there was no evidence of inhibitory control deficits or altered reward anticipation in the clinical groups

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J Atten Disord. 2016 Mar;20:270-78.

**ADHD UNDETECTED IN CRIMINAL ADULTS.**

**Buitelaar NJ, Ferdinand RF.**

**OBJECTIVE:** The objective of this study was to assess whether adults with ADHD in a forensic sample had received the diagnosis earlier and to investigate reasons for missing the diagnosis earlier.

**METHOD:** From December 1, 2007 until March 5, 2009, all patients from an outpatient clinic for forensic mental health care who were suspected of having ADHD were seen by a psychiatrist who assessed presence and severity of ADHD symptoms and other psychiatric disorders in a standardized way.

**RESULTS:** ADHD diagnosis was missed previously in life in 59 of 106 male adults (56%). ADHD diagnosis was missed more often in older men, in those with hyperactive/impulsive or combined subtype of ADHD, in those who reported fewer symptoms of ADHD in childhood or adolescence, in those with a comorbid mood disorder in adulthood, and in those who had never received mental health care before. Even in those who had previously received mental health care, the diagnosis had been missed in 42% of the cases. Prior contacts with police or court also predicted missing the diagnosis, an effect that was mediated by a lower chance to be referred to mental health care.

**CONCLUSION:** General and forensic mental health care workers should be alert for the fact that ADHD is missed very often in individuals who have problems with delinquency and should realize that ADHD may be masked by various factors

J Atten Disord. 2016 Apr;20:295-305.

**LONG-TERM OUTCOMES OF ADHD: A SYSTEMATIC REVIEW OF SELF-ESTEEM AND SOCIAL FUNCTION.**

*Harpin V, Mazzone L, Raynaud JP, et al.*

**OBJECTIVE:** To compare the long-term self-esteem and social function outcomes of individuals with untreated and treated ADHD across childhood, adolescence, and adulthood.

**METHOD:** A systematic search of 12 databases was performed to identify peer-reviewed, primary research articles, published January 1980 to December 2011, reporting long-term self-esteem and/or social function outcomes ( $\geq 2$  years; life consequences distinct from symptoms) of individuals with untreated or treated ADHD.

**RESULTS:** Overall, 127 studies reported 150 outcomes. Most outcomes were poorer in individuals with untreated ADHD versus non-ADHD controls (57% [13/23] for self-esteem; 73% [52/71] for social function). A beneficial response to treatment (pharmacological, nonpharmacological, and multimodal treatments) was reported for the majority of self-esteem (89% [8/9]) and social function (77% [17/22]) outcomes.

**CONCLUSION:** Untreated ADHD was associated with poorer long-term self-esteem and social function outcomes compared with non-ADHD controls. Treatment for ADHD was associated with improvement in outcomes; however, further long-term outcome studies are needed

J Atten Disord. 2016 Mar;20:206-13.

**CHILDHOOD PREDICTORS OF CRIMINAL OFFENDING: RESULTS FROM A 19-YEAR LONGITUDINAL EPIDEMIOLOGICAL STUDY OF BOYS.**

*Young S, Taylor E, Gudjonsson G.*

**OBJECTIVE:** To examine the relative contribution of hyperactivity, conduct, and emotional problems in predicting criminal offending.

**METHOD:** In all, 173 boys aged 6 to 8 years (assessed for hyperactivity, conduct, and emotional problems) were followed up 19 years later by examining criminal offense histories.

**RESULTS:** Significant main effects for total and violent convictions were found, the strongest being for violent criminal offenses. Conduct problems predicted general offending (irrespective of the type of conviction), whereas emotional problems were the single best predictor of violent convictions. Hyperactivity was not a significant predictor in the models.

**CONCLUSION:** The findings provide insight into the developmental mechanisms that mediate criminal behavior by showing that childhood emotional problems independently contribute to the risk of violent offending in later life

J Atten Disord. 2016 Mar;20:251-59.

**RESPONSE INHIBITION IN TIC DISORDERS: WAITING TO RESPOND IS HARDER WHEN ADHD IS PRESENT.**

**Thibeault M, Lemay M, Chouinard S, et al.**

**OBJECTIVE:** Tic disorders such as Gilles-de-la-Tourette syndrome (TS) are associated with difficulties in withholding movements and sometimes inappropriate actions. The present study examined whether these disorders lead to a specific difficulty in withholding preprogrammed voluntary movements irrespective of decisions on whether or not to move.

**METHOD:** Children with TS with or without attention-deficit hyperactivity disorder (ADHD) and controls performed a fast-paced simple reaction time task involving responses to a target in a rapid letter stream (9 letters/s, average foreperiod 332 ms) with feedback on response speed.

**RESULTS:** The ADHD group showed more premature responses and more variable response time than other groups, whether the timing of the target was predictable or not.

**CONCLUSION:** The data indicate that in tic disorders, the presence of ADHD is associated with difficulties in waiting to initiate preprogrammed movements independently of response selection or response timing difficulties

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J Atten Disord. 2016 Mar;20:199-205.

**STIGMATIZATION OF ADHD: A DEVELOPMENTAL REVIEW.**

**Lebowitz MS.**

**OBJECTIVE:** In recent years, the stigmatization faced by people with mental disorders has received considerable attention in the empirical literature. However, individuals with different disorders are subject to distinct types of negative attitudes, necessitating examinations of stigma that treat specific disorders individually.

**METHOD:** This article reviews recent empirical literature concerning the stigmatization of ADHD. Further specificity is achieved by taking a developmental perspective, reviewing studies of stigmatizing attitudes as a function of the age of the target and perceiver.

**RESULTS:** Findings from nationally representative data sets, experimental investigations, surveys, and qualitative studies indicate that individuals of all ages who exhibit symptoms of ADHD are the recipients of substantial stigmatization.

**CONCLUSION:** Although the stigmatizing attitudes of children and adolescents appear to differ in some ways from those of adults, negative perceptions toward people with ADHD appear to generally be present at all stages of development

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J Atten Disord. 2016 Feb;20:96-107.

**EMPIRICALLY DETERMINED, PSYCHOPATHOLOGICAL SUBTYPES IN CHILDREN WITH ADHD.**

**Zenglein Y, Schwenck C, Westerwald E, et al.**

**OBJECTIVE:** The aim of this study was to empirically determine subgroups of ADHD defined by specific patterns of psychopathology.

**METHOD:** A clinical sample of 223 children with ADHD, aged 5 to 14 years, was examined with the Child Behavior Checklist (CBCL). In addition, comorbid psychiatric disorders, psychosocial risk factors, and socioeconomic status were assessed.

**RESULTS:** Cluster analysis of CBCL subscales yielded a solution with four distinct subgroups. While "externalizers" showed a high rate of comorbid oppositional defiant disorder (ODD) and conduct disorder (CD), "obsessive-compulsives" exhibited thought problems, low rates of comorbid CD, and high symptoms of inattention. "High psychiatric symptom carriers" had high rates of familial risk factors, acute life events, comorbid ODD, and CD. "Low psychiatric symptom carriers" also scored low in all other variables studied.

**CONCLUSION:** Children with ADHD can be divided into four subgroups according to their CBCL-based psychopathology, and these subgroups differ in their risk factor profiles

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J Atten Disord. 2016 Mar;20:260-69.

**Comparison of On-Road Driving Between Young Adults With and Without ADHD.**

**Merkel RL, Jr., Nichols JQ, Fellers JC, et al.**

**OBJECTIVE:** This study compared video recordings from routine driving of ADHD and non-ADHD young adults to identify differences in driving behaviors.

**METHOD:** A matched sample of young adult drivers with and without ADHD are compared via blinded ratings of videoed g-force events recorded by DriveCam technology over 3 months of on-road driving.

**RESULTS:** ADHD drivers were significantly more likely to have more crashes, minor events, and g-force events. G-force events for the ADHD drivers involved significantly more risky and illegal, hyperactive/impulsive, and distracted behaviors. The g-force events of non-ADHD drivers were due to evasive, defensive driving or lapses in attention.

**CONCLUSION:** Increased risk for ADHD drivers may be the result of increased risk taking, increased hyperactivity/impulsivity or distraction behavior, and increased vulnerability to factors that interfere with driving in general, whereas the consequences of faulty driving were either higher or potentially higher in those drivers with ADHD

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J Atten Disord. 2016 Apr;20:325-34.

**ADHD AND HYPERKINETIC DISORDER SYMPTOMS IN AUSTRALIAN ADULTS: DESCRIPTIVE SCORES, INCIDENCE RATES, FACTOR STRUCTURE, AND GENDER INVARIANCE.**

**Gomez R.**

**OBJECTIVE:** ADHD and Hyperkinetic Disorder (HKD) have the same 18 symptoms, covering inattention (IA), hyperactivity (HYP), and impulsivity (IMP). This study was aimed at providing descriptive scores for the different symptom groups in these disorders and how these scores varied by age and gender, the percentages of individuals meeting the symptom thresholds for the different ADHD types and HKD, the factor structure, and gender invariance of these symptoms in adults.

**METHOD:** To accomplish this, 852 adults provided self-ratings for a scale comprising the 18 ADHD/HKD symptoms.

**RESULTS:** The findings showed that age and gender had minimal effects on the ADHD symptoms. Also, in terms of symptom counts, 2% had HKD and 6.3% had ADHD (inattentive = 1.6%, hyperactive-impulsive = 2.7%, and combined type = 2.0%). Confirmatory factor analysis (CFA) provided most support for the three-factor HKD model, involving separate factors for the IA, HYP, and IMP symptoms. This model showed full measurement invariance across gender.

**CONCLUSION:** The theoretical and clinical implications of the findings are discussed

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J Atten Disord. 2016 Feb;20:151-62.

**PHYSICAL ACTIVITY, AFFECT, AND COGNITION IN CHILDREN WITH SYMPTOMS OF ADHD.**

**Gawrilow C, Stadler G, Langguth N, et al.**

**OBJECTIVE:** To examine the role of physical activity in determining the affect and executive functioning of children with symptoms of ADHD.

**METHOD:** In Study 1, the association between physical activity and affect in the daily lives of children with varying degrees of hyperactivity was examined. In Study 2, children with ADHD were randomly assigned a physical activity or a sedentary task before working on a task requiring executive control.

**RESULTS:** Lack of physical activity was shown to relate to depressed affect, more strongly in participants with severe hyperactivity symptoms (Study 1). The physically active participants showed improved executive

functioning after only 5 min of vigorous activity; the sedentary control participants showed no improvement (Study 2).

**CONCLUSION:** These results indicate that interventions to increase the level of physical activity in children with and without ADHD might improve affect and executive functioning

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J Atten Disord. 2016 Mar;20:240-50.

**EFFECTS OF BIOLOGICAL VERSUS PSYCHOSOCIAL EXPLANATIONS ON STIGMATIZATION OF CHILDREN WITH ADHD.**

**Lebowitz MS, Rosenthal JE, Ahn WK.**

**OBJECTIVE:** Previous studies have found biological conceptualizations of psychopathology to be associated with stigmatizing attitudes and prognostic pessimism. This research investigated how biological and psychosocial explanations for a child's ADHD symptoms differ in affecting laypeople's stigmatizing attitudes and prognostic beliefs.

**METHOD:** Three experiments were conducted online with U.S. adults, using vignettes that described a child with ADHD and attributed his symptoms to either biological or psychosocial causes. Dependent measures gauged social distance and expectations about the child's prognosis.

**RESULTS:** Across all three studies, the biological explanation yielded more doubt about treatability but less social distance—a result that diverges from previous research with other disorders. Differences in the amount of blame ascribed to the child mediated the social distance effect.

**CONCLUSION:** The effects of biological explanations on laypeople's views of ADHD seem to be a "double-edged sword," reducing social rejection but exacerbating perceptions of the disorder as relatively untreatable

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J Autism Dev Disord. 2016 Mar;46:1071-83.

**REAL-WORLD EXECUTIVE FUNCTIONS IN ADULTS WITH AUTISM SPECTRUM DISORDER: PROFILES OF IMPAIRMENT AND ASSOCIATIONS WITH ADAPTIVE FUNCTIONING AND CO-MORBID ANXIETY AND DEPRESSION.**

**Wallace GL, Kenworthy L, Pugliese CE, et al.**

Although executive functioning (EF) difficulties are well documented among children and adolescents with autism spectrum disorder (ASD), little is known about real-world measures of EF among adults with ASD. Therefore, this study examined parent-reported real-world EF problems among 35 adults with ASD without intellectual disability and their correlations with adaptive functioning and co-morbid anxiety and depression symptomatology. A variable EF profile was found with prominent deficits occurring in flexibility and metacognition. Flexibility problems were associated with anxiety-related symptoms while metacognition difficulties were associated with depression symptoms and impaired adaptive functioning (though the metacognition-adaptive functioning relationship was moderated by ADHD symptoms). These persistent EF problems are predictors of broader functioning and therefore remain an important treatment target among adults with ASD

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J Clin Exp Neuropsychol. 2016;38:12-22.

**THE EFFECT OF PREMORBID ATTENTION-DEFICIT/HYPERACTIVITY DISORDER ON NEUROPSYCHOLOGICAL FUNCTIONING IN INDIVIDUALS WITH ACUTE MILD TRAUMATIC BRAIN INJURIES.**

**Van PR, Keith C, Bertolin M, et al.**

**INTRODUCTION:** Mild traumatic brain injury (mTBI) is a frequent, yet undertreated condition that typically manifests with transient neurological and cognitive symptoms that resolve over the course of several weeks. In contrast, attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that presents initially in childhood but often persists into adulthood. mTBI and ADHD include overlapping symptomatology, making it difficult for clinicians to disentangle the sequelae of each condition when they co-occur in the same individual. We hypothesized that neuropsychological tests would be sensitive to preexisting ADHD in inpatients with acute mTBIs.

**METHOD:** We retrospectively examined the medical charts of 100 inpatients, aged 18-40 years (96% Caucasian; 77% male) with mTBIs in an acute care setting, half of whom had self-reported the presence of premorbid ADHD, and half of whom were matched controls. We analyzed group differences across neuropsychological tests of attention, processing speed, and executive functions, examined the profile ratings of independent, blinded, board-certified neuropsychologists, and correlated cognitive performance with time from traumatic injury to testing.

**RESULTS:** Individuals with premorbid ADHD (a) performed significantly worse than their matched counterparts on several tests of attention, processing speed, and working memory, and (b) were significantly more likely to produce profiles later rated as impaired by independent, board-certified clinical neuropsychologists. In addition, time from traumatic injury to testing was found to be negatively correlated with neurocognitive performance.

**CONCLUSIONS:** These findings (a) argue for the utility of a brief assessment of premorbid ADHD in the acute care of individuals with mTBIs and (b) provide clinicians with a barometer for gauging the relative contributions of premorbid ADHD to neuropsychological impairments in the neurocognitive profiles of individuals with mTBIs. Reported effect sizes will assist clinicians in accurately weighing the impact of premorbid ADHD when interpreting such profiles

J Med Internet Res. 2016 Feb;18:e26.

**BEHAVIORAL OUTCOME EFFECTS OF SERIOUS GAMING AS AN ADJUNCT TO TREATMENT FOR CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A RANDOMIZED CONTROLLED TRIAL.**

*Bul KC, Kato PM, Van der Oord S, et al.*

**BACKGROUND:** The need for accessible and motivating treatment approaches within mental health has led to the development of an Internet-based serious game intervention (called "Plan-It Commander") as an adjunct to treatment as usual for children with attention-deficit/hyperactivity disorder (ADHD).

**OBJECTIVE:** The aim was to determine the effects of Plan-It Commander on daily life skills of children with ADHD in a multisite randomized controlled crossover open-label trial.

**METHODS:** Participants (N=170) in this 20-week trial had a diagnosis of ADHD and ranged in age from 8 to 12 years (male: 80.6%, 137/170; female: 19.4%, 33/170). They were randomized to a serious game intervention group (group 1; n=88) or a treatment-as-usual crossover group (group 2; n=82). Participants randomized to group 1 received a serious game intervention in addition to treatment as usual for the first 10 weeks and then received treatment as usual for the next 10 weeks. Participants randomized to group 2 received treatment as usual for the first 10 weeks and crossed over to the serious game intervention in addition to treatment as usual for the subsequent 10 weeks. Primary (parent report) and secondary (parent, teacher, and child self-report) outcome measures were administered at baseline, 10 weeks, and 10-week follow-up.

**RESULTS:** After 10 weeks, participants in group 1 compared to group 2 achieved significantly greater improvements on the primary outcome of time management skills (parent-reported;  $P=.004$ ) and on secondary outcomes of the social skill of responsibility (parent-reported;  $P=.04$ ), and working memory (parent-reported;  $P=.02$ ). Parents and teachers reported that total social skills improved over time within groups, whereas effects on total social skills and teacher-reported planning/organizing skills were nonsignificant between groups. Within group 1, positive effects were maintained or further improved in the last 10 weeks of the study. Participants in group 2, who played the serious game during the second period of the study (weeks 10 to 20), improved on comparable domains of daily life functioning over time.

**CONCLUSIONS:** Plan-It Commander offers an effective therapeutic approach as an adjunct intervention to traditional therapeutic ADHD approaches that improve functional outcomes in daily life.

**TRIAL REGISTRATION:** International Standard Randomized Controlled Trial Number (ISRCTN): 62056259; <http://www.controlled-trials.com/ISRCTN62056259> (Archived by WebCite at <http://www.webcitation.org/6eNsiTDJV>)

J Autism Dev Disord. 2016;46:3115-25.

**ASSOCIATION OF AUTISM SPECTRUM DISORDER WITH OBSESSIVE-COMPULSIVE AND ATTENTION-DEFICIT/HYPERACTIVITY TRAITS AND RESPONSE INHIBITION IN A COMMUNITY SAMPLE.**

**van der Plas E, Dupuis A, Arnold P, et al.**

We examined co-occurrence of autism spectrum disorder (ASD) with (traits of) attention-deficit/hyperactivity (ADHD), obsessive-compulsive (OCD) and inhibition deficits in a community sample (n = 16,676) and tested whether having a sibling with ASD manifested in increased features of ADHD, OCD or inhibition deficits. Individuals with ASD had increased ADHD and OCD traits compared with individuals without ASD. Individuals with a sibling with ASD exhibited more ADHD traits than did individuals whose sibling did not have ASD. The "sibling effect" on manifestation of ADHD traits was observed in individuals with and without ASD. Having a sibling with ASD did not affect OCD traits. Inhibition was impaired in individuals with ASD who had a sibling with ASD only

J Child Adolesc Ment Health. 2016;28:109-21.

**BEHAVIOUR PLANNING AND PROBLEM SOLVING DEFICIENCIES IN CHILDREN WITH SYMPTOMS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER FROM THE BALOBEDU CULTURE, LIMPOPO PROVINCE, SOUTH AFRICA.**

**Pila-Nemutandani RG, Meyer A.**

**OBJECTIVE:** To compare planning behaviour (frontal lobe functioning) in children with and without symptoms of attention deficit hyperactivity disorder (ADHD).

**METHOD:** A total of 90 children (45 with symptoms of ADHD and 45 matched controls without ADHD symptoms) of both genders, who were medication naïve, from the Balobedu culture (Limpopo province, South Africa), aged 7-13 years, participated in the study. The performance of the two groups was compared on a test of planning and problem solving, the Tower of London (ToL) task. The results were analysed as a function of gender and ADHD subtype. The Finger Tapping test (testing fine motor skills) was used as a control test to verify that the expected differences were not due to poor motor skills.

**RESULTS:** The children with ADHD symptoms scored significantly lower than the non-ADHD comparison group which indicated deficiency in frontal lobe functioning (p = 0.00). The difference in performance was not due to poor motor control (p = 0.70).

**CONCLUSION:** Children with ADHD symptoms show deficits in behavioural planning which indicates impairment of functions of the frontal areas supplied by the mesocortical dopamine branch. More so than others, the ADHD Inattentive and Combined subtypes showed poor performance in the Tower of London task, indicating poor organisational and planning skills in these groups. The results also did show that the difference was not due to problems with motor control and that the ToL task is a culture-fair instrument for testing planning behavior

J Child Adolesc Psychopharmacol. 2016;26:505-12.

**A SINGLE-DOSE, SINGLE-PERIOD PHARMACOKINETIC ASSESSMENT OF AN EXTENDED-RELEASE ORALLY DISINTEGRATING TABLET OF METHYLPHENIDATE IN CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.**

**Childress A, Newcorn J, Stark JG, et al.**

**Objective:** To determine the pharmacokinetic (PK) profile of a proprietary formulation of methylphenidate (MPH) in children and adolescents with attention-deficit/hyperactivity disorder (ADHD) in a phase 1 study. Methylphenidate extended-release orally disintegrating tablets (MPH XR-ODTs) combine two technologies in a single-tablet formulation - an extended-release profile that was designed for once-daily dosing in an ODT that does not require water or chewing for ingestion.

**Methods:** This was a single-dose, open-label, single-period, single-treatment study, in which 32 children with ADHD who were receiving MPH in doses of 40 or 60 mg before beginning the study each received a 60-mg dose (2 x 30 mg) of MPH XR-ODT. The following plasma PK parameters of MPH were determined for participants grouped by age (6-7, 8-9, 10-12, and 13-17 years old): maximum concentration (C<sub>max</sub>), time to

maximum concentration (T<sub>max</sub>), elimination half-life (T<sub>1/2</sub>), area under the curve from 0 hours to infinity (AUC<sub>inf</sub>), oral clearance (CL/F), and volume of distribution in the terminal phase (V<sub>z</sub>/F). Safety and tolerability were also assessed.

**Results:** A total of 32 participants received the study drug. For all participants, plasma concentration-time profiles of MPH exhibited a broad peak after administration of MPH XR-ODT through ~8 hours, indicating extended release from the formulation, followed by an apparent first-order elimination phase. As age increased, MPH exposure decreased and mean estimates of CL/F increased; however, weight-normalized CL/F values were comparable across age groups. Similarly, mean estimates of V<sub>z</sub>/F increased with age, but weight-normalization decreased differences across age groups, with the exception of the youngest age group, which had higher values. All adverse events (AEs) were mild.

**Conclusion:** This XR-ODT formulation of MPH demonstrated weight-normalized clearance rates that were consistent across all age groups, a PK profile consistent with once-daily dosing, and an AE profile consistent with this class of medication in children and adolescents with ADHD

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J Child Adolesc Psychopharmacol. 2016;26:513-19.

**AGOMELATINE AS A TREATMENT FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN AND ADOLESCENTS: A DOUBLE-BLIND, RANDOMIZED CLINICAL TRIAL.**

**Salardini E, Zeinodini A, Kohi A, et al.**

**OBJECTIVE:** Attention-deficit/hyperactivity disorder (ADHD) is a chronic neurodevelopmental disorder. Due to lack of response to the medication and significant side effects of the treatment with stimulants, alternative medications should be considered. The aim of this study is to evaluate efficacy of agomelatine in treatment of ADHD.

**METHODS:** Fifty-four outpatients, children 6-15 years old, with diagnosis of ADHD according to Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) diagnostic criteria participated in a 6-week, parallel, double-blind, randomized clinical trial. Fifty patients completed 6 weeks of treatment with either ritalin (methylphenidate hydrochloride [MPH]) (20 mg/day in participants below 30 kg and 30 mg/day in patients with weight ≥30 kg) or agomelatine (15 mg/day in patients with weight ≥30 kg and 25 mg/day in patients with weight ≥45 kg). Participants were assessed using Parent and Teacher ADHD Rating Scale-IV at baseline and at weeks 3 and 6.

**RESULTS:** General linear model repeated measures showed no significant differences between the two groups on Parent and Teacher Rating Scale scores (F = 1.13, df = 1.26, p = 0.305, and F = 0.95, df = 1.25, p = 0.353, respectively). Changes in Teacher and Parent ADHD Rating Scale scores from baseline to the study end were not significantly different between the agomelatine group (9.28 ± 8.72 and 24.12 ± 7.04, respectively) and the MPH group (6.64 ± 11.04 and 25.76 ± 7.82, respectively) (p = 0.46 and p = 0.44, respectively). There was a trend for less insomnia in the agomelatine group versus MPH-treated group (4% vs. 24%, p = 0.09).

**CONCLUSIONS:** A treatment course of 6 weeks with agomelatine demonstrated a favorable safety and efficacy profile in children and adolescents with ADHD. Nonetheless, larger controlled studies with longer treatment periods are necessary

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J Child Adolesc Psychopharmacol. 2016;26:555-61.

**INTRINSIC BRAIN CONNECTIVITY FOLLOWING LONG-TERM TREATMENT WITH METHYLPHENIDATE IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.**

**Battel L, Kieling RR, Kieling C, et al.**

**INTRODUCTION:** Although widely used for the treatment of attention-deficit/hyperactivity disorder (ADHD) across the life span, the effects of methylphenidate (MPH) on the brain are not completely understood. Functional neuroimaging techniques may help increase knowledge about the mechanisms of MPH action.

**OBJECTIVE:** To evaluate changes in functional connectivity patterns of the default mode network (DMN) in children with ADHD following long-term treatment with MPH.

**METHODS:** Twenty-three right-handed treatment-naïve boys with ADHD underwent a protocol of intrinsic functional connectivity before and after 6 months of treatment with MPH. Functional connectivity was analyzed using a region of interest (ROI) approach and independent component analysis (ICA).

**RESULTS:** ROI analyses showed no significant changes in connectivity between regions of the DMN following treatment, with a relatively small increase in the anterior-posterior connectivity of the network. ICA revealed a significant increase in connectivity between the left putamen and the DMN ( $p < 0.001$ , corrected). There was a correlation between the reduction of symptoms and the increased connectivity between the putamen and the DMN after treatment ( $\rho = -0.65$ ,  $p = 0.017$ ).

**CONCLUSION:** Dysfunctions in cortical-subcortical circuits have often been associated with the pathophysiology of ADHD. Our findings suggest that effective treatment with MPH in children with ADHD may affect brain functioning by increasing connectivity between the DMN and subcortical nuclei

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J Child Adolesc Psychopharmacol. 2016;26:548-54.

**CHILDHOOD ATTENTION-DEFICIT/HYPERACTIVITY DISORDER PRESCRIBING BY PRESCRIBER TYPE AND SPECIALTY IN OREGON MEDICAID.**

*Klein TA, Panther S, Woo T, et al.*

**Objective:** This study compares nurse practitioner (NP) and physician (MD/DO) prescribing patterns for treatment of children with an attention-deficit/hyperactivity disorder (ADHD)-related diagnosis covered by Oregon Medicaid from 2012 to 2013.

**Methods:** This study is a limited data set review of Oregon pharmacy claims for youth aged 3-18 at time of prescription fill, who were continuously enrolled for at least 10 months of the index year. Claims with selected ICD-9 codes ( $n = 197,364$ ) were further defined by 30-day prescriptions and prescription drug events (PDE) linked to each prescriber type of interest. Descriptive statistical analysis of variables included prescriber type (NP vs. physician) and specialty (generalist vs. specialist), child age, and controlled versus noncontrolled drug type.

**Results:** A total of 82,754 complete 30-day prescriptions for 10,753 children from 1785 unique prescribers (78 NP specialists; 303 NP generalists; 162 physician specialists; and 1242 physician generalist prescribers) and 16,669 PDE were analyzed. Physicians prescribed more than 81% of all ADHD medications, and physician generalists prescribed nearly 60% of all prescriptions. Sixty-four percent of 30-day supply prescriptions ( $n = 52,678$ ) were controlled substances. Generalists, both NPs and physician prescribers, prescribed controlled medications more often than specialists. Physician specialists consistently prescribed controlled substances for all age groups, while NP specialists prescribed more controlled substances as child age increased. Rates of controlled medications prescribed generally increased, as children got older, regardless of provider type.

**Conclusion:** NPs overall prescribe in a similar pattern to physicians when given the authority to prescribe controlled substances for ADHD. Comparisons between prescriber types for controlled substance prescribing by age should be explored further to identify possible variance from national guidelines

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J Child Neurol. 2016;31:1282-89.

**MEDICAL COMORBIDITY OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN US ADOLESCENTS.**

*Jameson ND, Sheppard BK, Lateef TM, et al.*

Understanding patterns of medical comorbidity in attention-deficit/hyperactivity disorder (ADHD) may lead to better treatment of affected individuals as well as aid in etiologic study of disease. This article provides the first systematic evaluation on the medical comorbidity of ADHD in a nationally representative sample (National Comorbidity Replication Survey-Adolescent Supplement;  $N = 6483$ ) using formal diagnostic criteria. Survey-weighted odds ratios adjusted for demographics, additional medical, and mental disorders were calculated for associations between ADHD and medical conditions. Models adjusted for demographics revealed significantly increased odds of allergy, asthma, enuresis, headache/migraine, and serious stomach or bowel problems. After adjusting for comorbidity, across the medical conditions, enuresis and serious

stomach problems were the strongest correlates of ADHD. These findings confirm the pervasive medical comorbidity of ADHD reported in previous clinical and community-based studies. The intriguing salience of enuresis and serious stomach or bowel conditions may also provide an important clue to multisystem involvement in ADHD

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J Child Psychol Psychiatry. 2016 Sep;57:1066-74.

**ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND SLUGGISH COGNITIVE TEMPO THROUGHOUT CHILDHOOD: TEMPORAL INVARIANCE AND STABILITY FROM PRESCHOOL THROUGH NINTH GRADE.**

**Leopold DR, Christopher ME, Burns GL, et al.**

**Background:** Although multiple cross-sectional studies have shown symptoms of sluggish cognitive tempo (SCT) and attention-deficit/hyperactivity disorder (ADHD) to be statistically distinct, studies have yet to examine the temporal stability and measurement invariance of SCT in a longitudinal sample. To date, only six studies have assessed SCT longitudinally, with the longest study examining SCT over a 2-year period. The overall goals of this study were to assess the 10-year longitudinal stability and interfactor relationships of ADHD and SCT symptoms among a community sample of children.

**Methods:** Confirmatory factor analysis was used to assess the temporal invariance of ADHD and SCT symptoms in a large population-based longitudinal sample (International Longitudinal Twin Study of Early Reading Development) that included children assessed at preschool and after kindergarten, first, second, fourth, and ninth grades (n = 489). Latent autoregressive models were then estimated to assess the stability of these constructs.

**Results:** Results demonstrated invariance of item loadings and intercepts from preschool through ninth grades, as well as invariance of interfactor correlations. Results further indicated that both ADHD and SCT are highly stable across these years of development, that these symptom dimensions are related but also separable, and that hyperactivity/impulsivity and SCT are both more strongly correlated with inattention than with each other and show differential developmental trajectories. Specifically, even in the presence of latent simplex analyses providing support for the developmental stability of these dimensions, linear comparisons indicated that that mean levels of hyperactivity/impulsivity decreased with time, inattentive ratings were generally stable, and SCT tended to increase slightly across development.

**Conclusions:** This study adds to the current literature by being the first to systematically assess and demonstrate the temporal invariance and stability of ADHD and SCT across a span of 10 years

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J Clin Diagn Res. 2016;10:OC01-OC05.

**EFFECT OF POLY UNSATURATED FATTY ACIDS ADMINISTRATION ON CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A RANDOMIZED CONTROLLED TRIAL.**

**Anand P, Sachdeva A.**

**Introduction:** Attention Deficit Hyperactivity Disorder (ADHD) is a common disorder of childhood. Studies have indicated nutritional deficiencies, particularly Poly Unsaturated Fatty Acids (PUFA) deficiency in these children and have suggested supplementation with PUFA for clinical improvement.

**Aim:** The present study aimed at evaluating the effect of PUFA administration in Indian children with ADHD.

**Settings and design:** The study was conducted in the paediatrics and psychiatry departments of a tertiary care hospital. We conducted a prospective double blind randomized control trial on children aged 4-11 years, diagnosed with ADHD according to DSM-IV TR criterias and Kiddie-Schedule for Affective Disorders and Schizophrenia - Present and lifetime version.

**Materials and Methods:** The study subjects were randomized into study and control groups. The control group was administered Atomoxetine, while the study group received Atomoxetine along with Eicosapentanoic acid (EPA) and Docosahexanoic acid (DHA). Both groups were followed up every 2 weeks over the next 4 months using Conner's Parent Rating Scale - Revised (CPRS-R).

**Statistical Analysis:** The data was carefully analysed by SPSS (17th version) software with the help of a statistician. Confidence interval of 95% was used. The complete data was analysed using appropriate parametric and non parametric tests. Correlation was done between various socio-demographic and illness related parameters. For all analyses, probability of 5% or less was assumed to represent statistical significance.

**Results:** Fifty children diagnosed with ADHD were randomized to study group (n=25) and control group (n=25). The study group had greater reduction in ADHD scores as compared to the control group, although not statistically significant ( $p = 0.08$ ). Improvement was more significant in male study subjects with combined type of ADHD

**Conclusion:** It may be concluded that PUFA supplementation improves the symptoms of ADHD. However, the effect is not clinically significant if supplementation is not given for prolonged duration and in adequate doses

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J Clin Child Adolesc Psychol. 2016 Sep;45:632-41.

**LONGITUDINAL CORRELATES OF SLUGGISH COGNITIVE TEMPO AND ADHD-INATTENTION SYMPTOM DIMENSIONS WITH SPANISH CHILDREN.**

**Servera M, Bernad MdM, Carrillo JM, et al.**

The objective was to examine the longitudinal correlates of sluggish cognitive tempo (SCT) and attention deficit/hyperactivity disorder (ADHD)-Inattention (IN) dimensions with mothers' and fathers' ratings of Spanish children. Mothers and fathers rated SCT, ADHD-IN, ADHD-hyperactivity/impulsivity (HI), oppositional defiant disorder (ODD), depression, academic impairment, and social impairment on 3 occasions (twice in first-grade year [6-week separation] and once in the second-grade year [12 months after the first assessment]) in Spanish children (758, 746, and 718 children at the 3 time-points with approximately 55% boys). The results showed that (a) higher levels of SCT from earlier assessments predicted higher levels of depression, academic impairment, and social impairment at Assessment 3 after controlling for ADHD-IN at earlier assessments; (b) higher levels of ADHD-IN from earlier assessments predicted higher levels of depression, academic impairment, and social impairment at Assessment 3 after controlling for SCT at earlier assessments; (c) higher levels of ADHD-IN from earlier assessments predicted higher levels of ADHD-HI and ODD at Assessment 3 after controlling for SCT from earlier assessments; and (d) higher levels of SCT from earlier assessments either showed no unique relationship with ADHD-HI and ODD or predicted lower levels of ADHD-HI and ODD at Assessment 3 after controlling for ADHD-IN from earlier assessments. Initial evidence is provided of SCT's unique longitudinal relationships with depression and academic/social impairment and different longitudinal relationships with ADHD-HI and ODD relative to ADHD-IN, thus adding to a growing body of research underscoring the importance of SCT as distinct from ADHD-IN

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Journal of Comprehensive Pediatrics. 2014;5.

**EARLY DETECTION OF AUTISM SPECTRUM DISORDERS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER BY MODIFIED CHECKLIST FOR AUTISM IN TODDLERS: A PILOT STUDY FROM INDIA.**

**Kattimani S, Sarkar S, Bharadwaj B, et al.**

**Background:** Symptoms of autism spectrum disorders (ASD) are commonly observed in children diagnosed with Attention Deficit/Hyperactivity Disorder (ADHD). These symptoms might underlie social and functional impairment in such children. The existing classification systems do not allow for diagnosing both conditions in children.

**Objectives:** This study aimed to assess the presence of ASD in a hospital-based sample of children diagnosed with ADHD and to find the utility of Modified Checklist for Autism in Toddlers (MCHAT) through using parent recall in predicting development of ASD.

**Patients and Methods:** A total of 50 children with a diagnosis of ADHD, who attended the Child Guidance Clinic of a tertiary care hospital in Southern India, were recruited through simple random sampling from July to December 2012. These children were assessed for current ASD using Childhood Autism Rating Scale

(CARS) and MCHAT based on parents recall. To test the diagnostic accuracy of MCHAT in early detection of ASD (index test), CARS was used as a reference test. OpenEpi 3.01 software was used for computing sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and diagnostic accuracy.

**Results:** Among 50 children, 30 (60%) had scores over the cutoff point of 33 on CARS while 38 (76%) had scored over the cutoff point on MCHAT, qualifying for presence of ASD. Moreover, presence of ASD was associated with older age ( $P = 0.035$ ), greater risk of medical comorbidities ( $P = 0.022$ ), lower social quotient on Vineland Social Maturity Scale (VSMS) ( $P = 0.001$ ), and poorer global functioning according to Children's Global Assessment Scale (CGAS) ( $P = 0.002$ ). Using CARS as Gold Standard, the sensitivity and specificity of MCHAT in predicting ASD were 86.7% and 40.0%, respectively. The PPV and NPV of MCHAT in detecting ASD were respectively 68.4% and 66.7%.

**Conclusions:** ASD is present in considerable proportion of children diagnosed with ADHD. MCHAT could be a useful instrument for early detection of children at risk of developing ASD

Journal of Comprehensive Pediatrics. 2015;6.

#### **PRELIMINARY INVESTIGATION ON DULOXETINE EFFICACY IN THE TREATMENT OF CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.**

**Dodangi N, Habibi N, Astaneh AN.**

**Background:** Stimulants are first-line agents for the treatment of attention-deficit/hyperactivity disorder (ADHD). Despite the impressive track record of stimulants in the treatment of ADHD, they fail in 25% of patients due to lack of efficacy or the emergence of unwanted side effects.

**Objectives:** In this study, we investigated the efficacy and safety of duloxetine, a serotonin and norepinephrine reuptake inhibitor, in the treatment of children with attention-deficit hyperactivity disorder (ADHD).

**Patients and Methods:** In an open label clinical trial, 13 children aged 6 - 11 years diagnosed with ADHD were prescribed 30 mg/day duloxetine once daily by oral administration for six weeks. Conners Parent Rating Scale-Revised-Short form (CPRS-R-S) and the ADHD Rating Scale were used to assess the efficacy of the treatment.

**Results:** Ten children with a mean age of 8.40 - 1.67 years terminated the trial. A significant reduction in CPRS-R and its subscales was evident from week four of the study. In terms of side effects, duloxetine was generally safe and well tolerated.

**Conclusions:** This preliminary assessment suggests that duloxetine may be a medication of interest in the treatment of children with ADHD. Further controlled studies with larger samples are required to evaluate the efficacy of duloxetine in treatment of children with ADHD

J Consult Clin Psychol. 2016.

#### **IMPROVING HOMEWORK PERFORMANCE AMONG CHILDREN WITH ADHD: A RANDOMIZED CLINICAL TRIAL.**

**Merrill BM, Morrow AS, Altszuler AR, et al.**

**Objective:** Evidence indicates that children with Attention Deficit Hyperactivity Disorder (ADHD) experience acute and prolonged academic impairment and underachievement including marked difficulty with completing homework. This study is the first to examine the effects of behavioral, psychostimulant, and combined treatments on homework problems, which have been shown to predict academic performance longitudinally.

**Method:** Children with ADHD (ages 5-12,  $N = 75$ , 71% male, 83% Hispanic/Latino) and their families were randomly assigned to either behavioral treatment (homework-focused parent training and a daily report card; BPT + DRC) or a waitlist control group. Children also participated in a concurrent psychostimulant crossover trial conducted in a summer treatment program. Children's objective homework completion and accuracy were measured as well as parent-reported child homework behaviors and parenting skills.

**Results:** BPT + DRC had large effects on objective measures of homework completion and accuracy (Cohen's  $d$ s from 1.40 to 2.21,  $p$ s < .001). Other findings, including unimodal medication and incremental combined treatment benefits, were not significant.

**Conclusions:** Behavioral treatment focused on homework problems results in clear benefits for children's homework completion and accuracy (the difference between passing and failing, on average), whereas long-acting stimulant medication resulted in limited and largely nonsignificant acute effects on homework performance

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J Neuropsychiatry Clin Neurosci. 2016;28:e59-e60.

**ATTENTION DEFICIT HYPERACTIVITY DISORDER SYMPTOMS IN PEDIATRIC EPILEPSY: DIFFERENCES BETWEEN FOCAL ONSET AND GENERALIZED SEIZURE DISORDERS.**

**Salpekar J, Phelps M, Salorio C.**

**Background:** Attention Deficit Hyperactivity Disorder (ADHD) is a common comorbidity in pediatric epilepsy, with a prevalence approximating 40%. The predominantly inattentive subtype of ADHD may be particularly common. Less is understood about the impact of specific epilepsy subtypes upon ADHD comorbidity.

**Objective:** Assess whether ADHD symptom presence varies depending upon epilepsy subtype.

**Methods:** A retrospective review was conducted from a tertiary care Neuropsychiatry and Epilepsy Specialty Outpatient Program. The records were obtained over a one year period from a clinical sample of prospectively collected data. Case records from 36 children and adolescents with full data, all of whom had confirmed epilepsy were included. The sample was restricted to those with average range IQ. All patients underwent clinical evaluation, and caregivers completed standardized questionnaire measures assessing general psychiatric symptoms including executive function and ADHD symptoms (Swanson, Nolan and Pelham Scale: SNAP).

**Results:** 21 children had generalized seizures (age range 3-16, average 9.28, 17 male). 15 children had focal seizures (age range 5-17, average 11.15, 14 male). On the SNAP scale, overall ADHD symptoms were more common in the generalized epilepsy group than in the focal epilepsy group (Chi-square 5.143; Fisher exact test:  $p=0.0409$ ). On a global executive function measure (BRIEF), the generalized epilepsy group had worse function than the focal group, but only trended toward significance (Chi square 3.540; Fisher exact test:  $p=0.0599$ ).

**Conclusion:** ADHD may be more common in children with generalized epilepsy than with focal epilepsy. Further study with a larger sample size is necessary to confirm results

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J Neuropsychol. 2016 Sep;10:223-38.

**THE EFFECTS OF CO-OCCURRING ADHD SYMPTOMS ON ELECTROPHYSIOLOGICAL CORRELATES OF COGNITIVE CONTROL IN YOUNG PEOPLE WITH TOURETTE SYNDROME.**

**Shephard E, Jackson GM, Groom MJ.**

Efficient cognitive control is implicated in tic control in young people with Tourette syndrome (TS). Attention-deficit/hyperactivity disorder (ADHD) frequently co-occurs with TS and is associated with impaired cognitive control. Young people with TS and ADHD (TS + ADHD) show poorer cognitive control performance than those with TS, but how co-occurring ADHD affects underlying neural activity is unknown. We investigated this issue by examining behavioural and event-related potential (ERP) correlates of cognitive control in young people with these conditions. Participants aged 9–17 with TS ( $n = 17$ ), TS + ADHD ( $n = 17$ ), ADHD ( $n = 11$ ), and unaffected controls ( $n = 20$ ) performed a visual Go/Nogo task during electroencephalography (EEG) recording. Behavioural performance measures (D-prime, RT, reaction time variability, post-error slowing) and ERP measures (N2, P3, error-related negativity (ERN), error positivity (Pe)) were analysed in a 2 (TS-yes, TS-no)  $\times$  2 (ADHD-yes, ADHD-no) factorial analysis to investigate the effects of TS, ADHD, and their interaction. The results of these analyses showed that ADHD was associated with poorer performance and reduced amplitude of all ERPs, reflecting widespread cognitive control impairments. Tourette syndrome was associated with slowed RTs, which might reflect a compensatory slowing of motor output to facilitate tic

control. There was no interaction between the TS and ADHD factors for any behavioural or ERP measure, indicating the impairing effects of ADHD on behaviour and electrophysiological markers of cognitive control were present in TS + ADHD and that RT slowing associated with TS was unaffected by co-occurring ADHD symptoms

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J Sleep Res. 2016;25:91.

**IMPROVEMENTS OF ADOLESCENT PSYCHOPATHOLOGY AFTER INSOMNIA TREATMENT: RESULTS FROM A RANDOMIZED CONTROLLED TRIAL OVER 1 YEAR.**

**De Bruin E, et al.**

**Objective:** To investigate whether 1. cognitive behavioral therapy for insomnia (CBTI) improves psychopathology in Internet- (IT) and face-to-face group treatment (GT) compared to waiting list (WL), 2. improvement in psychopathology can be explained by reduced insomnia, 3. improvements in psychopathology remain stable up to one year,

**Method:** 116 participants (age = 15.6 years, 25% males) with DSM- 5 insomnia, were randomly assigned to IT, GT, or WL. Assessments of psychopathology, insomnia, and objectively measured sleep occurred at baseline, post-test, and at 2, 6, and 12 months follow-up. Multilevel and mediation analyses were run to test hypotheses. The CBTI protocol, *ΓÇ£Sleeping SmartΓÇØ* consisted of 6 weekly sessions and a booster session after 2 months.

**Results:** Psychopathology symptoms, insomnia, and objective sleep measures decreased substantially in IT and GT compared to WL at 2 months follow-up with medium to large effect sizes. Psychopathology symptoms remained stable or further improved for up to 12 months follow-up for IT and GT respectively: affective ( $d = -0.87$  and  $-0.97$ ), anxiety ( $d = -0.81$  for IT), somatic ( $d = -0.38$  and  $d = -0.52$ ), oppositional ( $d = -0.42$  for GT), and ADHD problems ( $d = -0.47$  and  $-0.46$ ). Mediation analyses indicated full mediation of insomnia for effects of CBTI on affective and anxiety, and partial mediation on ADHD problems.

**Conclusions:** This is the first study demonstrating that Internet and face-to-face cognitive behavioral therapy for insomnia accomplishes long-term reduction in adolescent psychopathology by improvement of insomnia. This result has profound implications for youth mental health care

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J Sleep Res. 2016;25:186.

**LOOKING INTO THE EYE OF ADHD. FIRST DATA ON PHOTOPHOBIA IN ADULTS WITH ADHD.**

**Dorani F, Bijlenga D, Kooij S.**

**Objectives:** Many adults with Attention-Deficit/Hyperactivity Disorder (ADHD) wear sunglasses, also on cloudy days and in winter. They say they are oversensitive to light. This seems problematic because of the high prevalence of Delayed Sleep Phase Syndrome (78%) in adult ADHD. By wearing sunglasses, during daytime little light may reach their eyes, limiting even further synchronisation of the biological clock to time of the day. We aim to gain more insight into the associations between possible eye dysfunctions and photophobia, and the relationship with the delayed circadian rhythm in adult ADHD.

**Methods:** Overview of the literature and first data of a short online survey on the oversensitivity to light in adults with ADHD compared to controls.

**Results:** Literature: In 70-80% of ADHD children there are difficulties with the visual system. Visual acuity problems diminish with ADHD medications. The visual problems may correlate with the delayed circadian rhythm in adult ADHD. Online survey:  $N = 495$ , of which 47% had self-reported ADHD (symptoms) and 53% were controls. Adults with ADHD (symptoms), reported in 69% oversensitivity to light, versus 28% of controls, which was controlled for photophobia during episodes of migraine. After controlling for migraine, oversensitivity to light was associated with ADHD, age, eye problems, wearing glasses/eye lenses, chronic fatigue, but not with delayed sleep phase.

**Conclusions:** Visual function abnormalities are highly frequent in children with ADHD, and oversensitivity to light in adult ADHD. Our next study on the functioning of the visual system in adult ADHD will be discussed

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J Sleep Res. 2016;25:372.

**ASSOCIATION BETWEEN SLEEP FEATURES AND HYPERACTIVITY AND ATTENTION DEFICIT IN SCHOOL CHILDREN OF THE BIOBIO REGION IN CHILE.**

**Betancur Moreno C, Bustos C, Quezada C, et al.**

**Introduction:** The aim of this study is to know the sleep features of Chilean schoolchildren in the Biobio region and assess the association between them and hyperactivity and inattention.

**Method:** An observational, analytical, cross-sectional study. A questionnaire was applied to parents of 273 children (141 female) of first grade, with an average age of 6.54 years old (SD = 0.55) of three cities in the region of Biobio. The questionnaire included questions on sociodemographic data, physical features, a shortened version of the Pediatric Sleep Questionnaire (PSQ) and the Conners test (CT). Nonparametrical statistical analysis (Wilcoxon, Mann-Whitney and Spearman) was performed, using R software.

**Results:** There were statistically significant differences between the sleep hours (h) on school days (ScD) (M = 9.88; SD = 0.70) and weekends (WE) (M = 10.96, SD = 1.01) (P < 0.001) and between the time to get up in ScD and WE (M = 2.18 h; SD = 1.06) (P < 0.001). There was statistically significant correlation between the amount of sleep hours in ScD and CT scores (Spearman = - 0.15; P = 0.02) and between scores on the subscale of Snore of PSQ and CT (Spearman = 0.25; P < 0.001). There was a statistically significant difference in CT scores between those who snored (M = 9.81, SD = 5.41) and those who did not (M = 8.0, SD = 5.72) (P = 0.007).

**Conclusions:** There are an association between the number of sleep hours in Chilean schoolchildren of the Biobio region, the degree of snoring and hyperactivity and inattention

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J Sleep Res. 2016;25:230.

**POOR SLEEP AFFECTS COGNITION AND BEHAVIOUR IN BOTH ATTENTION DEFICIT/HYPERACTIVITY DISORDER AND TYPICALLY DEVELOPING CHILDREN, BUT WITH A DIFFERENTIAL PATTERN OF EFFECTS.**

**Knight FLC, Dimitriou D.**

**Objectives:** Sleep problems are commonly reported in attention deficit/hyperactivity disorder (ADHD), but are also a common characteristic of typical development (TD). Sleep problems can lead to disruptive behaviours and cognitive inattention, both traits of ADHD. We sought to elucidate the relationship between sleep, ADHD-trait behaviours and cognitive inattention, and how it manifests comparatively between ADHD and TD children.

**Methods:** 14 ADHD & 18 TD children (5-12 years) participated. Sleep profiles were assessed using subjective (Children's Sleep Habits Questionnaire) and objective (actigraphy) measures. We examined behaviour using Conners' Parent Report Scale, and attention across four domains using Conners' Continuous Performance Task.

**Results:** We found 1) more sleep problems in our ADHD sample, despite no difference in actual sleep time; 2) poor sleep in ADHD children predicted poorer attentional control, no association with behaviour; 3) poor sleep in TD children predicted increased ADHD like behaviours, no association with attention.

**Conclusions:** Poor sleep affects developmental subgroups in different ways. In ADHD children poor sleep worsens their cognitive deficit, whilst in TD children it mimics ADHD behaviours. The latter has specific implications for the over-diagnosis of ADHD, considering the modern child's sleep profile. Findings highlight the importance of promoting good sleep hygiene in all children

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J Sleep Res. 2016;25:281.

**ADHD, SLEEP AND HEALTH.**

**Kooij S, Bijlenga D, Wynchank D, et al.**

**Objectives:** ADHD in children and adults is often accompanied by sleep problems and sleep disorders. Sleep problems generally lead to sleepiness during the day and may further impair attentiveness. Sleep problems may also be part of, or induce mood disorders. Sleep debt in the long term is associated with general health problems like obesity, diabetes, cardiovascular disease and cancer.

**Methods:** During this presentation, an overview of the literature on sleep in ADHD will be discussed, as well as recent research on the delayed sleep phase syndrome in ADHD and its consequences for health in this population.

**Results:** ADHD is comorbid with sleep problems and disorders in the majority of children and adults, like restless legs syndrome, sleep apnea, delayed sleep phase syndrome. In 75% the sleep phase is delayed, as has been shown using objective measures (dim light melatonin onset in saliva, actigraphy). Also body core temperature is delayed and slightly decreased. A late sleep pattern is often genetically driven, starts early, and may have several consequences for health in general in the long term. Available evidence for treatment with sleep hygiene, melatonin at night and bright light therapy in the morning will be discussed.

**Conclusions:** ADHD and circadian based sleep disorders seem intertwined in the majority of cases. This may have significant health consequences in the long term due to phase delay and short sleep duration. Prevention may be possible identifying effective treatments in patients with ADHD

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J Am Acad Child Adolesc Psychiatry. 2016 Sep;55:762-70.

**A RANDOMIZED CONTROLLED TRIAL OF A SCHOOL-IMPLEMENTED SCHOOL-HOME INTERVENTION FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS AND IMPAIRMENT.**

**Pfiffner LJ, Rooney M, Haack L, et al.**

**Objective:** This study evaluated the efficacy of a novel psychosocial intervention (Collaborative Life Skills [CLS]) for primary-school students with attention-deficit/hyperactivity disorder (ADHD) symptoms. CLS is a 12-week program consisting of integrated school, parent, and student treatments delivered by school-based mental health providers. Using a cluster randomized design, CLS was compared with usual school/community services on psychopathology and functional outcomes.

**Method:** Schools within a large urban public school district were randomly assigned to CLS (12 schools) or usual services (11 schools). Approximately 6 students participated at each school (N = 135, mean age 8.4 years, grade range 2–5, 71% boys). Using PROC GENMOD (SAS 9.4), the difference between the means of CLS and usual services for each outcome at post treatment was tested. To account for clustering effects by school, the generalized estimating equation method was used.

**Results:** Students from schools assigned to CLS compared with those assigned to usual services had significantly greater improvement on parent and teacher ratings of ADHD symptom severity and organizational functioning, teacher-rated academic performance, and parent ratings of oppositional defiant disorder symptoms and social/interpersonal skills.

**Conclusion:** These results support the efficacy of CLS compared with typical school and community practices for decreasing ADHD and oppositional defiant disorder symptoms and improving key areas of functional impairment. They further suggest that existing school-based mental health resources can be redeployed from non-empirically supported practices to those with documented efficacy. This model holds promise for improving access to efficient evidence-based treatment for inattentive and disruptive behavior beyond the clinic setting

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Klin Psikofarmakol Bul. 2016;26:265-72.

**ATTENTION DEFICIT HYPERACTIVITY DISORDER TREATMENT PRACTICE IN TURKEY.**

**Oner O, Turkcapar H, Isli F, et al.**

**Objective:** To determine the factors associated with type of ADHD prescription and re-admission of the cases to the outpatient clinics between January-July 2013.

**Method:** The Ministry of Health prescription database, which included prescriber, region, age and gender data and contained almost 20% of IMS data.

**Results:** A total of 73,189 prescription were prescribed to a total of 41,341 (30,014 males; 72.7%) patients. 38645 (93.5%) of the patients were between 6 and 18 years of age. The most frequently prescribed drug was OROS methylphenidate (MPH, 59.7%) followed by IR MPH, atomoxetine and combination of drugs. There were several regional differences in prescription practice. Treatment choice changed significantly with age and gender. Rate of repeated prescription was highest among 6-18 year-old male subjects receiving combination treatment.

**Conclusions:** ADHD treatment choice seemed to be heavily influenced by official regulations. Age, gender and drug of choice were important factors associated with treatment adherence

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Lancet. 2016 Mar;387:1240-50.

**ATTENTION DEFICIT HYPERACTIVITY DISORDER.**

**Thapar A, Cooper M.**

Attention deficit hyperactivity disorder (ADHD) is a childhood-onset neurodevelopmental disorder with a prevalence of 1.4-3.0%. It is more common in boys than girls. Comorbidity with childhood-onset neurodevelopmental disorders and psychiatric disorders is substantial. ADHD is highly heritable and multifactorial; multiple genes and non-inherited factors contribute to the disorder. Prenatal and perinatal factors have been implicated as risks, but definite causes remain unknown. Most guidelines recommend a stepwise approach to treatment, beginning with non-drug interventions and then moving to pharmacological treatment in those most severely affected. Randomised controlled trials show short-term benefits of stimulant medication and atomoxetine. Meta-analyses of blinded trials of non-drug treatments have not yet proven the efficacy of such interventions. Longitudinal studies of ADHD show heightened risk of multiple mental health and social difficulties as well as premature mortality in adult life

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Lancet. 2016 Feb;387:737.

**ATTENTION DEFICIT HYPERACTIVITY DISORDER.**

**Barnett R.**

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Laterality. 2016;21:161-76.

**HEMISPHERIC SPECIALIZATION OF IMPAIRED DISENGAGEMENT OF ATTENTION IN DEPRESSION: A TACHISTOSCOPIC METHOD.**

**Pereira DM, Khan A.**

Difficulty shifting attention away from negative stimuli once engaged is a well-established cognitive bias observed in depression. This study attempted to determine whether this impaired disengagement of attention is lateralized in the brain. Thirty depressed and 30 control participants performed an attention disengagement task wherein the valence of the stimulus and the visual field was presented. The depressed group had longer reaction times than the control group, indicative of the typical cognitive and psychomotor slowing seen in depression. The effect of visual field presentation on the ability to disengage attention however was different for controls as compared to the patients. In controls, a distinct right hemisphere advantage was seen for disengaging attention which is in line with research that has identified right hemisphere structures as the seat

of behavioural inhibition. In the depressed group, however, this right hemisphere advantage was not observed

Learn Individ Differ. 2016 Jul;49:341-47.

**WORKING MEMORY IN CHILDREN WITH SPECIFIC LEARNING DISORDERS AND/OR ATTENTION DEFICITS.**

**Maehler C, Schuchardt K.**

Specific working memory deficits have been documented for different learning disorders (dyslexia, dyscalculia). Also children with attention deficit disorders (ADHD) have working memory problems especially with regard to executive functioning. There is a high rate of comorbidity of learning and attention disorders and yet, it is an open question, how this comorbidity might affect working memory functioning. We tested six groups of children with dyslexia (N = 31), dyscalculia (N = 18), ADHD (N = 34), with dyslexia and ADHD (N = 37), with dyscalculia and ADHD (N = 21) and typically achieving control children (N = 31). Working memory was assessed by a battery of 16 phonological, visual-spatial and central executive tasks, according to the model of Baddeley (1986). Results reveal distinct patterns of working memory deficits: dyslexia corresponds with deficits in phonological loop and dyscalculia with deficits in visual-spatial sketchpad. ADHD corresponds with deficits in central executive. No interaction effect could be detected. Thus, it should be concluded that the comorbidity leads to additive working memory deficits, i.e. children with both disorders must cope with broader deficits

Mol Psychiatry. 2016;21:1202-07.

**PSYCHIATRIC GENE DISCOVERIES SHAPE EVIDENCE ON ADHD'S BIOLOGY.**

**Thapar A, Martin J, Mick E, et al.**

A strong motivation for undertaking psychiatric gene discovery studies is to provide novel insights into unknown biology. Although attention-deficit hyperactivity disorder (ADHD) is highly heritable, and large, rare copy number variants (CNVs) contribute to risk, little is known about its pathogenesis and it remains commonly misunderstood. We assembled and pooled five ADHD and control CNV data sets from the United Kingdom, Ireland, United States of America, Northern Europe and Canada. Our aim was to test for enrichment of neurodevelopmental gene sets, implicated by recent exome-sequencing studies of (a) schizophrenia and (b) autism as a means of testing the hypothesis that common pathogenic mechanisms underlie ADHD and these other neurodevelopmental disorders. We also undertook hypothesis-free testing of all biological pathways. We observed significant enrichment of individual genes previously found to harbour schizophrenia de novo non-synonymous single-nucleotide variants (SNVs;  $P=5.4 \times 10^{-4}$ ) and targets of the Fragile X mental retardation protein ( $P=0.0018$ ). No enrichment was observed for activity-regulated cytoskeleton-associated protein ( $P=0.23$ ) or N-methyl-D-aspartate receptor ( $P=0.74$ ) post-synaptic signalling gene sets previously implicated in schizophrenia. Enrichment of ADHD CNV hits for genes impacted by autism de novo SNVs ( $P=0.019$  for non-synonymous SNV genes) did not survive Bonferroni correction. Hypothesis-free testing yielded several highly significantly enriched biological pathways, including ion channel pathways. Enrichment findings were robust to multiple testing corrections and to sensitivity analyses that excluded the most significant sample. The findings reveal that CNVs in ADHD converge on biologically meaningful gene clusters, including ones now established as conferring risk of other neurodevelopmental disorders

Mov Disord. 2016;31:S567.

**TOURETTE SYNDROME AND ATTENTION DEFICIT HYPERACTIVITY DISORDERS.**

**Aminov K.**

**Objective:** Tourette syndrome (TS) and related tic disorders are commonly associated with obsessive-compulsive disorder (OCD) and attention deficit hyperactivity disorder (ADHD). It has been argued, however,

that any observed association between TS and these and other psychopathologies may be due to ascertainment bias in that individuals with multiple problems are more likely to be referred for medical evaluation. A tic is a sudden, uncontrollable movement which can occur anywhere in the body or be vocal. Tics are often very mild and may not be noticeable to others but tics can also be grandiose. It is common for some tics to normally occur in people, particularly children. Background: In order to overcome the potential confounding by ascertainment bias, we conducted a community-based study of school children using direct interviews to determine the prevalence of tic disorders and any comorbid psychopathology.

**Methods:** A standard psychiatric interview and standardized rating scales were utilized to diagnose childhood behavioral disorders.

**Results:** Of the 325 children interviewed, 71 were identified as having tics. The following psychopathologies were found more commonly ( $p < 0.05$ ) in the children with tics: OCD, ADHD, separation anxiety, overanxious disorder, simple phobia, social phobia, agoraphobia, mania, major depression, and oppositional defiant behavior.

**Conclusions:** The behavioral spectrum of tic disorders includes OCD, other anxiety disorders, a mood disorder, and attention-deficit and disruptive behavior disorders

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Neuro-Oncology. 2016;18:iii152.

#### **MULTIDIMENSIONAL ASSESSMENT OF ATTENTION FUNCTIONING IN CHILDREN WITH BRAIN TUMORS.**

**Weiler L, Pletschko T, Schwarzinger A, et al.**

**Objectives:** It is well examined that children with brain tumors are at high risk for cognitive deficits; especially in attention functioning. Due to different considered constructs of attention and assigned neuropsychological tests, the neuropsychological profile of attention in children with brain tumors is to some point unclear.

**Methods:** Children with brain tumors ( $N = 66$ ) between 6 and 16 years were assessed for differentiated attentional constructs (e.g. sustained or divided attention). Furthermore, we compared this group to healthy children, children with other acquired brain injuries ( $N = 47$ ; e.g. epilepsy, stroke,..) and children with ADHD ( $N = 67$ ). Each construct was assessed by a number subtests of neuropsychological batteries, proxy reports (parents) and standardized behavioral observations.

**Results:** In general we found that children with brain tumors had significantly more problems in various attentional components than healthy children. Some tumor groups appeared to be more at risk than others. However, no specific neuropsychological profile for these children could be described. Interestingly, children with ADHD or other acquired brain injuries had even more deficits, especially considering their attentional behavior. Specific attentional problems in daily life could be highlighted by parental ratings.

**Conclusion:** Our Results highlight the necessity of a differentiated neuropsychological assessment to meet patients' needs best. Since we could not identify a specific pattern that is valid for all brain tumor patients in contrast to our control groups, we should rather look at individual neuropsychological profiles of attention functioning for each child suffering from a brain tumor

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Neuroimage Clin. 2016;10:274-82.

#### **DISSOCIATION OF WORKING MEMORY IMPAIRMENTS AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN THE BRAIN.**

**Mattfeld AT, Whitfield-Gabrieli S, Biederman J, et al.**

Prevailing neuropsychological models of attention-deficit/hyperactivity disorder (ADHD) propose that ADHD arises from deficits in executive functions such as working memory, but accumulating clinical evidence suggests a dissociation between ADHD and executive dysfunctions. This study examined whether ADHD and working memory capacity are behaviorally and neurobiologically separable using functional magnetic resonance imaging (fMRI). Participants diagnosed with ADHD in childhood who subsequently remitted or persisted in their diagnosis as adults were characterized at follow-up in adulthood as either impaired or unimpaired in spatial working memory relative to controls who never had ADHD. ADHD participants with impaired spatial working memory performed worse than controls and ADHD participants with unimpaired

working memory during an n-back working memory task while being scanned. Both controls and ADHD participants with unimpaired working memory exhibited significant linearly increasing activation in the inferior frontal junction, precuneus, lingual gyrus, and cerebellum as a function of working-memory load, and these activations did not differ significantly between these groups. ADHD participants with impaired working memory exhibited significant hypoactivation in the same regions, which was significantly different than both control participants and ADHD participants with unimpaired working memory. These findings support both a behavioral and neurobiological dissociation between ADHD and working memory capacity

NeuroImage Clin. 2016;12:397-404.

**AMPLITUDE VARIABILITY OVER TRIALS IN HEMODYNAMIC RESPONSES IN ADOLESCENTS WITH ADHD: THE ROLE OF THE ANTERIOR DEFAULT MODE NETWORK AND THE NON-SPECIFIC ROLE OF THE STRIATUM.**

**Sørensen L, Eichele T, van Wagoningen H, et al.**

It has been suggested that intra-individual variability (IIV) in performance on attention and other cognitive tasks might be a cognitive endophenotype in individuals with ADHD. Despite robust IIV findings in behavioral data, only sparse data exist on how what type of brain dysfunction underlies variable response times. In this study, we asked whether ADHD IIV in reaction time on a commonly-used test of attention might be related to variation in hemodynamic responses (HRs) observed trial-to-trial. Based on previous studies linking IIV to regions within the "default mode" network (DMN), we predicted that adolescents with ADHD would have higher HR variability in the DMN compared with controls, and this in turn would be related to behavioral IIV. We also explored the influence of social anxiety on HR variability in ADHD as means to test whether higher arousal associated with high trait anxiety would affect the neural abnormalities. We assessed single-trial variability of HRs, estimated from fMRI event-related responses elicited during an auditory oddball paradigm in adolescents with ADHD and healthy controls (11-18 years old; N = 46). Adolescents with ADHD had higher HR variability compared with controls in anterior regions of the DMN. This effect was specific to ADHD and not associated with traits of age, IQ and anxiety. However, an ADHD effect of higher HR variability also appeared in a basal ganglia network, but for these brain regions the relationships of HR variability and social anxiety levels were more complex. Performance IIV correlated significantly with variability of HRs in both networks. These results suggest that assessment of trial-to-trial HR variability in ADHD provides information beyond that detectable through analysis of behavioral data and average brain activation levels, revealing specific neural correlates of a possible ADHD IIV endophenotype

Neurological Research. 2016;1-6.

**SNAP-25 GENE VARIATIONS AND ATTENTION-DEFICIT HYPERACTIVITY DISORDER IN IRANIAN POPULATION.**

**Zarrabi Alhosseini M, Jamshidi J, Zare Bidoki A, et al.**

**OBJECTIVES:** Attention deficit hyperactivity disorder (ADHD) is a common psychiatric condition of childhood characterized by persistent symptoms of hyperactivity, inattention, and impulsivity. The objective of this study was to investigate the association of synaptosomal-associated protein of 25 kDa (SNAP-25) gene variants with ADHD.

**METHODS:** A case-control study with a total of 150 children with ADHD (mean age 9.61; range 6-16; gender ratio 105m/45f) and 150 normal children (mean age 10.02; range 6-16; gender ratio 98m/52f) was conducted. Genomic DNA was extracted from peripheral blood of all samples and SNPs rs78428954 and rs3746544 located in SNAP-25 gene were genotyped.

**RESULTS:** Our analysis indicated that there is no significant association between none of studied variants in SNAP-25 and ADHD.

**DISCUSSION:** To our knowledge, it is the first report of SNAP-25 genotyping in Iranian patients with ADHD. Further investigations with larger populations are needed in order to clarify the exact role of SNAP-25 variations in susceptibility to ADHD

Neuropsychol Rehabil. 2016 Sep;26:910-41.

**EFFECTS OF MEMORY STRATEGY TRAINING ON PERFORMANCE AND EVENT-RELATED BRAIN POTENTIALS OF CHILDREN WITH ADHD IN AN EPISODIC MEMORY TASK.**

**Jonkman LM, Hurks PP, Schleepen TMJ.**

Evidence for memory problems in children with attention deficit hyperactivity disorder (ADHD) is accumulating. Attempting to counter such problems, in the present study children with ADHD aged 8–12 years underwent a six-week metacognitive memory strategy training (MST) or one of two other active trainings, either a metacognitive attention-perceptual-motor training (APM) or placebo training consisting of playing board games (PLA). Effects of the training on episodic memory and underlying brain processes were investigated by comparing performance and event-related brain potentials (ERPs) on pre- and post-training sessions in an old/new recognition task between the three training groups. Potential far transfer effects of the memory strategy training were investigated by measuring performance on neuropsychological attention and memory-span tasks and parent-rated ADHD symptoms. The metacognitive memory strategy training led to significantly improved memory performance and enhanced amplitude of left parietal P600 activity associated with the process of memory recollection when compared to PLA, but APM training evoked similar improvements. Memory performance gains were significantly correlated with the memory-related ERP effects. Preliminary far transfer effects of MST training were found on attention and working memory performance and on parent-rated ADHD symptoms, although these results need replication with larger and better IQ-matched groups

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Pediatr Neurol. 2016 Jan;54:55-63.

**INFANT MOTOR DELAY AND EARLY SYMPTOMATIC SYNDROMES ELICITING NEURODEVELOPMENTAL CLINICAL EXAMINATIONS IN JAPAN.**

**Hatakenaka Y, Kotani H, Yasumitsu-Lovell K, et al.**

**BACKGROUND:** Abnormalities of early motor development have been reported in autism spectrum disorder, attention-deficit/hyperactivity disorder, intellectual developmental disorder, developmental coordination disorder, and other Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations (ESSENCE). However, few studies have been conducted with a view to following up a clinically representative cohort of children coming for assessment of motor delay before age two years. We performed a prospective clinical cohort study to examine whether or not early motor delay is often an indication of ESSENCE.

**METHODS:** The sample comprised a one-year cohort of all children who came to a Japanese neurodevelopmental center before their second birthday because of delayed or abnormal gross motor development. The children were followed up from the ESSENCE viewpoint.

**RESULTS:** Of the 30 children, 28 (18 boys and 10 girls) (93%) were given diagnoses subsumed under the ESSENCE umbrella. Of the 15 children with an identified or strongly suspected etiology, 13 (8 boys and 5 girls) (87%) had ESSENCE disorders or symptoms. Of the 15 children without a known etiology, all had ESSENCE disorders or symptoms.

**CONCLUSION:** This study indicated that the vast majority of children with motor delay or abnormality in the first two years of life meet criteria for a disorder within the group of ESSENCE at follow-up; this means that young children, presenting with motor problems always need a broad clinical assessment, not just related to motor function, and systematic follow-up

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Pediatr Res. 2016;80:228-36.

**ADHD RISK ALLELES ASSOCIATED WITH OPIATE ADDICTION: STUDY OF ADDICTED PARENTS AND THEIR CHILDREN.**

**Ornoy A, Finkel-Pekarsky V, Peles E, et al.**

**Background:** Polymorphisms in genes such as DAT1, 5HTTLPR, D4DR4, and MAO-A have been linked to attention deficit hyperactivity disorder (ADHD) and susceptibility for opiate addiction. We investigated in

opiate-addicted parents and their children the rate of ADHD and genetic markers that could predict susceptibility to ADHD and/or opiate addiction.

**Methods:** We studied 64 heroin-addicted, methadone-maintained parents, and their 94 children who had or had not been exposed prenatally to opiates. DNA extracted from mouthwash was assessed for genetic polymorphism for six polymorphic sites of four different genes. Study subjects also filled a variety of questionnaires assessing the rate of ADHD in the parents and children and the children's intelligence quotient.

**Results:** Children of opiate-dependent mothers had a higher rate of ADHD compared to those of the opiate-dependent fathers. Opiate-dependent parents have a high risk of being carriers of most risk alleles examined except DRD4EX3 (allele 7). There was no difference whether the addicted parents had or did not have ADHD.

**Conclusions:** Serotonergic and dopaminergic risk alleles seem to be mainly related to opiate dependence with no effect on the occurrence of ADHD. People carrying those polymorphisms are susceptible to opioid addiction and not necessarily to ADHD

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Pediatr Res. 2016;80:480-85.

**ASSOCIATIONS BETWEEN ALLERGIC DISEASES AND ATTENTION DEFICIT HYPERACTIVITY/OPPOSITIONAL DEFIANT DISORDERS IN CHILDREN.**

**Lin YT, Chen YC, Gau SSF, et al.**

**Background:** We aim to investigate the detailed associations between allergic diseases with attention deficit hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD) among children.

**Methods:** Clinical information from 2,896 children enrolled in the Taiwan Children Health Study was obtained for analyses. Allergic diseases, including atopic dermatitis, asthma, and allergic rhinitis, have been evaluated based on the questions adjusted from International Study of Asthma and Allergies in Childhood. The Swanson, Nolan, and Pelham questionnaire was used to assess symptoms of ADHD and ODD. Symptoms of depression, stress, and poor sleep quality were evaluated as the interactive risk factors.

**Results:** Children having symptoms of allergic diseases within the past 1 y were associated with having all dimensions of symptoms of ADHD and ODD. Children with ever having a physician-diagnosed atopic dermatitis were associated with inattentive and hyperactive-impulsive symptoms of ADHD. Ever diagnosed asthma was associated with ADHD and ODD. Ever diagnosed allergic rhinitis was associated with inattentive and combined symptoms of ADHD and ODD.

**Conclusion:** Children with allergic diseases, such as atopic dermatitis, asthma, and allergic rhinitis, were associated with exhibiting ADHD and ODD

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Pediatr Res. 2016;80:356-62.

**ASSOCIATION OF TRAUMATIC BRAIN INJURY IN CHILDHOOD AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A POPULATION-BASED STUDY.**

**Yang LY, Huang CC, Chiu WT, et al.**

**Background:** We evaluated the risk of attention-deficit hyperactivity disorder (ADHD) following childhood traumatic brain injury (TBI).

**Methods:** Using Taiwan's National Health Insurance Research Database, we included 10,416 newly diagnosed TBI children (aged 1-12 y) between 2001 and 2002 and 41,664 children without TBI, who were frequency matched by sex, age, and year of the index medical service with each TBI child, as controls. Children who had been diagnosed with ADHD prior to their medical service index were excluded. Each individual was followed for 9 y to identify ADHD diagnosis. We also compared the ADHD risk in children who were treated for fractures but not TBI as sensitivity analysis.

**Results:** During the 9-y follow-up period, children with TBI had a higher ADHD risk (adjusted hazard ratio (AHR) = 1.32, 95% confidence interval (CI) = 1.19, 1.45) than did those without TBI. Furthermore, children with mild and severe TBI had higher AHRs for ADHD than did those without TBI (AHR = 1.30; 95% CI = 1.10,

1.53; and AHR = 1.37; 95% CI = 1.22, 1.55). However, no significant association was observed between fractures and ADHD.

**Conclusion:** TBI in childhood is associated with a greater likelihood of developing ADHD

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Pediatrics. 2016;138.

**RACIAL AND ETHNIC DISPARITIES IN ADHD DIAGNOSIS AND TREATMENT.**

**Coker TR, Elliott MN, Toomey SL, et al.**

**OBJECTIVES:** We examined racial/ethnic disparities in attention-deficit/hyperactivity disorder (ADHD) diagnosis and medication use and determined whether medication disparities were more likely due to underdiagnosis or undertreatment of African-American and Latino children, or overdiagnosis or overtreatment of white children.

**METHODS:** We used a population-based, multisite sample of 4297 children and parents surveyed over 3 waves (fifth, seventh, and 10th grades). Multivariate logistic regression examined disparities in parent-reported ADHD diagnosis and medication use in the following analyses: (1) using the total sample; (2) limited to children with an ADHD diagnosis or symptoms; and (3) limited to children without a diagnosis or symptoms.

**RESULTS:** Across all waves, African-American and Latino children, compared with white children, had lower odds of having an ADHD diagnosis and of taking ADHD medication, controlling for sociodemographics, ADHD symptoms, and other potential comorbid mental health symptoms. Among children with an ADHD diagnosis or symptoms, African-American children had lower odds of medication use at fifth, seventh, and 10th grades, and Latino children had lower odds at fifth and 10th grades. Among children who had neither ADHD symptoms nor ADHD diagnosis by fifth grade (and thus would not likely meet ADHD diagnostic criteria at any age), medication use did not vary by race/ethnicity in adjusted analysis.

**CONCLUSIONS:** Racial/ethnic disparities in parent-reported medication use for ADHD are robust, persisting from fifth grade to 10th grade. These findings suggest that disparities may be more likely related to underdiagnosis and undertreatment of African-American and Latino children as opposed to overdiagnosis or overtreatment of white children

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PLoS ONE. 2016;11.

**A RANDOMISED CONTROLLED TRIAL OF A PLAY-BASED INTERVENTION TO IMPROVE THE SOCIAL PLAY SKILLS OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD).**

**Wilkes-Gillan S, Bundy A, Cordier R, et al.**

There is a need for effective interventions to address the social difficulties of children with ADHD. This randomised controlled trial examined the effectiveness of a play-based intervention for improving the social play skills of children with ADHD in peer-to-peer interactions. Children with ADHD (5 to 11 years) were randomised to an intervention-first (n = 15) or waitlist control-first group (n = 14). Participants allocated to the control-first group received the intervention after a 10-week wait period. Children invited a typically-developing playmate and parents of children with ADHD participated. The intervention involved: six clinic play-sessions, weekly home-modules and a one-month home follow up. The Test of Playfulness (ToP) was scored by a blinded rater. Parent reported treatment adherence was used to assess treatment fidelity. Between group statistics were used to compare the change of the intervention-first (10-week intervention period) and control-first (10-week wait period) groups. Once all children had received the intervention, repeated measures ANOVA, post hoc Least Significance Difference tests and Cohen's-d were used to measure effect. Changes in ToP social items were analysed using Friedman's ANOVA. Linear regression analyses were used to identify variables that predicted change. The control-first group did not change during the wait period. The change in the intervention-first group was significantly greater than the change in the control-first group (during the wait period). When the data from the two groups were combined, the mean ToP scores of the children with ADHD (n = 29) improved significantly following the intervention, with a large effect from pre to post intervention and from pre intervention to follow up. Children maintained treatment gains at follow up. All ToP social items improved significantly following the intervention. The findings support

the use of play involving parent and peer mediated components to enhance the social play skills of children with ADHD

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PLoS ONE. 2016;11.

**MULTICLASS CLASSIFICATION FOR THE DIFFERENTIAL DIAGNOSIS ON THE ADHD SUBTYPES USING RECURSIVE FEATURE ELIMINATION AND HIERARCHICAL EXTREME LEARNING MACHINE: STRUCTURAL MRI STUDY .**

**Qureshi MNI, Min B, Jo HJ, et al.**

The classification of neuroimaging data for the diagnosis of certain brain diseases is one of the main research goals of the neuroscience and clinical communities. In this study, we performed multiclass classification using a hierarchical extreme learning machine (H-ELM) classifier. We compared the performance of this classifier with that of a support vector machine (SVM) and basic extreme learning machine (ELM) for cortical MRI data from attention deficit/hyperactivity disorder (ADHD) patients. We used 159 structural MRI images of children from the publicly available ADHD-200 MRI dataset. The data consisted of three types, namely, typically developing (TDC), ADHD-inattentive (ADHD-I), and ADHD-combined (ADHD-C). We carried out feature selection by using standard SVM-based recursive feature elimination (RFE-SVM) that enabled us to achieve good classification accuracy (60.78%). In this study, we found the RFE-SVM feature selection approach in combination with H-ELM to effectively enable the acquisition of high multiclass classification accuracy rates for structural neuroimaging data. In addition, we found that the most important features for classification were the surface area of the superior frontal lobe, and the cortical thickness, volume, and mean surface area of the whole cortex

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Prax Kinderpsychol Kinderpsychiatr. 2016;65:298-314.

**ADAPTIVE AND MALADAPTIVE STRATEGIES OF EMOTION REGULATION IN ADOLESCENTS WITH ADHD.**

**Lange S, Troster H.**

The present study investigated differences between adolescents with ADHD and control subjects in their adaptive and maladaptive regulation of negative emotions. We assessed emotion regulation strategies using the German self-report questionnaire FEEL-KJ in a sample of adolescents (between 11 and 18 years) with ADHD (disturbance of activity, impulsivity and attention: n = 32, hyperkinetic conduct disorder: n = 26) and controls (n = 58). We found that adolescents with ADHD reported using less adaptive strategies for dealing with negative emotions than control subjects. No effects were found for maladaptive emotion regulation strategies for anger, fear and sadness. Our findings indicate that adolescents with ADHD should be encouraged in the development of adaptive emotion regulation

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Prog Neurobiol. 2016 Jan;136:28-49.

**IMPAIRED OLIGODENDROCYTE MATURATION IN PRETERM INFANTS: POTENTIAL THERAPEUTIC TARGETS.**

**van TE, Heijnen CJ, Benders MJ, et al.**

Preterm birth is an evolving challenge in neonatal health care. Despite declining mortality rates among extremely premature neonates, morbidity rates remain very high. Currently, perinatal diffuse white matter injury (WMI) is the most commonly observed type of brain injury in preterm infants and has become an important research area. Diffuse WMI is associated with impaired cognitive, sensory and psychological functioning and is increasingly being recognized as a risk factor for autism-spectrum disorders, ADHD, and other psychological disturbances. No treatment options are currently available for diffuse WMI and the underlying pathophysiological mechanisms are far from being completely understood. Preterm birth is associated with maternal inflammation, perinatal infections and disrupted oxygen supply which can affect the cerebral microenvironment by causing activation of microglia, astrogliosis, excitotoxicity, and oxidative stress. This intricate interplay of events negatively influences oligodendrocyte development, causing arrested oligodendrocyte maturation or oligodendrocyte cell death, which ultimately results in myelination failure in

the developing white matter. This review discusses the current state in perinatal WMI research, ranging from a clinical perspective to basic molecular pathophysiology. The complex regulation of oligodendrocyte development in healthy and pathological conditions is described, with a specific focus on signaling cascades that may play a role in WMI. Furthermore, emerging concepts in the field of WMI and issues regarding currently available animal models are put forward. Novel insights into the molecular mechanisms underlying impeded oligodendrocyte maturation in diffuse WMI may aid the development of novel treatment options which are desperately needed to improve the quality-of-life of preterm neonates

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Psychiatry Res. 2016 Aug;242:180-85.

**DSM-5 CHANGES ENHANCE PARENT IDENTIFICATION OF SYMPTOMS IN ADOLESCENTS WITH ADHD.**

**Sibley MH, Kuriyan AB.**

This study evaluates the impact of the DSM-5 ADHD symptom wording changes on symptom endorsement among adolescents with ADHD. Parents of adolescents with systematically diagnosed DSM-IV-TR ADHD (N = 78) completed counterbalanced DSM-IV-TR and DSM-5 ADHD symptom checklists in a single sitting. General linear models were conducted to evaluate whether the new DSM-5 symptom descriptors influenced the total number of ADHD symptoms and overall ADHD symptom severity endorsed by parents, how demographic factors were associated with noted changes in symptom endorsement when moving to the DSM-5, and which DSM ADHD items displayed notable changes in endorsement rates under the new wording. On average, parents identified 1.15 additional symptoms of ADHD in adolescents when moving from the DSM-IV-TR to the DSM-5. Increased symptom identification was not specific to age, sex, ethnicity, race, or socioeconomic status. Over half of the sample experienced increased symptom endorsement when changing texts (59.0%). Under the new DSM-5 wording, four symptoms had statistically significant endorsement increases (range: 11.2–16.7%): difficulty sustaining attention, easily distracted, difficulty organizing tasks and activities, and does not seem to listen

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Psychiatry Research: Neuroimaging. 2016 Aug;254:119-26.

**GLOBAL AND LOCAL GREY MATTER REDUCTIONS IN BOYS WITH ADHD COMBINED TYPE AND ADHD INATTENTIVE TYPE.**

**Vilgis V, Sun L, Chen J, et al.**

Attention-deficit/hyperactivity disorder (ADHD) has reliably been associated with global grey matter reductions but local alterations are largely inconsistent with perhaps the exception of the caudate nucleus. The aim of this study was to examine local and global brain volume differences between typically developing children (TD) and children with a diagnosis of ADHD. We also addressed whether these parameters would differ between children with the ADHD-combined type (ADHD-C) and those with the ADHD-inattentive type (ADHD-I). Using an ROI approach caudate volume differences were also examined. 79 boys between the ages of 8 and 17 participated in the study. Of those 33 met diagnostic criteria for the ADHD-C and 15 for the ADHD-I subtype. 31 boys were included in the TD group. Structural magnetic resonance imaging data were analysed using voxel-based morphometry. The ADHD group had significantly lower global and local grey matter volumes within clusters in the bilateral frontal, right parietal and right temporal regions compared to TD. A significant group by age interaction was found for right caudate nucleus volume. No differences between the ADHD-C and ADHD-I groups were found. Right caudate nucleus volume and age are more strongly related in ADHD than in TD consistent with previous research

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Psychol Assess. 2016 Mar;28:319-30.

**MEASURING EXECUTIVE FUNCTION IN EARLY CHILDHOOD: A CASE FOR FORMATIVE MEASUREMENT.**

**Willoughby MT, Blair CB.**

This study tested whether individual executive function (EF) tasks were better characterized as formative or reflective indicators of the latent construct of EF. EF data that were collected as part of the Family Life Project (FLP), a prospective longitudinal study of families who were recruited at the birth of a new child (N = 1,292), when children were 3, 4, and 5 years old. Vanishing tetrad tests were used to test the relative fit of models in which EF tasks were used as either formative or reflective indicators of the latent construct of EF in the prediction of intellectual ability (at Age 3), attention-deficit hyperactivity disorder symptoms (at Ages 3 to 5 years), and academic achievement (at kindergarten). Results consistently indicated that EF tasks were better represented as formative indicators of the latent construct of EF. Next, individual tasks were combined to form an overall measure of EF ability in ways generally consistent with formative (i.e., creating a composite mean score) and reflective (i.e., creating an EF factor score) measurement. The test-retest reliability and developmental trajectories of EF differed substantially, depending on which overall measure of EF ability was used. In general, the across-time stability of EF was markedly higher when represented as a factor score versus composite score. Results are discussed with respect to the ways in which the statistical representation of EF tasks can exert a large impact on inferences regarding the developmental causes, course, and consequences of EF

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Psychol Med. 2016 Feb;46:529-41.

**DISRUPTIONS OF WORKING MEMORY AND INHIBITION MEDIATE THE ASSOCIATION BETWEEN EXPOSURE TO INSTITUTIONALIZATION AND SYMPTOMS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER.**

**Tibu F, Sheridan MA, McLaughlin KA, et al.**

**BACKGROUND:** Young children raised in institutions are exposed to extreme psychosocial deprivation that is associated with elevated risk for psychopathology and other adverse developmental outcomes. The prevalence of attention deficit hyperactivity disorder (ADHD) is particularly high in previously institutionalized children, yet the mechanisms underlying this association are poorly understood. We investigated whether deficits in executive functioning (EF) explain the link between institutionalization and ADHD.

**METHOD:** A sample of 136 children (aged 6-30 months) was recruited from institutions in Bucharest, Romania, and 72 never institutionalized community children matched for age and gender were recruited through general practitioners' offices. At 8 years of age, children's performance on a number of EF components (working memory, response inhibition and planning) was evaluated. Teachers completed the Health and Behavior Questionnaire, which assesses two core features of ADHD, inattention and impulsivity.

**RESULTS:** Children with history of institutionalization had higher inattention and impulsivity than community controls, and exhibited worse performance on working memory, response inhibition and planning tasks. Lower performances on working memory and response inhibition, but not planning, partially mediated the association between early institutionalization and inattention and impulsivity symptom scales at age 8 years.

**CONCLUSIONS:** Institutionalization was associated with decreased EF performance and increased ADHD symptoms. Deficits in working memory and response inhibition were specific mechanisms leading to ADHD in previously institutionalized children. These findings suggest that interventions that foster the development of EF might reduce risk for psychiatric problems in children exposed to early deprivation

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Psychol Med. 2016 Feb;46:519-28.

**DEFAULT MODE NETWORK ABNORMALITIES DURING STATE SWITCHING IN ATTENTION DEFICIT HYPERACTIVITY DISORDER.**

**Sidlauskaite J, Sonuga-Barke E, Roeyers H, et al.**

**BACKGROUND:** Individuals with attention deficit hyperactivity disorder (ADHD) display excess levels of default mode network (DMN) activity during goal-directed tasks, which are associated with attentional disturbances and performance decrements. One hypothesis is that this is due to attenuated down-regulation

of this network during rest-to-task switching. A second related hypothesis is that it may be associated with right anterior insula (rAI) dysfunction - a region thought to control the actual state-switching process.

**METHOD:** These hypotheses were tested in the current fMRI study in which 19 adults with ADHD and 21 typically developing controls undertook a novel state-to-state switching paradigm. Advance cues signalled upcoming switches between rest and task periods and switch-related anticipatory modulation of DMN and rAI was measured. To examine whether rest-to-task switching impairments may be a specific example of a more general state regulation deficit, activity upon task-to-rest cues was also analysed.

**RESULTS:** Against our hypotheses, we found that the process of down-regulating the DMN when preparing to switch from rest to task was unimpaired in ADHD and that there was no switch-specific deficit in rAI modulation. However, individuals with ADHD showed difficulties up-regulating the DMN when switching from task to rest.

**CONCLUSIONS:** Rest-to-task DMN attenuation seems to be intact in adults with ADHD and thus appears unrelated to excess DMN activity observed during tasks. Instead, individuals with ADHD exhibit attenuated up-regulation of the DMN, hence suggesting disturbed re-initiation of a rest state

Psychotropes (Belgium). 2016;22:91-108.

#### **GAMBLING AND ATTENTION DEFICIT HYPERACTIVITY DISORDERS (ADHD) IN ADOLESCENTS.**

**Romo L, Rémond JJ, Kotbagi ACG, et al.**

Attention Deficit Disorder with or without Hyperactivity (ADHD) is a neuro-developmental disorder associated with comorbidities such as depression, anxiety or addictive disorders. Many studies confirm that problematic gambling is associated with ADHD and particularly with the severity of positive symptoms. This study had two aims: (I) to test if the presence of ADHD had a significant association with problematic gambling and (II) to observe the impact of the presence of ADHD associated with problematic gambling on self-esteem and academic performance. A total of 719 students (445 males and 274 females) were recruited from six high schools and two higher educational institutions of -de-France. Data included their scores on the ICJE, UPPS, WURS, ASRS and Rosenberg scales, along with their demographic data. We found that 37.5% had high scores on the problematic gambling scale as well as on the WURS and the ASRS scales, as against 14.55% with no gambling addiction. The results also indicated that ADHD among young people was also associated with problematic gambling. Significant associations were observed between ADHD and impulsivity, academic difficulties and problematic gambling. Also, men are significantly more likely to develop problematic gambling when they have ADHD. However, results didn't show that self-esteem was significantly impacted when an individual had high scores on both ADHD and problematic gambling

Res Dev Disabil. 2016;59:176-85.

#### **BENEFITS OF AN EXPERIMENTAL PROGRAM OF EQUESTRIAN THERAPY FOR CHILDREN WITH ADHD.**

**García-Gómez A, Rodríguez-Jiménez M, Guerrero-Barona E, et al.**

**BACKGROUND:** Equestrian therapy has been shown to be a useful instrument in the sphere of the emotional wellbeing and mental health of different population groups.

**AIMS:** To empirically determine the effects of a program of equestrian therapy on quality of life and various psychosocial variables of a group of 14 pupils diagnosed with Attention Deficit Hyperactivity Disorder (ADHD), aged from 7 to 14 years.

**METHODS AND PROCEDURES:** A quasi-experimental design, with a pre-test and a post-test, was implemented with an experimental group and a control group. The program consisted of 24 biweekly sessions, therefore lasting some 3 months. The data acquisition instruments used were: the "Behavior Assessment System for Children" (BASC) and an ad-hoc quality of life questionnaire.

**OUTCOMES AND RESULTS:** The results deriving from the teachers' responses and the different scales of the BASC showed no significant group differences, but for the experimental group there was an improvement in the indicator corresponding to interpersonal relationships in the quality-of-life questionnaire.

**CONCLUSIONS AND IMPLICATIONS:** It would seem that it is currently possible to recommend this activity, for this target population, as a sporting activity that provides similar benefits to other physical activities, but which is still far from being able to be recognized as a therapeutic activity

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Res Dev Disabil. 2016;59:186-93.

**DIFFICULTIES OF CHILDREN WITH ADHD SYMPTOMS IN SOLVING MATHEMATICAL PROBLEMS WHEN INFORMATION MUST BE UPDATED.**

**Re AM, Lovero F, Cornoldi C, et al.**

It has been hypothesized that ADHD is associated both with difficulties in mathematical problem solving and in updating information in working memory. However, the relationship between updating and performance on mathematical word problems has never been studied for children with ADHD. The present study examined these issues comparing the performance of solving mathematical word problems (with no updating request vs high updating request) in a group of 117 12-year old children with ADHD compared to a matched control group with typical development (TD). Results showed that children with ADHD solved fewer problems correctly than typically-developing children; moreover they made more errors in solving problems with updating requirements than those without updating requirements. In contrast, typically-developing children did not show any differences in problems performance on problems with and without updating requirements. Fine grained analyses of children's problem solving processes showed that children with ADHD found more difficult to select the appropriate data prior to calculation and to choose and execute the correct solution than typically-developing children. The difficulty to select the appropriate data results more severe in problems with updating requirements. Overall, these results support the hypothesis that the learning difficulties of children with ADHD are related to their executive dysfunctions, that negatively affect complex tasks requiring updating of to-be-processed information

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Rev Med Liege. 2016 Mar;71:141-46.

**CONTROVERSIES AROUND THE DIAGNOSIS OF ADHD.**

**Hooft MN, Denis C, Pitchot W.**

Complaints about restlessness, difficulties to focus and impulsivity are amongst the most frequent reasons for child psychiatric consultations. Those complaints refer to the core symptoms of the ADHD. However, the diagnosis of ADHD is delicate to establish and subject to several controversies regarding its etiopathological origins and, therefore, its treatment. In practice, those situations include very different cases and it seems obvious that this is a polyfactorial disorder, no single factor alone being sufficient to account for all the difficulties experienced by the children. It would therefore be simplistic to consider the ADHD as issued only from a neurobiological disorder and to consider a drug treatment, only. We are rather in favor of an integrative approach and a global treatment on a case by case basis

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School Psychology Quarterly. 2016 Sep;31:393-404.

**WRITING ABILITIES LONGITUDINALLY PREDICT ACADEMIC OUTCOMES OF ADOLESCENTS WITH ADHD.**

**Molitor SJ, Langberg JM, Bourchtein E, et al.**

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Soc Sci Med. 2016;168:111-19.

**PEER INFLUENCE AS A POTENTIAL MAGNIFIER OF ADHD DIAGNOSIS.**

**Aronson B.**

The prevalence of Attention Deficit and Hyperactivity Disorder (ADHD) is growing in America, but its cause is unclear. Scholars have identified many environmental factors that can cause or confound ADHD diagnosis, but epidemiological studies that try to control for confounding factors still find evidence that rates of ADHD diagnosis are increasing. As a preliminary explanation to ADHD's increasing prevalence, this article examines whether core ADHD diagnostic traits are subject to peer influence. If ADHD diagnosis can be confounded by peer influence, there are several mechanisms that could have caused increased rates of diagnosis. With data drawn from two schools across three waves in the National Longitudinal Survey of Adolescent Health (n = 2193), the author uses a stochastic actor oriented model to estimate the effect of peer influence on inattention, controlling for alternative network and behavioral causes. Results indicate that respondents have a strong likelihood to modify their self-reports of inattention, a core ADHD trait, to resemble that of their friends

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Tijdschr Psychiatr. 2016;58:318-22.

**CASE REPORT: THE CHILD- AND ADOLESCENT PSYCHIATRIC PHENOTYPE OF A BROTHER AND SISTER WITH 16P11.2 MICRODUPLICATION.**

**Afschrift HC, van den Steene HC, Dhar M, et al.**

16p11.2 microduplication is linked with a vulnerability for a range of psychiatric and somatic problems, with variable expression and penetration rate. We discuss the phenotypical expression of this microduplication with the case of a brother and sister. Both subjects went through child psychiatric diagnostics and treatment, where a varying degree of developmental delay and symptoms that match an attention deficit/hyperactivity disorder were observed in combination with short stature and low body mass index

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West J Nurs Res. 2016 Sep;38:1155-84.

**ENHANCED PHYSICAL ACTIVITY IMPROVES SELECTED OUTCOMES IN CHILDREN WITH ADHD: SYSTEMATIC REVIEW.**

**Song M, Lauseng D, Lee S, et al.**

This review examines associations between physical activity (PA) and cognitive, behavioral, and physiological outcomes in children with attention-deficit/hyperactivity disorder (ADHD). We reviewed studies on participants = 18 years old, published in English between January 1998 and December 2014, in PubMed, CINAHL, PsycINFO, and Cochrane Reviews. Twenty-six studies were grouped into two categories: those that did and did not account for effects of ADHD medications. The first category showed lower levels of PA and improved cognitive and behavioral outcomes in youth whose ADHD was treated with medications. The second category showed a positive association between PA levels and cognitive and behavioral outcomes in youth whose ADHD was not treated with medications. For both categories of studies, results were inconclusive regarding physiological outcomes. Randomized controlled trials are needed to better clarify the relationship between PA and outcomes in youth with ADHD, and particularly to understand the impact of ADHD medications on that relationship

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Z Kinder Jugendpsychiatr Psychother. 2016;44:275-84.

**TIME TRENDS IN THE FREQUENCIES OF ADHD AND STIMULANT MEDICATION.**

**Steinhausen HC, Dopfner M, Schubert I.**

Time-trends in the frequencies of mental disorders represent specific challenges for the planning of services. The present review addresses the specific question whether or not there are time changes in terms of an increase of prevalence and incidence rates of attention-deficit hyperactivity disorders (ADHD) based on findings from international epidemiological studies from several decades. While there is no evidence that

prevalence rates of ADHD have systematically increased, various national and international incidence studies on ADHD but also prevalence and incidence studies on prescribed medication indicate that the number of treated people with ADHD has increased significantly in the recent past. This increase remains even after adjusting for the general increase in the number of persons admitted to psychiatry for any disorder. Thus, the gap between those in need of treatment and those who actually receive treatment for ADHD has narrowed over time. However, after years of an increase, in recent years German studies dealing with prescriptions of medications have shown also a declining trend

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Zhonghua Yu Fang Yi Xue Za Zhi. 2016 Feb;50:192-97.

**THE EFFECTS OF PRENATAL ENVIRONMENTAL EXPOSURES ON CHILDREN DEVELOPMENT AND HEALTH.**

***Tao S, Tao F.***

The negative effects of environmental exposure during pregnancy on fetal growth and children development have been confirmed. It has been found that environmental exposures during pregnancy have a great influence on the growth and development of fetus, birth outcomes and children's psychology, behavior and neural development. In this review, according to different types of environmental exposures, we focused on the key issues of the fetus or children induced by four aspects of environment exposure, including environmental chemicals, unhealthy life styles and behaviors, stress and other risk factors, and discussed the adverse effects of environmental factors on the growth and development of infants, children's psychology, behavior, social and cognitive, such as birth defects, autism spectrum disorders, attention deficit hyperactivity disorder, emotional problems, learning disorder and intelligence development and so on. We also suggested that the researches on mechanism of the negative effects of environmental exposure on children's health should be strengthened in the future

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## Difficulties of children with ADHD symptoms in solving mathematical problems when information must be updated



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### ABSTRACT

It has been hypothesized that ADHD is associated both with difficulties in mathematical problem solving and in updating information in working memory. However, the relationship between updating and performance on mathematical word problems has never been studied for children with ADHD. The present study examined these issues comparing the performance of solving mathematical word problems (with no updating request vs high updating request) in a group of 11–12 year old children with ADHD compared to a matched control group with typical development (TD). Results showed that children with ADHD solved fewer problems correctly than typically-developing children; moreover they made more errors in solving problems with updating requirements than those without updating requirements. In contrast, typically-developing children did not show any differences in problems performance on problems with and without updating requirements. Fine grained analyses of children's problem solving processes showed that children with ADHD found more difficult to select the appropriate data prior to calculation and to choose and execute the correct solution than typically-developing children. The difficulty to select the appropriate data results more severe in problems with updating requirements. Overall, these results support the hypothesis that the learning difficulties of children with ADHD are related to their executive dysfunctions, that negatively affect complex tasks requiring updating of to-be-processed information.

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### What this paper adds

The relationship between updating and performance on mathematical word problems has never been studied for children with ADHD. This paper showed that the request of updating information impaired the problem solving ability of children with ADHD with respect to children with typical development. In addition, fine grained analyses of children's problem solving processes showed that children with ADHD found more difficult to select the appropriate data prior to calculation and to choose and execute the correct solution than typically-developing children. Our results support the view that updating is problematic in ADHD children and that updating influences their problem solving ability.

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## 1. Introduction

One of the main goals of mathematical education is to develop students' ability to solve mathematical word problems. This ability is important both for academic success and for problem solving in everyday life. However, mathematical word problem solution is very demanding and difficult for many students (Mayer & Hegarty, 1996). Solving mathematical word problems may be particularly difficult for children with atypical development, such as those with ADHD symptoms, but the issue has not been deeply studied (Marzocchi, Cornoldi, Lucangeli, De Meo, & Fini, 2002), whereas more attention has been devoted to other mathematical abilities of children with ADHD, with partly contradictory results. Indeed, although, several studies showed a significant negative correlation between mathematics and ADHD symptoms (Benedetto-Nasho & Tannock, 1999; Greven, Kova, Willcutt, Petrill, & Plomin, 2014; Thorell, 2007), not all studies found this negative relations (for a review see Tosto, Momi, Asherson, & Malki, 2015).

The primary purpose of this study was therefore to determine whether 6th graders with ADHD (aged 11–12 years) are impaired in solving mathematical word problems, compared to typically-developing children of same age and grade. A second goal of the study was to test the hypothesis that the difficulty of children with ADHD is related to their weaknesses in working memory, specifically, in updating processes necessary to build the correct mental model of the problem. A third goal of the study was to examine which steps of the problem solving process were specifically disrupted for the ADHD group.

### 1.1. *Mathematical word problem processes*

In the school setting, mathematical word problems are typically presented as a short story that includes relevant numerical information (e.g., “data”) and a question (e.g., John bought 4 pizzas with 8 slices each. He and his friends Bruce ate 12 slices of the pizzas. How many slices were left?). The solution of the problem requires the use of arithmetic operations (i.e., addition, subtraction, multiplication, or division), and the execution of several different cognitive processes, as now we will describe. Initially, in the understanding phase, children must formulate a cognitive representation of the information drawn from the text of the problem. This initial cognitive representation requires discriminating relevant from irrelevant information. Subsequently, in the solution phase, they need to formulate a plan for solving the problem (Lee, Ng, & Ng, 2009; Mayer & Hegarty, 1996; Mayer, Larkin, & Kadane, 1984; Riley & Greeno, 1988). Devising a plan involves choosing appropriate sub-goals for the solution and consequently include the choice of the correct arithmetic operations and algorithms. Finally, they have to correctly perform the calculations.

Memory processes related with the Central Executive component of working memory appear to be important for successful solutions of mathematical word problems (Lee et al., 2009; Rasmussen & Bisanz, 2005; Swanson, Jerman, & Zheng, 2008). Although several working memory models have been described in the literature, our research is within the theoretical framework of the widely accepted model of Baddeley and Hitch (1974) see also Baddeley (1986, 1992, 2000). According to Baddeley's model, working memory involves two slave systems, the articulatory loop and visuospatial sketch pad, which store verbal and visuospatial materials, respectively. The activity of these storage systems is coordinated by the Central Executive, a system with supervisory and attentional functions. A fourth component, the episodic buffer, is responsible for integrating information from the working memory storage and long-term memory. However, the outcomes on this component are still very scarce in the area of developmental psychology.

According to Miyake et al. (2000), the Central Executive component of Baddeley's model is related with three main executive functions: inhibition, updating, and shifting. Inhibition involves the ability to suppress dominant or prepotent responses, shifting involves the ability to shift strategies when attending to multiple tasks or mental processes and updating involves the ability to replace outdated and irrelevant information by maintaining only a restricted set of elements in working memory.

### 1.2. *Updating and mathematical word problem*

Research is still scarce about the influence of the executive components of working memory on the solution of arithmetic word problems. Previous research has shown a relationship between the ability to inhibit irrelevant information stored in working memory and problem solving (Passolunghi & Siegel, 2001, 2004; Passolunghi, Cornoldi, & De Liberto, 1999). Specifically, Passolunghi and Siegel (2001, 2004) found that, compared to good problem solvers, poor problem solvers found it difficult to suppress information that was irrelevant to the problem solving task. With regard to updating, several authors have suggested that updating could also be a key cognitive process for solving mathematical word problems (Blessing & Ross, 1996; Iglesias-Sarmiento, Carriedo López, & Rodríguez Rodríguez, 2015; Kotsopoulou & Leeb, 2012; Passolunghi & Pazzaglia, 2004). In fact, word problem solving requires the maintenance of information and the construction of a mental model that may also need to be modified at each step of the problem-solving process (Blessing & Ross, 1996; Hegarty, Mayer, & Monk, 1995; Passolunghi & Pazzaglia, 2004). This updating process mirrors a similar process in reading comprehension, where readers need to construct a mental representation of the contents of the text, a process that requires integrating information from the text with previous knowledge (Gernsbacher, 1993), and updating it when new information appears (Gernsbacher, 1993). Accordingly, the mechanisms involved in this process include the enhancement of new relevant information and the inhibition of information already processed but no longer relevant.

When they are comprehending mathematical word problems, problem solvers have to process all of the information derived from the problem text. Information that is not relevant to the problem solution should be inhibited. Other information will be connected in a coherent mental model that may be successively modified in response to new information. This mental model will be complete when all the information relevant to solving the question is integrated. Updating is a complex process that includes selecting information to retain or exclude from the model maintained in working memory. On this respect [Passolunghi and Pazzaglia \(2004\)](#) found that fourth grade children with low updating functioning showed worse performance on arithmetic problems than a control group matched for intelligence but with higher updating ability. Comparable results in studies using similar tests have been reported in reading comprehension (e.g. [Chiappe, Hasher, & Siegel, 2000](#); [Palladino, Cornoldi, De Beni, & Pazzaglia, 2001](#)) and in problem solving with children with typical development (respectively, 5th graders in [Iglesias-Sarmiento et al. \(2015\)](#), and 8th graders in [Kotsopoulou & Leeb, 2012](#)).

### 1.3. *Updating and mathematical word problems in children with atypical development*

A study with poor comprehenders ([Cornoldi, Drusi, Tencati, Giofrè, & Mirandola, 2012](#)) found that they also had problem solving difficulties related with their updating difficulties. [Passolunghi and Pazzaglia \(2005\)](#) compared the performance in updating ability in two groups of 4th grade children with and without poor problem-solving ability. They found the main difficulties of poor problem solvers were not in memory storage, but in updating and the strategic control of information.

In summary, there is evidence suggesting that success in mathematical problem solving is associated with the efficient use of working memory updating processes. This conclusion has implications for the children with ADHD, as several studies provided support to the hypothesis that children with ADHD have poor working memory, in particular in suppressing irrelevant information and updating relevant information ([Armstrong, Hayes, & Martin, 2001](#); [Barkley, 1997](#); [Mariani & Barkley, 1997](#)). [Cornoldi et al. \(2001\)](#) hypothesized that the reason children with ADHD symptoms have lower performance and higher number of intrusion errors both in verbal and spatial working memory tasks is because they are not capable of suppressing information that initially has to be processed, and subsequently excluded from the memory system. This deficit could contribute to the poor performance on children with ADHD in mathematics, in combinations with their difficulties in other processes, including calculation ([Mayes & Calhoun, 2006](#); [Sella, Re, Lucangeli, Cornoldi, & Lemaire, 2012](#); [Zentall, Smith, Lee, & Wiczorek, 1994](#)). Consistent with the view, children with ADHD are impaired in solving math word problems that include irrelevant information that must be inhibited for successful solution, as suggested by [Marzocchi et al. \(2002\)](#) and [Passolunghi, Marzocchi, and Fiorillo \(2005\)](#). However, these two previous studies only considered the case of exclusion of irrelevant information, and did not examine the case, present in school problem solving and particularly frequent in everyday life, in which old information maintained in working memory must be not only excluded but also substituted with new one. Therefore, in the present study we focused on updating processes in mathematical word problems. In fact, updating requires not only the exclusion/inhibition of irrelevant information of the problem, but also its substitution with a new relevant information,

### 1.4. *The present study*

In the present study, we examined the mathematical word problem solving ability of 6th grade children with reported symptoms of ADHD (referred to as children with ADHD), compared to children with typical development. The children were asked to solve mathematical word problems containing 1–3 to be updated data (presenting numerical information that initially had to be processed, but had, in a second time, to be updated with other relevant numerical information according to the goal of the problem). The texts were read to the children in order to simulate typical everyday situations where there is no written text and also to emphasize the role of working memory (see the detailed procedure and materials in the Method Section).

Our aims were to determine whether children with ADHD symptoms have lower performance on math word problems, whether they found problems requiring updating more difficult than problems which did not require updating, and to determine which solution processes are involved when the children experienced difficulties. In particular we focused on four processes represented by: a) the data report (i.e., if the child had written all the data mentioned by the experimenter); b) the correct selection of data (i.e., if the data used by the child in solving the problem were the appropriate ones or the child became confused, for example in problems with updating, and selected the old data); c) the choice of arithmetic operation (i.e., if the child had chosen the appropriate operations for solving the problem) and d) the execution of the algorithm (i.e., if the child had correctly made the calculations). Our hypothesis was that children with ADHD would have lower performance on math word problems than children with typical development. Further, we hypothesized that children with ADHD symptoms might experience a more severe difficulty on problems with updating where their difficulties might be related with the correct selection of data, due to the fact that they should not be able to substitute the old irrelevant wrong data with the new updated data.

**Table 1**Mean (*M*) and Standard Deviation (*SD*) of age, intelligence, and SDAI rating scales of the two groups of children with ADHD and typically-developing (TD).

	Group	N	M	SD	p
Age	ADHD	14	132.42 (months)	2.35	>0.05
	TD	14	132.42 (months)	2.30	
SDAI Inattention	ADHD	14	16.79	0.83	<0.001
	TD	14	1.37	0.47	
SDAI Hyperactivity	ADHD	14	7.53	1.04	<0.001
	TD	14	0.95	0.41	
ODD	ADHD	14	0.63	0.17	>0.05
	TD	14	0	0	
Anxiety	ADHD	14	1.95	0.35	>0.05
	TD	14	0.89	0.70	
PMA	ADHD	14	18.42	0.56	>0.05
	TD	14	19.26	0.62	

SDAI = "Scala per i Disturbi di Attenzione/Iperattività per Insegnanti," *ADHD rating scale for teachers* – Marzocchi et al., 2010. ODD = Oppositional Defiant Disorder; PMA = Primary Mental Abilities (e & Thurstone, 1963).

## 2. Method

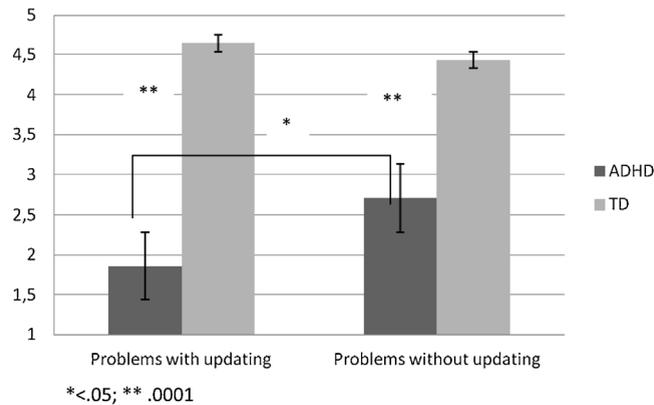
### 2.1. Participants

Participants included 14 children with ADHD symptoms and 14 typically-developing children (TD). Groups were matched for schooling (all children were sixth-graders), gender (10 males and 4 females in each group), sociocultural context (all children were native Italians and lived in the same medium size town of the Italian region of Puglia), intelligence (assessed with the Figure Grouping subtest of the PMA Battery – Primary Mental Abilities (Thurstone & Thurstone, 1963) and age. Because an explicit diagnosis of ADHD is rarely used in the area where the study was carried out, the ADHD group was in first place identified through a teacher rating scale (SDAI – "Scala per i Disturbi di Attenzione/Iperattività per Insegnanti," *ADHD rating scale for teachers* – (Marzocchi, Re, & Cornoldi, 2010)). Teachers were also interviewed to collect further information on the children. The SDAI Scale is similar in organization and scope to scales used in other countries to identify children with ADHD (e.g. DuPaul et al., 1998). Teachers are shown the 18 ADHD symptoms (described by DSM-IV and DSM-5) and asked to rate the frequency and intensity of those symptoms on 4-point items (9 for the subscale of inattention and 9 for the subscale of hyperactivity-impulsivity) for each child. For each subscale, the cutoff is at 14 points. All the children included in the ADHD group scored above the cutoff in at least one scale (inattention or hyperactivity-impulsivity). The scale has been validated and standardized for the Italian population (Marzocchi et al., 2010) and has good inter-rater reliability ( $r=0.95$ ) and test-retest reliability ( $r=0.80$ ).

During the interviews, teachers were asked for further information on the presence of ADHD symptoms in the ADHD group children in different life contexts. Teachers were interviewed to confirm the characteristics of the groups, i.e. the presence of ADHD symptom and the absence of other associated problems. Teachers were also asked to rate any general cognitive weakness, oppositional and aggressive behavior, anxiety and depressive behavior, using the COM scale – "Comorbidity scale", Marzocchi et al., 2010), which has the same format as the SDAI and has also revealed good psychometric properties (e.g. an inter-rater reliability of  $r=0.97$ , Marzocchi et al., 2010). Other exclusion criteria were: use of medication; a previous diagnosis of a learning disorder, a history of neurological disorders, sensory problems, motor impairments, or any neurodevelopmental disorder other than ADHD. In particular children who had a diagnosis of Learning Disabilities were excluded (in Italy all children who have a LD have to present a diagnostic certificate according to a specific Italian law). Mean ages and scores of the two groups in the intelligence and rating scales are reported in Table 1.

### 2.2. Materials

The materials included 12 word mathematical problems, 6 without and 6 with information that required updating in the course of solving the problem. The six problems without updating, created *ad hoc* for the present study, were typical of problems administered in the area of mathematics to Italian sixth-graders, representing the variability in arithmetic and geometric knowledge a sixth-grader would be faced with in math word problems. On the basis of these problems, we created six additional problems that required updating. These involved similar reasoning and arithmetic operations, but with the inclusion of numerical information that, when presented, seemed necessary for the solution of the problem, but subsequently had to be updated with new information. In order to have problems of similar length and difficulty, the text of the problems without updating required more verbal elaboration and could include other minor difficulties. For example, the first problem without updating was the following: "Before starting his work, the gardener must calculate the perimeter of a beautiful and great garden having the shape of a trapezoid isosceles. The major base of the garden is 50 m long, the minor base is 35 and the sides are long 28 m each. How long is the perimeter of the garden?" The text of the corresponding problem with updating was the following: "You must calculate the perimeter of a field having the shape of a rectangle.



**Fig. 1.** Mean numbers of the problems with and without updating correctly solved by the children with ADHD and Typically-Developing (TD) children (error bars are Standard Deviations). Maximum score was 6.0.

When the field was measured, its sides were 32 and 27 m, respectively for the base and the height. However, when the garden was measured a second time, the actual length of the base was 29 m. How long is the perimeter of the field?" In this example, the numerical data had to be updated with the new measurement. There were 2 problems with 1 information to be updated, 2 problems with 2 information to be updated, and 2 problems with 3 information to be updated. A preliminary control confirmed that the problems with and without updating were of similar difficulty for typically developing children.

### 2.3. Procedure

Children were individually tested in a small quiet room of their school. Before starting to solve the problems, children were assessed on the basic geometrical rules necessary for computing areas and perimeters of the forms present in the geometrical problems included in the battery. As all the children resulted familiar with these basic rules, we moved on and asked the children to complete an example problem (without updating) and then proceed with the experimental problems.

Problems were orally presented at a slow rate of approximately 2 s for one content word in such a way that the child could not write the entire text of the problem, but could take notes and write the numbers involved in the problem. Children were instructed that the problem could not be read a second time and therefore were invited to pay great attention and take notes of the data. Furthermore, the experimenter controlled that the children were carefully following the reading of the text and eventually paused in order to facilitate them. After the presentation of each problem, the child was invited to solve without time limitations the problem in a written form including all the solution steps. When s/he reported having solved the problem, the next problem was presented. Problems were presented in a fixed order, starting with the simplest one and finishing with the most complex one, alternating problems with and without updating. This approach was used to minimize the possibility that children would find the problems too difficult and become frustrated.

## 3. Results

All children paid attention to the presented problems and were able to complete all the problems. Fig. 1 presents the mean numbers of the problems (with and without updating) correctly solved by the two groups. Number of problems solved correctly was analyzed in a 2 (Group: Typical, ADHD)  $\times$  2 (problem type: no updating, updating) mixed ANOVA. There was a significant main effect of group,  $F(1, 26) = 15.46$ ,  $p < 0.001$ ,  $\eta^2_p = 0.37$ . Children with ADHD symptoms solved fewer problems correctly than control children (Problems correctly solved by ADHD:  $M = 4.57$ ,  $SD = 3.11$ ; problems correctly solved by TD:  $M = 9.07$ ,  $SD = 2.95$ ). There was also a significant interaction between group and problem type,  $F(1, 26) = 5.79$ ,  $p = 0.023$ ,  $\eta^2_p = 0.18$ . The interaction occurred because the difference in accuracy between problems with and without updating was significant only in the case of the children with ADHD symptoms (respectively  $M = 1.86$ ,  $SD = 1.75$ ;  $M = 2.71$ ,  $SD = 1.59$ , Bonferroni post-hoc comparison  $p = 0.011$ , see Fig. 1). Thus, as predicted, children with ADHD symptoms were more affected by the requirement to update problem information than were typically-developing children.

In order to better understand the sources of the difficulties for children with ADHD symptoms, we considered the children's protocols and we examined to which of the solving phases errors were due. In particular we focused on the following categories: the data report (i.e., if the child had written all the data mentioned by the experimenter), the correct selection of data (i.e., if the data used by the child in solving the problem were the appropriate ones), the choice of arithmetic operation (i.e., if the child had chosen the appropriate operations for solving the problem) and the execution of the algorithm (i.e., if the child had correctly made the calculations, independently from the numbers s/he had decided to use). These aspects were scored by considering, for each problem, the proportion of correct elements within each step with respect to the number of involved elements. For example if a problem involved 4 numbers and the child wrote down only three of the numbers,

**Table 2**

Means (*M*) and Standard Deviations (*SD*) of the scores obtained for the four categories of the problem solving process for problems with and without updating, in children with ADHD and typical development (TD).

	Problems without updating				Problems with updating			
	ADHD		TD		ADHD		TD	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Data report	5.71	0.39	5.78	0.47	5.47	0.81	5.78	0.41
Correct selection of data	5.06	0.65	5.61	0.80	4.02	1.32	5.41	0.64
Choice of arithm. operations	3.00	1.28	4.53	0.88	2.55	1.41	4.19	0.94
Execution of the algorithms	3.69	1.14	4.77	0.95	2.81	0.93	3.36	0.55

the proportion of data was 0.75. The proportions calculated for each problem, separately for problems without and with updating request, were then summed.

Table 2 presents the mean summed proportions of elements of the six problems that were correctly included by the child in the written protocol for each category described above. The main differences between the two groups were in the correct selection of data and in the choice of the appropriate arithmetic operation. In particular, in the correct selection of data, children with ADHD symptoms obtained a score of 4.02 with the problems with updating largely below the controls who had a score of 5.41, i.e. used a proportion of 0.90 (vs 0.66 of children with ADHD symptoms) of the data they had actually to use. In fact, four  $2 \times 2$  ANOVAs (groups  $\times$  updating) separately calculated for the four categories of the solution process showed different patterns. In the case of data report, we did not find any significant effect either in the comparison between the two groups [ $F(1,26) = 1.36, p > 0.05$ ] or the kind of problems [ $F(1,26) = 1.46, p > 0.05$ ] or interaction [ $F(1,26) = 1.13, p > 0.05$ ]. In the category of the correct selection of data, we found a significant main effect of the updating [ $F(1,26) = 11.71, p = 0.002, \eta^2_p = 0.310$ ], a significant effect of group [ $F(1,26) = 11.50, p = 0.002, \eta^2_p = 0.307$ ] and a significant interaction [ $F(1,26) = 5.39, p = 0.028, \eta^2_p = 0.172$ ]. Post hoc analysis showed that in the ADHD group the comparison between problem with versus problems without updating was significant ( $p < 0.001$ ).

The choice of arithmetic operation category showed a significant main effect of problems [ $F(1,26) = 7.89, p = 0.010, \eta^2_p = 0.240$ ] and a significant main effect of group [ $F(1,26) = 14.45, p = 0.001, \eta^2_p = 0.366$ ], but there was not an interaction. We found the same pattern of results also for the category of the execution of the algorithms (i.e., a significant main effect of problems [ $F(1,26) = 40.08, p < 0.001, \eta^2_p = 0.616$ ] and a significant main effect of group [ $F(1,26) = 9.19, p = 0.006, \eta^2_p = 0.269$ ], but not a significant interaction).

#### 4. Discussion

Although mathematical learning disabilities are highly comorbid with ADHD (Mayes, & Calhoun, 2006), knowledge about the abilities of individual with ADHD to solve mathematical problems is scarce. The main aims of the present research were to examine whether of children with ADHD symptoms present mathematical problem solving difficulties and to verify if the request of updating information further impairs the problem solving ability of children with ADHD symptoms with respect to children with typical development. As it is well known from literature, children with ADHD symptoms have problems in executive functions (e.g., Barkley, 1997), including the use of the executive controlled component of working memory (Cornoldi, Giofrè, Calgaro, & Stupiggia, 2013) and this difficulty has severe consequences for different aspects of their learning. Thus, children with ADHD symptoms present problems in learning tasks, especially when their regulative deficits (i.e., attentional or working memory control, planning, organization, monitoring, etc.) are in conflict with the task requests. For example, children with ADHD symptoms perform worse than control children in expressive writing (e.g. Mayes & Calhoun, 2006; Re, Pedron, & Cornoldi, 2007; Re, Caeran, & Cornoldi, 2008), presumably because writing involves various complex executive functions, such as planning, working memory, organization, monitoring, and attention. The evidence of the present study shows that these difficulties also occur for children with ADHD symptoms in mathematical problem solving.

The word problem solution requires several cognitive processes such as the construction of a mental model and its progressive updating when going on to the next step (Blessing & Ross, 1996; Hegarty et al., 1995; Passolunghi & Pazzaglia, 2004). We hence hypothesized that children with ADHD symptoms, due to their executive working memory weaknesses, would meet particular difficulties in problems with updating than children with typical development. Our results confirmed this hypothesis showing that children with ADHD symptoms could solve fewer problems than children with typical development. In particular, children with typical development did not show any difference in solving problems with or without updating, while children with ADHD symptoms showed a worse performance in solving problems with updating than those without updating. Indeed, a child who has to update information during a problem solving task has to select relevant information, to inhibit information already processed but no longer relevant, and to substitute the no longer relevant information with a new one (Passolunghi & Pazzaglia, 2004). Our results support the view that updating is problematic in ADHD children and may be a further source of their difficulty when solving mathematical problems. On this respect their impairment in the ability to update information should not differ from the updating difficulties present in other children with specific learning difficulties in mathematics (Passolunghi & Pazzaglia, 2004).

To better understand the difficulties experienced by children with ADHD symptoms in problem solving, we examined the children's written work, which allowed us to examine different steps in the problem solving process. We analyzed: a) the data report (i.e., whether child had written all the data mentioned by the experimenter); b) the correct selection of data (i.e., whether the child selected the appropriate data to solve the problem); c) the choice of arithmetic operation (i.e., whether the child had chosen the appropriate operations for solving the problem and d) the execution of the algorithm (i.e., whether the child correctly calculated the answer, independently from the numbers s/he had decided to use).

Results of this analysis showed that differences between children with ADHD symptoms and typically-developing children varied according to the solution step. Both groups were successful in writing down most of the numbers that were mentioned in the story problem. This result further confirms that all children actually paid attention to the presented material and were able to register the necessary numerical information. In contrast, children with ADHD symptoms were less likely to use the correct numbers in their calculation for updating problems than the typically-developing children. On the other two problem steps the children with ADHD symptoms were also less likely to choose the correct solution procedure and were less likely to execute it accurately. These patterns of results confirm that an important role of the difficulties encountered by children with ADHD symptoms in the problem solving is probably due to dysfunctions in the executive processes involved in the selection and controlled use of the procedure. However, the ability to update information resulted critical in differentiating the groups. Research (e.g. Carretti, Cornoldi, & Pelegrina, 2007) has shown that mathematical updating involves different aspects, including the comparison between old and new information, the elimination of old to-be-updated information, its substitution with new information. Future research should therefore examine which updating components may in particular affect an updating difficulty of ADHD children.

In conclusion the present study offers for the first time clear evidence on the general difficulties children with ADHD symptoms may encounter in solving mathematical problems and on the specific implications of the updating request typically involved in many school problems, but especially in everyday life problems where the exact data (e.g. times, locations, values, prices) are continuously changing. However, due to the limited size and the specific age of the sample and the specific characteristics of the task and materials, these results should be replicated with different and larger samples of children with a diagnosis of ADHD and also with other type of materials and tasks, including a larger selection of mathematical word problems. Furthermore, although evidence concerning a working memory deficit is already large, as for example shown by the meta-analysis of Martinussen and colleagues (Martinussen, Hayden, Hogg-Johnson, & Tannock, 2005), measures of working memory could be collected in order to confirm the presence of a deficit and examine their relationship with the impairment due to the updating request. Despite the study limitations, results of the present study offer new insight on the difficulties met by children with ADHD symptoms in mathematical problem solving and useful information also for intervention. In fact, due to the importance of problem solving in school learning and also in everyday life, difficulties of ADHD children due to updating processes should be considered more deeply and intervention programs focused on the weaknesses should be carried out.

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L'IRCCS – Istituto di Ricerche Farmacologiche Mario Negri si trova a Milano in zona Bovisa nelle vicinanze del Campus Politecnico (Ingegneria) e della Triennale Bovisa. E' facilmente raggiungibile con il passante ferroviario, scendendo alle fermate di Bovisa (FNM) o Villapizzone (FS). Se fermate a Bovisa ricordatevi di scendere le scale che si trovano sul lato destro della stazione.

Con il patrocinio della:



#### Segreteria organizzativa:

Laboratorio per la Salute Materno Infantile  
 Dipartimento di Salute Pubblica  
 IRCCS - Istituto di Ricerche Farmacologiche Mario Negri  
 Via Giuseppe La Masa, 19. Milano  
 Tel. 02 39014511 – fax 02 3550924 - ADHD@marionegri.it

La partecipazione è gratuita e prevede l'assegnazione di 2,80 crediti ECM.  
 L'iscrizione al Convegno è obbligatoria e deve essere effettuata entro il 20 ottobre p.v. accedendo al link:

[ADHD.marionegri.it](http://ADHD.marionegri.it)

# Audit Clinico in Neuropsichiatria dell'Infanzia e dell'Adolescenza (il caso ADHD)



**Milano, 26 ottobre 2016**  
**Ore 9.00-13.00 - AULA GUASTI**

IRCCS  
 Istituto di Ricerche Farmacologiche Mario Negri  
 Via G. La Masa 19 - 20156 Milano



*L'AUDIT CLINICO è l'iniziativa condotta da clinici, che si pone l'obiettivo di migliorare la qualità e gli outcome dell'assistenza attraverso una revisione fra pari strutturata, per mezzo della quale i clinici esaminano la propria attività e i propri risultati in confronto a standard espliciti e la modificano se necessario, sottoponendo i risultati di tali modifiche a nuove verifiche.*

L'Audit può essere finalizzato a valutare l'appropriatezza degli interventi clinico-assistenziali attuati (**Audit di processo**) o l'effetto che ha avuto l'attività assistenziale sulla salute dei pazienti (**Audit di esito**).

La realizzazione di un Audit avviene attraverso la sequenza di una serie di fasi attinenti alle modalità e al contesto in cui l'assistenza oggetto di valutazione è erogata.

Sebbene l'Audit rappresenti uno strumento essenziale per garantire la qualità delle cure offerte è quindi un elemento importante per instaurare e mantenere un rapporto fiduciario con i pazienti i processi di Audit non sono ancora patrimonio di tutte le realtà assistenziali.

In questo contesto, la discussione collegiale di tre Audit clinici spontanei e naif potrà aiutare a meglio definire i percorsi formali da intraprendere e garantire da parte di tutti i servizi di Neuropsichiatria Infantile e dell'Adolescenza non solo per le cure dell'ADHD, ma per tutta l'assistenza erogata.



Il Progetto: "Condivisione dei percorsi diagnostico-terapeutici per l'ADHD in Lombardia" è stato in parte finanziato dalla Regione Lombardia con DG Welfare 2394 del 31 marzo 2016. 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 degli Spedali Civili di Brescia.

**“Audit come strumento di conoscenza e occasione di trasformazione delle attività sanitarie, assai rilevante nel dibattito sullo sviluppo del governo clinico nelle organizzazioni sanitarie”**

*Alessandro Liberati*

http://graficomaria.forumtree.it/

## PROGRAMMA

Coordina: **Maurizio Bonati**

*IRCCS Istituto di Ricerche Farmacologiche Mario Negri, Milano*

### ■ **Principi etici e razionali alla base dell'audit clinico**

**Marco Geddes da Filicaia**

*Azienda Ospedaliera Universitaria Pisana, Pisa*

### ■ **Esempi di audit in tema di ADHD**

– **Antonella Costantino**

*UOC Neuropsichiatria Infanzia e Adolescenza, IRCCS “Ca’ Granda”  
Ospedale Maggiore Policlinico di Milano*

– **Massimo Molteni**

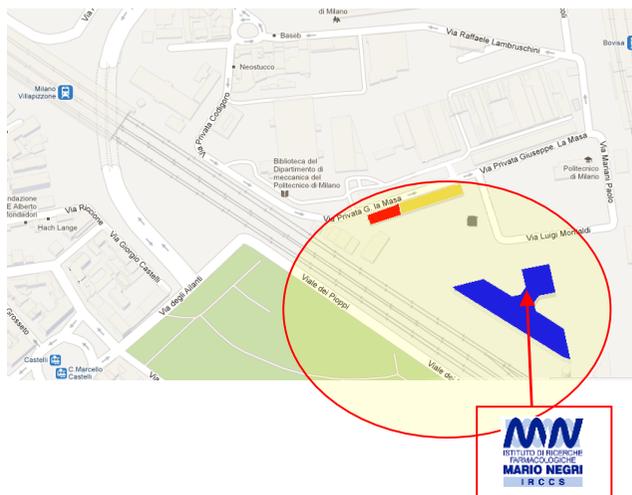
*IRCCS E. Medea Associazione La Nostra Famiglia, Bosisio Parini (LC)*

– **Ottaviano Martinelli**

*UOC di Neuropsichiatria dell'Infanzia e dell'Adolescenza, ASST di Lecco*

## DISCUSSIONE

- Maurizio Bonati**  
Dipartimento Salute Pubblica, IRCCS Ist. "Mario Negri" di Milano
- Samuele Cortese**  
Psychology, University of Southampton, United Kingdom
- Serafino Corti**  
Dipartimento Disabili, Fondazione Ist. Ospedaliero di Sospiro (CR)
- Antonella Costantino**  
SINPIA Presidente;  
UONPIA, IRCCS "Ca' Granda" Osp. Maggiore Policlinico di Milano
- Paolo Curatolo**  
UOC Neuropsichiatria Infantile - Policlinico Tor Vergata, Roma
- Rocco Farruggia**  
Azienda USL RM A, U.O.S. Residenzialità Età Evolutiva, Roma
- Antonella Gagliano**  
U.O.C di Neuropsichiatria Infantile dell'Azienda Policlinico "Gaetano Martino",  
Messina
- Fulvio Guccione**  
Neuropsichiatria ASL di Novara
- Bjorn Kadesjo**  
Gillberg Neuropsychiatry Centre, University of Gothenburg, Sweden
- Ottaviano Martinelli**  
UOC di Neuropsichiatria dell'Infanzia e dell'Adolescenza, A.O. Provincia di  
Lecco
- Gian Marco Marzocchi**  
Dipartimento di Psicologia, Università degli Studi di Milano-Bicocca, Milano
- Dino Maschietto**  
Neuropsichiatria Infantile, ASL di San Donà di Piave (VE)
- Gabriele Masi**  
UOC di Medicina Molecolare per Malattie Neurodegenerative, IRCCS  
Fondazione Stella Maris, Pisa
- Luigi Mazzone**  
Neuropsichiatria Infantile, IRCCS Ospedale Pediatrico Bambino Gesù, Roma
- Massimo Molteni**  
IRCCS, Istituto Scientifico Eugenio Medea di Bosisio Parini
- Annalisa Monti**  
Direttore UOC NPI ASL 11 (Empoli); Membro del consiglio Direttivo SINPIA
- Kerstin Jessica Plessen**  
Child and Adolescent Mental Health Centre & Faculty for Health and Medical  
Sciences, University of Copenhagen, Denmark
- Laura Reale**  
Dipartimento Salute Pubblica, IRCCS Istituto "Mario Negri" di Milano
- Renata Rizzo**  
Neuropsichiatria Infantile, Dipartimento Scienze Mediche e Pediatriche,  
Università degli Studi di Catania
- Monica Sacconi**  
UONPIA, A.O. San Paolo, Università degli Studi di Milano
- Edmund Sonuga-Barke**  
Developmental Psychopathology, The University of Southampton, United  
Kingdom
- Renato Scifo**  
UOC di NPIA Ospedale Acireale, ASP Catania
- Joseph A. Sergeant**  
Klinische Neuropsychologie, Vrije Universiteit, Amsterdam, The Netherland
- Paolo Soli**  
Neuropsichiatria dell'Infanzia e della Adolescenza Regione Emilia Romagna,  
Bologna
- Roberto Tombolato**  
Neuropsichiatria Infantile ULSS Vicenza
- Alessandro Zuddas**  
Neuropsichiatria Infantile Università degli Studi di Cagliari



IRCCS - Istituto di Ricerche Farmacologiche Mario Negri is easily reachable taking the trains leaving Cadorna station, in the center of Milan, which stop at the Milano Bovisio-Politecnico station. Exiting the Bovisio Politecnico stop you should take the stairs on the right and reach the main road. Take the left and follow the road, then take the first road on the right. After 100 m. take the first road on the left and the Istituto Mario Negri will be right in front of you (5 minutes walk).

Under the patronage of:

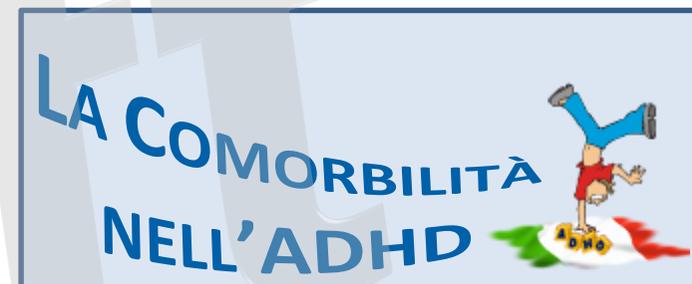


### Congress Secretariat:

Laboratory for Mother and Child Health  
Department of Public Health  
IRCCS – Istituto di Ricerche Farmacologiche Mario Negri  
Via Giuseppe La Masa, 19 - 20156 Milan - Italy  
Tel. +39 02 39014511 – fax +39 02 3550924  
ADHD@marionegri.it

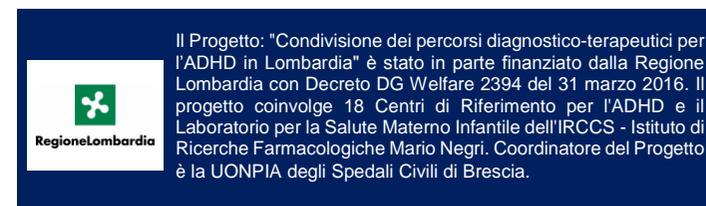
**Participation is free (11,2 ECM).  
The Congress registration is mandatory and must be  
made before 10 December 2016 by accessing the link:**

[ADHD.marionegri.it](http://ADHD.marionegri.it)



Milan, 14-15 december 2016  
9.00-18.00 - AULA A

IRCCS  
Istituto di Ricerche Farmacologiche Mario Negri  
Via G. La Masa 19 - 20156 Milano



## PRESENTAZIONE

Il convegno si pone a conclusione di 6 anni di attività dei 18 Centri di riferimento per l'ADHD nell'ambito di uno specifico progetto regionale, in cui è stato definito in modo collegiale e valutato nella pratica il percorso per la diagnosi e il trattamento dell'ADHD del bambino e dell'adolescente in Regione Lombardia.

Il progetto ha consentito di delineare un percorso assistenziale condiviso, appropriato, aggiornato e attuabile nella pratica, di attuare attività formative mirate a supporto del percorso stesso, di introdurre strategie di monitoraggio e audit nonché di porre le basi per la riorganizzazione dei servizi e la strutturazione di un network coordinato di cura.

Anche altre nazioni europee hanno cercato di intervenire in tema di modelli clinico-organizzativi specifici per l'ADHD, e la prima giornata si pone quindi come utile confronto tra il potenziale "modello lombardo" quelli di altre regioni italiane e quanto attuato altrove in Europa.

La seconda giornata sarà invece dedicata all'approfondimento di uno dei temi più rilevanti sul piano clinico-organizzativo in neuropsichiatria dell'infanzia e dell'adolescenza. I tassi di comorbidità risultano infatti molto elevati sia per l'ADHD che per altri disturbi neuropsichici dell'età evolutiva, e richiedono riflessioni mirate. Le diverse comorbidità psichiatriche e mediche associate all'ADHD sono spesso correlate all'età e al livello di sviluppo, e possono influenzare la fenomenologia, la gravità, la prognosi e il trattamento dell'ADHD. Nonostante numerosi e approfonditi studi abbiano descritto le comorbidità più frequentemente associate all'ADHD, pochi sono stati condotti con adeguata metodologia e basandosi su un approccio multidimensionale, condiviso e multicentrico, valutando sia le componenti psicosociali che cliniche di un disturbo complesso come l'ADHD. In proposito anche il lavoro svolto nell'ambito del Progetto Regionale necessita di un appropriato approfondimento e sviluppo.

09.00 – 13.00

## ADHD CENTRES IN EUROPE

Chair: *Maurizio Bonati*

## The model of ADHD Centre in Lombardy Region (Italy)

*Antonella Costantino*

## Sweden

*Bjorn Kadesjo*

## Denmark

*Kerstin Jessica Plessen*

## United Kingdom

*Edmund Sonuga-Barke*

## The Netherland

*Joseph Sergeant*

DISCUSSION

14.30 – 18.00

## ADHD NEI SERVIZI DI NEUROPSICHIATRIA IN ITALIA

Coordina: *Antonella Costantino*

## Piemonte

*Fulvio Guccione*

## Veneto

*Roberto Tombolato*

## Emilia Romagna

*Paolo Soli*

## Toscana

*Annalisa Monti*

## Lazio

*Rocco Farruggia*

## Sardegna

*Alessandro Zuddas*

## Sicilia

*Renato Scifo*

DISCUSSIONE

09.00 – 13.00

## LA COMORBILITÀ NELL'ADHD

Coordinano e commentano:

*Gian Marco Marzocchi, Dino Maschietto*

## Dal Registro della Regione Lombardia

*Monica Saccani e Laura Reale*

## Disturbi ad alta Frequenza

- ✓ **Apprendimento**
- ✓ **Sonno**
- ✓ **Comportamento/Umore**

*Antonella Gagliano**Samuele Cortese**Gabriele Masi*

14.00 – 18.00

Coordinano e Commentano:  
*Serafino Corti, Ottaviano Martinelli*

## Disturbi a bassa Frequenza

- ✓ **TIC/Sindrome di Tourette**
- ✓ **Autismo**
- ✓ **Epilessia**

*Renata Rizzo**Luigi Mazzone**Paolo Curatolo*

## La multidimensionalità della comorbidità nei disturbi psichiatrici dell'età evolutiva

*Massimo Molteni*

DISCUSSIONE



## Questionario per la valutazione della Newsletter ADHD



Gent.mi lettori,

questo è un invito alla compilazione del questionario on-line sulla Newsletter ADHD.

Tale operazione Vi impegnerà per 2 minuti al massimo accedendo al seguente link:

<http://www.adhd.marionegri.it/index.php/newsletter/valutazione-newsletter>

Si confida nella Vs preziosa collaborazione.

Per ricevere la newsletter iscriversi al seguente indirizzo:  
<http://www.adhd.marionegri.it/index.php/newsletter/iscrizione-newsletter>

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