NEWSLETTER

INDICE:

BIBLIOGRAFIA ADHD APRILE 2021

Aggress Behav. 2021 May;47:364-74.

ECOLOGICAL CONTEXTS OF YOUTH ANTISOCIAL BEHAVIORS: A LONGITUDINAL PERSPECTIVE.

Zhang S, Lefmann TA, Lee NY, et al.

The current study examined and compared the relative influence of ecological factors on youth antisocial behaviors (i.e., aggression and rule-breaking) using longitudinal data while assessing the moderating effect of youth attention-deficit/hyperactivity disorder (ADHD) diagnosis. The study used the fifth and sixth wave of data from the Fragile Families and Child Wellbeing Study (n = 2595; mean age = 9.26 at wave five) for the analysis. Multivariate models show that youth ADHD, physically and psychologically abusive parenting, peer victimization, and community cohesion were important predictors of youth antisocial behaviors. Furthermore, youth ADHD diagnosis moderated some associations between the ecological factors and antisocial behaviors, suggesting that youth with and without ADHD may respond to some ecological contexts differently regarding the concerning behaviors. The findings imply that interventions targeting youth antisocial behaviors should involve collaboration across systems and coordination across programs to tackle a multilayered ecological context, especially when youth with ADHD are involved

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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.

Aggress Behav. 2021 May;47:251-59.

PARENTING BEHAVIOR AND GROWTH OF CHILD CONDUCT PROBLEMS: MODERATION BY CALLOUS-UNEMOTIONAL TRAITS.

Falk AE, Stiles K, Krein IN, et al.

Although positive parenting behavior is central to efficacious interventions for child conduct problems (CP), studies of youth CP have focused mostly on negative parenting behavior. That is, few studies have examined dimensions of positive parenting behavior (e.g., positive reinforcement, involvement) as independent predictors of CP and even fewer have investigated their potential moderation by callous-unemotional (CU) traits. A sample of 184 6-9 year-old children with and without attention-deficit/hyperactivity disorder (ADHD) was followed prospectively for two years. Controlling for baseline ADHD diagnostic status, initial CP, and negative parenting (i.e., corporal punishment), we examined CU traits, positive reinforcement and involvement, and their interactions as predictors of two-year change in CP. Positive reinforcement and CU traits independently predicted increased rule breaking behavior whereas parental involvement inversely predicted aggressive behavior. A significant positive reinforcement x CU traits interaction suggested that positive reinforcement predicted a decrease in aggressive behavior, but only in children with low CU traits; conversely, positively reinforcement marginally predicted increased aggressive behavior among children with high CU traits. No other significant parenting x CU traits interaction was observed. We consider these findings within a developmental psychopathology framework where interactive exchanges underlie the development of CP

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Annals of Medicine and Surgery. 2020;57:303-06.

OCULAR FINDINGS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A CASE-CONTROL STUDY.

Ababneh LT, Bashtawi M, Ababneh BF, et al.

Background: To evaluate the differences of ocular abnormalities between children with attention deficit hyperactivity disorder and non-attention deficit hyperactivity disorder children using siblings of cases in Jordan.

Methods: A case-control study of 55 children with attention deficit hyperactivity disorder, and 55 children without the disorder as a control group using siblings of cases. Examination included visual acuity, motility, anterior and posterior segments, convergence, optical coherence tomography and corneal topography.

Results: Thirty-eight patients from the attention deficit hyperactivity disorder group had visual acuity better than 0.8 in both eyes; 36.4% had normal cyclorefraction, while 54.5% had mild hyperopia. Most of them did not need glasses. Tomography showed normal values with no statistically significant differences between the two groups. The near point of convergence showed significantly abnormal values in 41.9% of children with attention deficit hyperactivity disorder. Pentacam measurements showed normal values with no statistically significant differences between the two groups.

Conclusions: Children with attention deficit hyperactivity disorder show significant low near point convergence compared with the study control group

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Arch Dis Child. 2021.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: PARENT/CARER PERCEPTIONS OF BARRIERS TO HEALTHCARE ACCESS.

Rezel-Potts E, Kordowicz M, Downs J, et al.

Background: Children and young people (CYP) with attention-deficit/hyperactivity disorder (ADHD) face delays in diagnosis and barriers to accessing appropriate interventions. Evidence is limited on how these barriers are perceived by their parents and carers.

Methods: Focus group in South London with parents/carers of CYP with ADHD. Data were thematically analysed using an inductive/deductive hybrid approach.

Results: Participants (n=8) described the challenge of accessing services within a disjointed, multiagency system for their CYP's ADHD and broader health needs. They described feeling judged and overlooked by healthcare professionals, which could negatively impact the health, relationships and educational progress

of their children. Pragmatic solutions were proposed, including providing parents with information on navigating services at an early stage of ADHD symptom recognition.
Conclusions: Parents/carers sought improved continuity of care within and between services. They are a key group for consultation on the development of interventions to improve access for CYP with ADHD

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Arch Neurocienc. 2021;26:24-31.
NON-PHARMACOLOGICAL INTERVENTION ON INHIBITORY CONTROL IN ADOLESCENTS WITH ATTENTION-DEFICIT / HYPERACTIVITY DISORDER.
Daniel HT, Alma LO.
One of the main neuropsychological features in Attention-Deficit / Hyperactivity Disorder (ADHD) are the failures in executive functioning, especially inhibitory control (IC), which is important for the stopping of an ongoing response, permits a delay in the decision to respond and protects this period of time. Due to these deficits, teenage population with ADHD are more susceptible to present behaviors such as substance abuse, high-risk sexual behavior and the presence of comorbidities. The aim of the present study was to conduct a review of the last 10 years about the non-pharmacological interventions on IC in adolescents with ADHD. An electronic search was made in Scopus, PubMed and Web of Sciences databases, combining the next keywords: "intervention", "inhibitory control", "adolescents", "teenagers" and "ADHD". Articles were selected from 2010 to 2020. Transcranial magnetic stimulation was the most reported non-pharmacological intervention for enhancing the IC in adolescents with ADHD, followed by physical exercise and neurofeedback. The lack of literature about this topic is a relevant issue to generate future research lines about the treatment of executive functions in adolescents with ADHD

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Asia-Pacific Psychiatry. 2021;13.
THE DEVELOPMENTAL COORDINATION DISORDER QUESTIONNAIRE AND CORRELATED NEUROPSYCHOLOGICAL CHARACTERISTICS IN ADHD CHILDREN.
Lee T, Park KJ, Kim HW.
Purpose: Developmental coordination disorder (DCD) is a common neurologic disorder, affecting up to 6% of children. DCD and Attention-Deficit/Hyperactivity Disorder (ADHD) coexist with each other, at comorbidity rates of 50%. In this study, we aimed to assess the extent of motor coordination in ADHD and controls by using the Developmental Coordination Disorder Questionnaire (DCDQ), and assess the correlation between motor coordination and cognitive/ behavioral characteristics.
Materials and method: We recruited 298 children, aged 5 to 12 years, at the outpatient clinic of Pediatric Psychiatry at Asan Medical Center, Seoul, Korea. ADHD diagnosis were made according to the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) and Kiddie-Schedule for Affective Disorders and Schizophrenia-Present and Lifetime Version (K-SADS-PL). Parents of the participants completed the DCDQ, and the Korean Personality Rating Scale for Children (KPRC). The Wechsler Intelligence Scale for Children (WISC) were administered by clinical psychologists.
Results: The children who participated in the study were of 7.6 -¦ 1.7 years old, and 214 (71.8%) were boys. A total of 176 children had a diagnosis of ADHD. The ADHD group showed significantly lower scores in the DCDQ total score ($p < 0.001$), and all three subscales, which are Control During Movement ($p < 0.001$), Fine Motor/ Handwriting ($p < 0.001$), and General Coordination ($p = 0.002$), indicating more deficits in motor coordination. DCDQ total score were significantly correlated with the Perceptual Reasoning Index (PRI), the Working Memory Index (WMI), and the Processing Speed Index (PSI) of the WISC subscales. In addition, DCDQ total score was significantly correlated with externalizing and internalizing problems measured by KPRC, but the extent of correlation was higher with externalizing problems.
Conclusion: Our study suggests that DCDQ scores are lower in ADHD subjects, indicating difficulties in motor coordination. Moreover, DCDQ scores are significantly correlated with specific domains of cognition and attention

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Autism. 2021.

AUTISM-SPECTRUM QUOTIENT-CHILD AND AUTISM-SPECTRUM QUOTIENT-ADOLESCENT IN CHINESE POPULATION: SCREENING AUTISM SPECTRUM DISORDER AGAINST ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND TYPICALLY DEVELOPING PEERS.

Wong PPS, Wai VCM, Chan RWS, et al.

The Hong Kong Chinese version of the Autism-Spectrum Quotient-Child and Autism-Spectrum Quotient-Adolescent were examined for their psychometric properties and specificity on screening autism spectrum disorder against attention-deficit/hyperactivity disorder. This study recruited three groups of participants: typically developing children; children with autism spectrum disorder and children with attention-deficit/hyperactivity disorder. Both the Autism-Spectrum Quotient questionnaires demonstrated satisfactory psychometric properties in terms of internal consistency, testΓÇôretest reliability and area under receiver operating characteristics curve in discriminating the autism spectrum disorder group from the attention-deficit/hyperactivity disorder and typically developing groups, separately and jointly. The optimal cutoff scores for both the Autism-Spectrum Quotient questionnaires were identified to be 76, with satisfactory sensitivity and specificity, for differentiating the autism spectrum disorder group from the typically developing group and from the typically developing and attention-deficit/hyperactivity disorder groups combined. On the contrary, both Autism-Spectrum Quotient questionnaires could not effectively differentiate the attention-deficit/hyperactivity disorder group from the typically developing group, or in other words, they did not misclassify attention-deficit/hyperactivity disorder as autism spectrum disorder because of their phenotypic overlap in social difficulties. These findings supported that both the Autism-Spectrum Quotient questionnaires were not general measures of child and adolescent psychopathology, but could claim to be more specific measures of autism spectrum disorder, given their success in identifying the autism spectrum disorder group from the attention-deficit/hyperactivity disorder/typically developing groups, while failing to differentiate the latter two groups.

Lay abstract: The Autism-Spectrum Quotient is a 50-item questionnaire developed to assess autistic symptoms in adults, adolescents and children. Its original version and others in different countries are known to be effective tools in identifying individuals with autism spectrum disorder. This study examined whether the Hong Kong Chinese versions of the Autism-Spectrum Quotient-Child and Autism-Spectrum Quotient-Adolescent were effective in identifying autism spectrum disorder children and adolescents. On top of comparing them with their typically developing peers, this study also included a group of children/adolescents with attention deficit/hyperactivity disorder, a disorder with similar social difficulties as autism spectrum disorder. Results showed that both the Autism-Spectrum Quotient questionnaires were effective in differentiating the autism spectrum disorder group from the typically developing and attention-deficit/hyperactivity disorder groups, separately and jointly. On the contrary, they could not identify the attention-deficit/hyperactivity disorder group from the typically developing group so that they were not misclassifying attention-deficit/hyperactivity disorder as autism spectrum disorder. These findings supported that both the Autism-Spectrum Quotient-Child and Autism-Spectrum Quotient-Adolescent were not general measures of child and adolescent psychopathology, but could claim to be specific measures of autism spectrum disorder. Such capability would enormously enhance their utility in clinical practice for identifying autism spectrum disorder children/adolescents from their typically developing peers and from those with attention-deficit/hyperactivity disorder. This is because, the latter is a common neurodevelopmental disorder frequently presented to child psychiatric clinics alongside with autism spectrum disorder

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Autism Res. 2021 Feb;14:356-68.

OBSERVING VISUAL ATTENTION AND WRITING BEHAVIORS DURING A WRITING ASSESSMENT: COMPARING CHILDREN WITH AUTISM SPECTRUM DISORDER TO PEERS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND TYPICALLY DEVELOPING PEERS.

Zajic MC, Solari EJ, McIntyre NS, et al.

Children with autism spectrum disorder (ASD) demonstrate heterogeneous writing skills that are generally lower than their typically developing (TD) peers and similar to peers with attention difficulties like attention-deficit/hyperactivity disorder (ADHD). Recent evidence suggests children with ASD spend less time engaging in writing tasks compared to their peers, but previous studies have not examined engagement specifically

within the writing task environment. This study used video observation data collected from 121 school-age children (60 children with ASD, 32 children with ADHD, and 29 TD children) to compare differences in visual attention and writing task behaviors and relationships between task behaviors and age, cognitive skills, and ASD and ADHD symptom severity. Findings indicated that groups mostly spent time looking at and writing on the draft, though this was lowest in the ASD group. No differences were found between the ASD and ADHD groups after accounting for task behavior durations as percentages of total used task time. Groups spent little time looking at their outlines and looking away from the task, with all groups spending relatively more time looking at the task picture. Time spent engaged with the draft showed a positive relationship with writing performance across groups, but a negative relationship between time spent looking at the task picture and writing performance only appeared for the ADHD group. The ASD and ADHD groups showed negative associations between draft engagement and ASD symptom severity but not ADHD symptom severity. Implications are discussed for understanding writing task engagement in research and instructional contexts. Children with autism spectrum disorder (ASD) demonstrate variable writing skills. Here, we examine how children with ASD engage during a writing task by using video observation data to compare their engagement to peers with and without attention difficulties. Findings indicate (a) lower draft engagement and similar task disengagement in children with ASD compared to their peers and (b) moderate-to-strong relationships between writing scores and ASD symptom severity with within-task engagement in children with ASD and their peers with attention difficulties

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Biol Psychiatry. 2021;89:S217.

EFFECT OF BODY-ORIENTED TRAINING ON EXECUTIVE ABILITIES IN CHILDREN WITH ADHD ONE YEAR AFTER COMPLETING TRAINING.

Kiselev S.

Background: It is important to develop trainings for improving the executive abilities in children with ADHD. We have revealed that body-oriented training has positive effect on executive abilities in children with ADHD (Kiselev & Parshakova, 2018). Moreover, we have shown that this training has positive effect on executive abilities in these children six months after completing this therapy (Kiselev, 2020). The goal of this study was to reveal effect of body-oriented training on executive abilities in children with ADHD one year after completing therapy.

Methods: We compared the efficacy of two methods of training (body-oriented therapy for children vs. conventional motor exercises) in a randomized controlled pilot study. 16 children with ADHD at the age of 6-7 years were included and randomly assigned to treatment conditions according to a 2+ù2 cross-over design. The body-oriented therapy included the exercises from yoga and breathing techniques. We assessed the executive abilities in these children one year after the training using 3 subtests from NEPSY (Auditory Attention and Response Set, Visual Attention, Statue).

Results: The ANOVA for repeated measurements has revealed ($p<.05$) that for all used subtests the body-oriented therapy was superior to the conventional motor training, with effect sizes in the medium-to-high range (0.49-0.90).

Conclusions: The findings from this longitudinal study suggest that body-oriented therapy has one-year long-term positive effect on executive abilities in children with ADHD. We assume that body-oriented therapy is one of the most effective ways for helping children with this disorder.

Supported By: Act 211 Government of the Russian Federation, agreement 02.A03.21.0006.

Keywords: ADHD, Executive Functions, Neurocognitive Training, NEPSY

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Biol Psychiatry. 2021;89:S108.

EFFECTS OF METHYLPHENIDATE ON ABERRANT BRAIN NETWORK DYNAMICS IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A RANDOMIZED CONTROLLED CLINICAL TRIAL.

Mizuno Y, Cai W, Spekar K, et al.

Background: Attention deficit/hyperactivity disorder (ADHD) is a highly prevalent neurodevelopmental disorder. Methylphenidate is a widely used first-line treatment for ADHD, but the underlying neurobiological

mechanisms are poorly understood. Here we investigate whether a single dose of methylphenidate can remediate aberrancies in attention and functional circuit dynamics in cognitive control networks which have been implicated in ADHD.
Methods: In a randomized placebo-controlled double-blind crossover design, 27 children with ADHD were scanned twice with resting-state functional MRI and sustained attention was examined using a continuous performance task under methylphenidate and placebo conditions. Forty-nine matched typically-developing (TD) children was scanned once for comparison. Dynamic time-varying cross-network interactions between the salience (SN), frontoparietal (FPN), and default mode (DMN) networks were examined in children with ADHD under both treatment conditions, and compared with TD children.
Results: Children with ADHD showed deficits in sustained attention on a continuous performance task under placebo, which was remediated by methylphenidate. Children with ADHD showed aberrancies in dwell times in dynamic brain states, and time-varying cross-network interactions between the SN, FPN and DMN under placebo, which were remediated by methylphenidate. Additionally, the methylphenidate-induced changes in aberrant brain network dynamics were associated with methylphenidate-induced improvements in sustained attention.
Conclusions: These findings suggest that a single dose of methylphenidate can remediate aberrant brain circuit dynamics in cognitive control circuits and improve sustained attention in children with ADHD. Findings identify a novel brain circuit mechanism underlying a first-line treatment for ADHD, and may contribute to clinically useful biomarkers for evaluating treatment outcomes.
Funding Source: NIH, JSPS, MEXT, AMED Keywords: ADHD, Dynamic Functional Connectivity, Randomized Controlled Trial, Methylphenidate, Large-Scale Brain Networks

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Biol Psychiatry. 2021;89:S193-S194.
DIFFERENCES IN NEUROMETABOLITES AND TRANSCRANIAL MAGNETIC STIMULATION MOTOR MAPS IN CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.
Kahl C, Swansburg R, Hai T, et al.
Background: Although much is known about cognitive dysfunction in attention-deficit/hyperactivity disorder (ADHD), there have been few studies examining the pathophysiology of disordered motor circuitry. This study explored differences in neurometabolite concentrations and transcranial magnetic stimulation (TMS) derived corticomotor representations between children with ADHD and their typically developed peers (TDC). We a priori hypothesized reduced excitation in the ADHD motor network.
Methods: Magnetic resonance spectroscopy (MRS) protocols were used to measure excitatory (Glx: glutamate + glutamine) and inhibitory (+¦-aminobutyric acid: GABA) neurometabolite concentrations in the supplementary motor area (SMA) and dominant primary motor cortex (M1) of children with ADHD and TDC. Robotic neuronavigated TMS was used to create corticomotor maps.
Results: Data was collected from 26 ADHD (medication-free, 7-16 years) and 25 TDC participants (11 ΓÇô 16 years). Those with ADHD had higher SMA GABA (T(38)=1.823, p=0.043, d=0.6) and lower M1 Glx (T(45)=-2.143, p=0.038 d=0.6). Additionally, in the ADHD group, mean resting motor threshold was lower (T(40)=-2.491, p=0.038, d=0.8) and hotspot density was higher (T(37)=2.789, p=0.029, d=0.9). M1 GABA levels were associated with motor map area (p<0.001) and volume (p=0.047).
Conclusions: Both the neurochemistry and neurophysiology of key nodes in the motor network may be altered in children with ADHD and the differences appear to be related to each other. This suggests potentially novel neuropharmacological and neuromodulatory targets in ADHD.
Supported By: This work was supported by the Alberta Children's Hospital Foundation, the Werklund School of Education (University of Calgary), the Canadian Institute for Health Research (CIHR), the Branch Out Neurological Foundation (BONF), and support for the Scientific Director of the Strategic Clinical Network for Addictions and Mental Health from Alberta Health Services.
Keywords: ADHD, Motor Cortex, Transcranial Magnetic Stimulation (TMS), Motor-Mapping, Magnetic Resonance Spectroscopy

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Biol Psychiatry. 2021;89:S22-S23.

WHITE MATTER MICROSTRUCTURE IN ADHD: EVIDENCE FROM 2500 INDIVIDUALS FROM THE ENIGMA-ADHD COLLABORATION.

Buitelaar J, Hoogman M, Thompson PM, et al.

Background: Previously the ENIGMA-ADHD group investigated (sub)cortical brain volumes of individuals with and without ADHD across the life span. We showed small but robust differences in the striatal and limbic regions as well as a general effect on surface area (Hoogman et al. 2017, 2019). This has given us insights in the relevance of different grey matter regions for ADHD. In addition to grey matter, white matter is also thought to play a role in ADHD, but the anatomical locations and effect sizes vary widely across studies. By harmonizing diffusion tensor imaging (DTI) processing methods, and with our large sample size, we aim to increase power to reliably identify white matter tracts associated with ADHD.
Methods: We collected DTI data from 21 cohorts of all ages to perform the largest ever study of measures of white matter integrity in ADHD. For a total of 2500 cases and controls fractional anisotropy (FA) for 25 tracts of the JHU atlas were extracted. In addition, we also characterized axial diffusivity, radial diffusivity, and mean diffusivity.
Results: We found a difference in FA for the right posterior limb of the internal capsule (p=0.0002) for the entire sample combined. When we stratified by age-group, this effect was more pronounced in adolescents and adults, compared to children.
Conclusions: The results are unexpected as our previous ENIGMA-analyses did not show structural effects of ADHD in the adults. The identification of the posterior limb of the internal capsule in relation to ADHD gives us leads to further our understanding the ADHD brain.
Supported By: NWO Veni Grant 91619115 (to Dr Hoogman), European Union IMI grants EU-AIMS and AIMS-2-TRIALS (Grant No. 115300 and 777394) (Dr Buitelaar).
Keywords: ADHD, Structural Brain Imaging, Diffusion Tensor Imaging (DTI), ENIGMA Consortium

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Biol Psychiatry. 2021;89:S355-S356.

CINGULATE-LATERAL PREFRONTAL CONNECTIVITY MEDIATES ASSOCIATION BETWEEN A LATENT PSYCHOPATHOLOGY P FACTOR AND ADAPTIVE FUNCTIONING IN A TRANSDIAGNOSTIC PEDIATRIC SAMPLE.

Kaminski A, You X, Li S, et al.

Background: A latent dimension of psychopathology - p factor, has gained explanatory traction in adult psychiatry but remains relatively unexplored in child psychiatry. Here we capitalized on a transdiagnostic pediatric sample to examine its association with adaptive behavior and mediating neural correlates. As flexible cognitive control facilitates adaptive behavior, mediation was tested for dorsal anterior cingulate (dACC) functional connectivity (FC) during conflict adaptation on a novel social stroop task.
Methods: Parents of 89 8-14 year-olds (37 ASD, 38 ADHD, 6 MD, 8 NOS; mean age 11.3; 23 females) completed the Child Behavior Checklist (CBCL) and the Vineland Adaptive Behavior Scale-II (VABS). During fMRI, children responded to direction of target arrow on nasion of faces with congruent (C) or incongruent (I) eye-gaze direction. A whole-brain voxel-wise generalized psychophysiological interaction analysis with two dACC seeds (affiliated to frontoparietal and salience networks) identified FC modulation during conflict adaptation (reduced interference following I than C trials) that was correlated with VABS composite score.
Results: The conflict adaptation effect was observed for accuracy and RT, ps<0.006. The first principal component (eigenvalue=54.3124) of CBCL subdomains predicted VABS (R2=0.306, p<0.001). This relationship was partially mediated by FC between dACC seed affiliated with frontoparietal network and right middle frontal gyrus (rMFG), indirect effect: (-0.04)*(2.41)=-0.09950, p=0.006).
Conclusions: dACC-rMFG FC subserving flexible cognitive control partially explained individual differences in the association between general psychopathology and adaptive behavior. These results contribute to the identification of an intermediate phenotype for adaptive behavior that could serve as a therapeutic target in pediatric psychiatric disorders.
Supported By: R01, NIH
Keywords: p factor, Adaptive Behavior, Psychophysiological Interaction analysis, Social Stroop task, Transdiagnostic

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Biol Psychiatry. 2021;89:S107.

ALTERED SINGLE-SUBJECT GRAY MATTER STRUCTURAL NETWORKS IN DRUG-NAÏVE ADHD CHILDREN.

Chen Y, Lei D, Cao H, et al.

Background: Altered topological organization of brain structural covariance networks has been observed in attention deficit hyperactivity disorder (ADHD). However, results have been inconsistent, potentially related to confounding medication effects. In addition, since structural networks are traditionally constructed at the group level, variabilities in individual structural features may have been overlooked.
Methods: Structural brain imaging with MRI was performed on 84 drug-naïve children with ADHD and 83 age-matched healthy controls. Single-subject gray matter (GM) networks were obtained based on areal similarities of GM, and network topological properties were analyzed using graph theory. Group differences in each topological metric were compared by nonparametric permutation tests.
Results: Compared with healthy subjects, GM networks in ADHD patients demonstrated significantly altered topological characteristics, including higher global and local efficiency and clustering coefficient, and shorter path length. In addition, ADHD patients exhibited abnormal centrality in the corticostriatal circuitry including the superior frontal gyrus, orbitofrontal gyrus, medial superior frontal gyrus, precentral gyrus, middle temporal gyrus and pallidum (all $p<0.05$, FDR corrected). Altered global and nodal topological efficiencies were associated with the severity of hyperactivity symptoms and the performance of the Stroop and WCST tests (all $p<0.05$, FDR corrected). ADHD combined and inattention subtypes were differentiated by nodal attributes of amygdala ($p<0.05$, FDR corrected).
Conclusions: Alterations in GM network topologies were observed in drug-naïve ADHD patients, in particular in the fronto-striatal loop and amygdala. These alterations may underlie impaired cognitive functioning and impulsive behavior in ADHD.
Funding Source: 81801358
Keywords: ADHD, Gray Matter Network, Clinical Severity, Cognitive Deficits

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Biol Psychiatry. 2021;89:S215.

BUT WHAT ARE WE REALLY MEASURING? ASSESSING THE TRAIL MAKING TASK IN ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Harvie G, Braund T, Kohn M, et al.

Background: The trail making task (TMT) is commonly used as a measure of executive function in children with ADHD. However, previous literature suggests that the cognitive components of TMT performance may differ between normal and neuropsychologically impaired individuals. This study aims to investigate whether the cognitive contributions of TMT performance differ between adolescent participants with and without ADHD, as well as between individuals with ADHD when medicated and unmedicated.
Methods: 160 unmedicated ADHD participants and 160 age-gender matched typically developing controls (TDC), 12-18 years completed a computerised touchscreen-based emotion and cognition assessment battery (Brain Resource Ltd.). After 6 weeks of methylphenidate (MPH) therapy, 137 of the ADHD participants returned to complete the assessment battery for a second time. Correlation and multiple regression analyses were performed to establish which cognitive domains contributed to performance on various TMT measures, at baseline and after MPH therapy.
Results: Working memory contributed most to TMT task measures at baseline and post-methylphenidate therapy in ADHD adolescents. Processing speed also contributed to TMT-B and B-A performance at baseline in ADHD adolescents, while motor speed was a contributor post-methylphenidate treatment. For typically developing adolescents, sustained attention, and working memory span were the most important contributors to TMT performance.
Conclusions: Typically developing, unmedicated and methylphenidate treated ADHD adolescents recruit different aspects of cognitive and executive functions during TMT completion. These results demonstrate that impure cognitive tasks, like the TMT, can still yield valuable insights and remain useful tools in understanding cognitive and executive functioning.
Supported By: N/A
Keywords: ADHD, Methylphenidate, Trail Making Task, Neurocognitive Assessments, Set-Shifting

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Biol Psychiatry. 2021;89:S179.

ASSOCIATIONS BETWEEN DIMENSIONAL PSYCHOPATHOLOGY AND BRAIN VOLUME IN CHILDREN.

Durham EL, Jeong HJ, Moore TM, et al.

Background: Childhood is an important time for the manifestation of psychopathology. Psychopathology is characterized by considerable comorbidity which is mirrored in the underlying neural correlates of psychopathology. Both common and dissociable variations in brain volume have been found across multiple mental disorders in adult and youth samples. However, the majority of these studies used samples with broad age ranges which may obscure developmental differences. The current study examines associations between regional gray matter volumes (GMV) and psychopathology in a large sample of children with a narrowly defined age range.

Methods: We used data from 9,607 9- to 10-year-old children collected as part of the Adolescent Brain and Cognitive Development (ABCD) Study. A bifactor model identified a general psychopathology factor that reflects common variance across disorders and specific factors representing internalizing symptoms, ADHD symptoms, and conduct problems. Brain volume was acquired using 3T MRI.

Results: After correction for multiple testing, structural equation modeling revealed nearly global inverse associations between regional GMVs and general psychopathology and conduct problems, with associations also found for ADHD symptoms (p-values .048, FDR-corrected). Age, sex, and race were included as covariates. Sensitivity analyses including total GMV or intracranial volume (ICV) as covariates support this global association, as most region-specific results become non-significant. Sensitivity analyses including income, parental education, and medication use as covariates demonstrate largely convergent results.

Conclusions: These findings suggest that globally smaller GMVs are a nonspecific risk factor for general psychopathology, and possibly for conduct problems and ADHD as well.

Supported By: National Institute on Drug Abuse, National Institute of Mental Health, National Center for Advancing Translational Sciences, Lifespan Brain Institute of the University of Pennsylvania, Children's Hospital of Philadelphia

Keywords: Developmental Psychopathology, Dimensional Psychopathology, Bifactor Model, Neuroanatomy

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Biol Psychiatry. 2021;89:S106.

SPORTS PARTICIPATION MITIGATES GENETIC RISK FOR PSYCHOPATHOLOGY VIA HIPPOCAMPAL VOLUME DIFFERENCES IN SCHOOL-AGED CHILDREN.

Kunitoki K, Hughes D, Hopkinson C, et al.

Background: Attention deficit-hyperactivity disorder (ADHD) is a common disease in children, and has both genetic and environmental determinants. Physical activity has previously been linked to both reduced psychopathology symptoms and increased hippocampal volumes in children. Here, we leveraged the Adolescent Behavior Cognitive Development (ABCD) Study to determine whether sports participation mitigates risk for psychopathology conferred by genetic loading for ADHD, and potential mediation via hippocampal volumes, in 9-10-year-old children.

Methods: We included unrelated children of European ancestry (n=3,776). Genetic risk for ADHD was calculated using polygenic risk score (PRS) algorithms from the Psychiatric Genomics Consortium. Lifetime team sports participation was assessed by the ABCD Longitudinal Parent Sports and Activities Involvement Questionnaire. Hippocampal volumes were calculated from T1 and T2 weighted MRI images with FreeSurfer. Multilevel regression modeled effects of PRS, sports involvement, and bilateral hippocampal volume on Child Behavior Checklist (CBCL) Total Score, including age, sex, race/ethnicity, parental income and education, and total intracranial volume as fixed effects, and MRI scanner and study site as random effects.

Results: Team sports participation associated with lower CBCL Total score (+¦=-1.70, p<0.0001) and larger hippocampal volume (+¦=42.6, p=0.0061). The association between PRS and CBCL total score was weaker in children with team sports participation compared to those without it (interaction +¦= -1.25, p= 0.0007). 2.49% of the effects of team sports on CBCL total score were mediated by hippocampal volume (p=0.022).

Conclusions: Participation in team sports mitigated genomic risk for psychopathology at age 9-10, in part through increased hippocampal volume.

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Biol Psychiatry. 2021;89:S223.

CHILDREN AREN'T JUST SMALL ADULTS: NON-SPECIFIC MAPPING OF POLYGENIC RISK SCORES ONTO DIMENSIONAL PSYCHOPATHOLOGY AT AGE 9-10 IN THE ABCD STUDY.

Hughes D, Hopkinson C, Eryilmaz H, et al.

Background: Genome wide association studies (GWAS) in psychiatry, and polygenic risk score (PRS) analyses, have focused primarily on disorders that emerge in adulthood and have enrolled adult participants. Effects of polygenic loading for these disorders on psychopathology in children remain largely unexplored. Dimensional measures of psychopathology in children may index risk for emergence of full-blown disorders later in life. As such, an understanding of how genetic loading for these disorders maps onto dimensional symptoms in children may have value for prognosis and early intervention. Leveraging baseline data from the Adolescent Brain Cognitive Development (ABCD) Study, we examined how indices of polygenic risk track with dimensional psychopathology at age 9-10.

Methods: GWAS data from 4,413 non-related ABCD participants of European descent was used to estimate effects of 8 disorder-specific PRS, and both conventional and genomic structural equation modeling (GSEM)-derived (compulsive/perfectionistic, mood/psychotic, neurodevelopmental) cross-disorder PRS, on 12 dimensions of psychopathology, captured via parent-reported ratings.

Results: Among disorder-specific PRS scores, ADHD and MDD scores predicted diffuse psychopathology (9 phenotypes each; p-s.003 to 2.8E-09). Among GSEM cross-disorder factors, the neurodevelopmental factor most strongly predicted psychopathology, across the broadest range of categories (11 total dimensions; p-s.004 to 2.6E-09).

Conclusions: Genetic underpinnings of dimensional psychopathology at age 9-10 predominantly reflect those of neurodevelopmental disorders. Notably, effects of such genetic loading are clinically diffuse at age 9-10. Future ABCD studies, including with intermediate biological markers, may clarify not only how but when more parsimonious relationships between disease-specific PRS and specific emergent psychopathology arise during adolescence.

Supported By: RO1

Keywords: Polygenic Risk Score (PRS), Dimensional Psychopathology, Adolescent Brain Cognitive Development (ABCD) Study, Genomic Structural Equation Modelling, CBCL

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Biol Psychol. 2021;161.

AIDING DIAGNOSIS OF CHILDHOOD ATTENTION-DEFICIT/HYPERACTIVITY DISORDER OF THE INATTENTIVE PRESENTATION: DISCRIMINANT FUNCTION ANALYSIS OF MULTI-DOMAIN MEASURES INCLUDING EEG.

Johnstone SJ, Parrish L, Jiang H, et al.

Introduction: We developed a neurocognitive assessment tool (NCAT) in consultation with mental health professionals working with children with AD/HD as a diagnostic aid and screening tool. This study examines the predictive utility of NCAT in the classification of children with AD/HD Inattentive presentation.

Method: Fifty three children with AD/HD Inattentive presentation and 161 typically-developing children completed an NCAT assessment. Discriminant function analyses examined group membership prediction for separate components of NCAT and for the components combined.

Results: The combined model correctly classified 93.4 % of participants, with 91.4 % sensitivity and 93.9 % specificity. Contributions to classification were from SNAP-IV, psychological needs satisfaction, self-regulation, executive function performance, and EEG. The combined model resulted in a 9.3 % increase in specificity and 5.9 % increase in sensitivity compared to SNAP-IV alone.

Conclusions: NCAT provides good discrimination between children with and without AD/HD of the Inattentive presentation, and further investigation including other subtypes and comorbidities is warranted

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Biomedical Reports. 2021;14.

ALTERATIONS IN SERUM AMINO ACID PROFILES IN CHILDREN WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Skalny AV, Mazaletskaya AL, Zaitseva IP, et al.

The objective of the present study was to evaluate the circulating serum amino acid levels in children with attention deficit/hyperactivity disorder (ADHD). A total of 71 children with untreated ADHD and 31 neurotypical controls aged 7-14 years old were examined. Serum amino acid levels were evaluated using high-performance liquid chromatography (HPLC) with UV-detection. Laboratory quality control was performed with reference materials of human plasma amino acid levels. The obtained data demonstrated that children with ADHD were characterized by 29, 10 and 20% lower serum histidine (His), glutamine (Gln) and proline (Pro) levels compared with neurotypical children, respectively. In contrast, circulating aspartate (Asp), glutamate (Glu) and hydroxyproline (Hypro) levels exceeded the respective control values by 7, 7 and 42%. Correspondingly, the Gln-to-Glu and Pro-to-Hypro ratios were 28% and 49%, respectively, lower in ADHD cases compared with the controls. Total Gln/Glu levels were also significantly lower in ADHD patients. No significant group differences were observed between the groups in the other amino acids analyzed, including phenylalanine. Multiple linear regression analysis revealed significant associations between circulating serum Gln, lysine (Lys) (both negative) and Glu (positive) levels with total ADHD Rating Scale-IV scores. The observed alterations in Pro/Hypro and Gln/Glu levels and ratios are likely associated with the coexisting connective tissue pathology and alterations in glutamatergic neurotransmission in ADHD, respectively. Altered circulating levels of His, Lys and Asp may also be implicated in ADHD pathogenesis. However, further in vivo and in vitro studies are required in order to investigate the detailed mechanisms linking amino acid metabolism with ADHD pathogenesis

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BMC Pediatr. 2021;21.

THE EFFECT OF VITAMIN D AND MAGNESIUM SUPPLEMENTATION ON THE MENTAL HEALTH STATUS OF ATTENTION-DEFICIT HYPERACTIVE CHILDREN: A RANDOMIZED CONTROLLED TRIAL.

Hemamy M, Pahlavani N, Amanollahi A, et al.

Background: Attention-Deficit / Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder, characterized by varying severity in attention deficit and hyperactivity. Studies have shown deficiencies in the serum level of magnesium and vitamin D in people with ADHD. The aim of this study is to determine the effect of vitamin D and magnesium supplementation on mental health in children with ADHD.

Methods: We conducted a randomized, double blind, placebo-controlled clinical trial of 66 children with ADHD. Participants were randomly allocated to receive both vitamin D (50,000 IU/week) plus magnesium (6 mg/kg/day) supplements (n = 33) or placebos (n = 33) for 8-weeks. Strengths and difficulties questionnaire was used to evaluate children's mental health at baseline and the end of the study.

Results: After eight weeks of intervention, the serum levels of 25-hydroxy-vitamin D3 and magnesium increased significantly in the intervention group compared with the control group. Also, children receiving vitamin D plus magnesium showed a significant reduction in emotional problems (p = 0.001), conduct problems (p = 0.002), peer problems (p = 0.001), prosocial score (p = 0.007), total difficulties (p = 0.001), externalizing score (p = 0.001), and internalizing score (p = 0.001) compared with children treated with the placebo.

Conclusion: Vitamin D (50,000 IU/week) and magnesium (6 mg/kg/day) co-supplementation for a duration of 8-weeks could improve the behavioral function and mental health of children with ADHD. However, further well-designed studies with a larger sample size are needed. Trial registration: IRCT2016030326886N1

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BMC Psychiatry. 2021 Apr;21:207.

AN EXPLORATION OF THE GENETIC EPIDEMIOLOGY OF NON-SUICIDAL SELF-HARM AND SUICIDE ATTEMPT.

Russell AE, Hemani G, Jones HJ, et al.

BACKGROUND: Empirical evidence supporting the distinction between suicide attempt (SA) and non-suicidal self-harm (NSSH) is lacking. Although NSSH is a risk factor for SA, we do not currently know whether

these behaviours lie on a continuum of severity, or whether they are discrete outcomes with different aetiologies. We conducted this exploratory genetic epidemiology study to investigate this issue further.
METHODS: We explored the extent of genetic overlap between NSSH and SA in a large, richly-phenotyped cohort (the Avon Longitudinal Study of Parents and Children; N = 4959), utilising individual-level genetic and phenotypic data to conduct analyses of genome-wide complex traits and polygenic risk scores (PRS).
RESULTS: The single nucleotide polymorphism heritability of NSSH was estimated to be 13% (SE 0.07) and that of SA to be 0% (SE 0.07). Of the traits investigated, NSSH was most strongly correlated with higher IQ (rG = 0.31, SE = 0.22), there was little evidence of high genetic correlation between NSSH and SA (rG = − 0.1, SE = 0.54), likely due to the low heritability estimate for SA. The PRS for depression differentiated between those with NSSH and SA in multinomial regression. The optimal PRS prediction model for SA (Nagelkerke R2 0.022, p < 0.001) included ADHD, depression, income, anorexia and neuroticism and explained more variance than the optimal prediction model for NSSH (Nagelkerke R2 0.010, p < 0.001) which included ADHD, alcohol consumption, autism spectrum conditions, depression, IQ, neuroticism and suicide attempt.
CONCLUSIONS: Our findings suggest that SA does not have a large genetic component, and that although NSSH and SA are not discrete outcomes there appears to be little genetic overlap between the two. The relatively small sample size and resulting low heritability estimate for SA was a limitation of the study. Combined with low heritability estimates, this implies that family or population structures in SA GWASs may contribute to signals detected

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BMJ Open. 2021;11.

COMORBIDITIES AND FUNCTIONAL IMPAIRMENTS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN CHINA: A HOSPITAL-BASED RETROSPECTIVE CROSS-SECTIONAL STUDY.

Shi X, Ji Y, Cai S, et al.

Objectives The aim of this study was to assess comorbidity patterns and functional impairment in children with and without attention deficit hyperactivity disorder (ADHD).
Design Hospital-based retrospective cross-sectional study; data collection occurred between 2016 and 2019.
Settings and patients A total of 8256 children and adolescents, 6-17 years of age, with suspected ADHD agreed to participate in this hospital-based cross-sectional study over a 4-year period in China. Comorbidities and social functions were assessed according to the scales Vanderbilt ADHD Diagnostic Parent Rating Scale and Weiss Functional Impairment Rating Scale-Parent Form, which were completed by the parents of the study participants.
Results Of the 8256 children, 5640 were diagnosed with ADHD. Other 2616 children who did not meet the ADHD diagnostic criteria were classified as the N-ADHD group. The proportion of comorbidities (47.4%) and functional impairments (84.5%) in the ADHD group were higher than the N-ADHD group (p-0.001). The functional impairment scores in all of the six domains, including family, academic, life skills, self-concept, social activities and risky activities, were significantly higher in the ADHD group than the N-ADHD group (p-0.001). The functional impairment in ADHD group with comorbidities was more severe than those without comorbidities (p-0.001). Comorbidities and core symptoms both can affect the functions of children with ADHD. Logistics regression analysis indicated that in all of the six functional domains, the effect of comorbidities on functional impairment exceeded the effects of ADHD core symptoms.
Conclusions Comorbidities had the greatest influence on different areas of adaptive functioning in children with ADHD. Clinical management of children suspected to have ADHD should address multiple comorbidities and functional impairments assessment, as well as core symptom analysis

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Brain Dev. 2021.

LONG-TERM HEARING AND NEURODEVELOPMENTAL OUTCOMES FOLLOWING KAWASAKI DISEASE: A POPULATION-BASED COHORT STUDY.

Robinson C, Lao F, Chanchlani R, et al.

Background: Kawasaki disease (KD) incidence is increasing in Ontario. Cardiovascular sequelae following KD are well-described. However, there are limited data on non-cardiovascular outcomes.

Objectives: To determine the risk of hearing loss, anxiety, developmental disorders, intellectual disabilities and attention-deficit/hyperactivity disorder (ADHD) among KD survivors vs. non-exposed children. Methods: We included all Ontario children (18 yr) surviving hospitalization with a KD diagnosis between 1995 and 2018, using population-based health administrative databases. We excluded children with prior KD diagnoses and non-residents. KD cases were matched with 100 non-exposed children by age, sex and year. Follow-up continued until death or March 2019. We calculated the prevalence, incidence and adjusted hazard ratios (aHR [95%CI]) of outcomes between 0-1 yr, 1-5 yr, 5-10 yr and >10 yr follow-up.

Results: Among 4597 KD survivors, 364 (7.9%) were diagnosed with hearing loss, 1213 (26.4%) anxiety disorders, 398 (8.7%) developmental disorders, 51 (1.1%) intellectual disability and 21 (0.5%) ADHD, during median 11 year follow-up. Compared to 459,700 non-exposed children, KD survivors were not at increased risk of hearing loss after adjustment for potential confounders. KD survivors were at increased risk of anxiety disorders between 0–1 yr (aHR 1.75 [1.46-2.10]), 1–5 yr (aHR 1.13 [1.01–1.28]), 5–10 yr (aHR 1.14 [1.03–1.28]) and >10 yr (aHR 1.11 [1.02-1.22]); developmental disorders between 0-1 yr (aHR 1.49 [1.28-1.74]) and 1–5 yr (aHR 1.19 [1.02-1.40]); intellectual disabilities >10 yr (aHR 2.36 [1.36-4.10]); and ADHD >10 yr (aHR 2.01 [1.14–3.57]).

Conclusions: KD survivors are at increased risk of being diagnosed with anxiety disorders sooner, being diagnosed with developmental disorders between 0 and 5 yr and being diagnosed with intellectual disabilities or ADHD >10 yr after KD diagnosis. This may justify enhanced developmental and audiological surveillance of KD survivors

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Brain Imaging Behav. 2021 Apr;15:1103-14.

EFFECTS OF THE DOPAMINE TRANSPORTER GENE ON NEUROIMAGING FINDINGS IN DIFFERENT ATTENTION DEFICIT HYPERACTIVITY DISORDER PRESENTATIONS.

Bacanli A, Unsel-Bolat G, Suren S, et al.

Attention-Deficit/Hyperactivity Disorder (ADHD) is a phenotipically and neurobiologically heterogeneous disorder. Deficiencies at different levels in response inhibition, differences in dopamine transporter genotype (DAT1) and various symptomatic presentations contribute to ADHD heterogeneity. Integrating these three aspects into a functional neuroimaging research could help unreval specific neurobiological components of more phenotipically homogeneous groups of patients with ADHD. During the Go-NoGo trial, we investigated the effect of the DAT1 gene using 3 T MRI in 72 ADHD cases and 24 (TD) controls that typically developed between the ages 8 and 15 years. In the total ADHD group, DAT1 predicted homozygosity for the 10R allele and hypoactivation in the anterior cingulate cortex and paracingulate cortex. There were no significant activation differences between DAT1 10R/10R homozygotes and 9R carriers in TD controls. Subjects with predominantly inattentive ADHD (ADHD-I) presentation with DAT1 10R/10R homozygous reduced neuronal activation during Go trial particularly in the frontal regions and insular cortex, and in the parietal regions during NoGo trial (brain regions reported as part of Default Mode Network- DMN). Additionally, DAT1 10R/10R homozygousness was associated with increased occipital zone activation during only the Go trial in the ADHD combined presentation (ADHD-C) group. Our results point the three main findings: 1) The DAT1 gene is 10R homozygous for differentiated brain activation in ADHD cases but not in the TD controls, supporting the DAT1 gene as a potential marker for ADHD, 2) The relationship between the DAT1 gene and the occipital regions in ADHD-C group which may reflect compensatory mechanisms, 3) The relationship between DAT1 gene and the reduced DMN suppression for 9R carriers probabaly stems from the ADHD-I group

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Brain Imaging Behav. 2021 Apr;15:930-40.

SENSORY MODULATION DISORDER AND ITS NEURAL CIRCUITRY IN ADULTS WITH ADHD: A PILOT STUDY.

Adra N, Cao A, Makris N, et al.

Compared to healthy controls (HCs), individuals with attention-deficit/hyperactivity disorder (ADHD) exhibit more symptoms of sensory processing disorder (SPD), which is associated with difficulties in educational and social activities. Most studies examining comorbid SPD-ADHD have been conducted with children and have not explored relations to brain volumes. In this pilot study, we assessed a subtype of SPD, sensory modulation disorder (SMD), and its relation to select brain volumes in adults with ADHD. We administered part of the Sensory Processing 3-Dimensions Scale (SP3D) to assess subtypes of SMD and collected structural imaging scans from 25 adults with ADHD and 29 healthy controls (HCs). Relative to HCs, subjects with ADHD scored higher on sensory craving (SC) and sensory under-responsivity (SUR) subscales. Although sensory over-responsivity (SOR) was marginally higher, this was no longer true when accounting for co-occurring anxiety. In individuals with ADHD, both SC and SUR were positively associated with amygdalar volume, SUR was also positively associated with striatal volume, whereas SOR was negatively associated with posterior ventral diencephalon volume. These preliminary findings suggest that SC and SUR may be characteristic of ADHD while SOR may be driven by co-occurring anxiety. Because different modalities were associated with different brain volumes, our findings also suggest that the modalities may involve unique neural circuits, but with a partial overlap between SC and SUR. These pilot data provide support for conducting studies examining SMD in larger samples of adults with ADHD to determine reproducibility, applicability and implications of these findings

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Brain Sciences. 2020;10:1-18.

CANNABINOIDS FOR PEOPLE WITH ASD: A SYSTEMATIC REVIEW OF PUBLISHED AND ONGOING STUDIES.

Fusar-Poli L, Cavone V, Tinacci S, et al.

The etiopathogenesis of autism spectrum disorder (ASD) remains largely unclear. Among other biological hypotheses, researchers have evidenced an imbalance in the endocannabinoid (eCB) system, which regulates some functions typically impaired in ASD, such as emotional responses and social interaction. Additionally, cannabidiol (CBD), the non-intoxicating component of Cannabis sativa, was recently approved for treatment-resistant epilepsy. Epilepsy represents a common medical condition in people with ASD. Additionally, the two conditions share some neuropathological mechanisms, particularly GABAergic dysfunctions. Hence, it was hypothesized that cannabinoids could be useful in improving ASD symptoms. Our systematic review was conducted according to the PRISMA guidelines and aimed to summarize the literature regarding the use of cannabinoids in ASD. After searching in Web of Knowledge, PsycINFO, and Embase, we included ten studies (eight papers and two abstracts). Four ongoing trials were retrieved in ClinicalTrials.gov. The findings were promising, as cannabinoids appeared to improve some ASD-associated symptoms, such as problem behaviors, sleep problems, and hyperactivity, with limited cardiac and metabolic side effects. Conversely, the knowledge of their effects on ASD core symptoms is scarce. Interestingly, cannabinoids generally allowed to reduce the number of prescribed medications and decreased the frequency of seizures in patients with comorbid epilepsy. Mechanisms of action could be linked to the excitatory/inhibitory imbalance found in people with ASD. However, further trials with better characterization and homogenization of samples, and well-defined outcomes should be implemented

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British Journal of Dermatology. 2021.

ASSOCIATION BETWEEN HOSPITAL-DIAGNOSED ATOPIC DERMATITIS AND PSYCHIATRIC DISORDERS AND MEDICATION USE IN CHILDHOOD.

Vittrup I, Andersen YMF, Droitcourt C, et al.

Background: While adult atopic dermatitis (AD) is associated with anxiety and depression, and paediatric AD is linked to attention deficit hyperactivity disorder (ADHD), the relationship between AD in childhood and other psychiatric disorders is largely unknown.

Objectives: To determine the relationship between AD and diagnosis and treatment of psychiatric disorders in children.
Methods: All Danish children born between 1 January 1995 and 31 December 2012 with a hospital diagnosis of AD (n = 14 283) were matched 1: 10 with children without a hospital diagnosis of AD. Endpoints were psychotropic medication use, hospital diagnoses of depression, anxiety, ADHD, or self-harming behaviour, accidental/suicidal death, and consultation with a psychiatrist or psychologist.
Results: Significant associations were observed between hospital-diagnosed AD and antidepressant [adjusted hazard ratio (aHR) 1·19, 95% confidence interval (CI) 1·04-1·36], anxiolytic (aHR 1·72, 95% CI 1·57-1·90), and centrally acting sympathomimetic (aHR 1·29, 95% CI 1·18-1·42) medication use. Consultation with a psychiatrist (aHR 1·33, 95% CI 1·16-1·52) or psychologist (aHR 1·25, 95% CI 1·11-1·41) was also associated with AD. No association with a hospital diagnosis of depression (aHR 0·58, 95% CI 0·21-1·56), anxiety (aHR 1·47, 95% CI 0·98-2·22) or self-harming behaviour (aHR 0·88, 95% CI 0·27-2·88) was observed, but a diagnosis of ADHD (aHR 1·91, 95% CI 1·56-2·32) was significantly associated with AD. The absolute risks were generally low.
Conclusions: The increased risk of treatment, but not of a hospital diagnosis of psychiatric disorders in children with hospital-diagnosed AD, suggests that psychiatric issues in children with AD could be of a transient, reversible or mild-moderate nature

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Case Reports in Psychiatry. 2021;2021.
THE EFFICACY OF PARENT-CHILD INTERACTION THERAPY (PCIT) IN CHILDREN WITH ATTENTION PROBLEMS, HYPERACTIVITY, AND IMPULSIVITY IN DUBAI.
Al Sehli SA, Helou M, Sultan MA.
Disruptive behaviors can be associated with significant functional impairment. Early intervention for young children is essential to prevent long-term consequences. Parent-Child Interaction Therapy (PCIT) is a psychotherapeutic intervention, which has shown to be effective for children with externalizing symptoms. We present the treatment course of PCIT for two kindergarten children. The first has Attention-Deficit/Hyperactivity Disorder (ADHD), and the second has frontal lobe epilepsy. Both presented with attention problems, hyperactivity, and impulsivity associated with significant impairment in multiple settings. Two certified PCIT therapists provided 17 sessions to the parents of the first patient and 25 sessions to the parents of the second patient. Most of the sessions were in-person; however, some were "virtual"due to the circumstances associated with the COVID-19 pandemic. Parents of both patients achieved the "mastery"criteria. In both cases, PCIT contributed to improving the disruptive behaviors. PCIT may serve as an effective therapeutic option for young children with externalizing symptoms in Dubai

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Child Adolesc Psychiatry Ment Health. 2021;15.
ELEMENTARY SCHOOL TEACHERS KNOWLEDGE AND ATTITUDE TOWARDS ATTENTION DEFICIT-HYPERACTIVITY DISORDER IN GONDAR, ETHIOPIA: A MULTI-INSTITUTIONAL STUDY.
Dessie M, Techane MA, Tesfaye B, et al.
Background: A child suffering from attention deficit hyperactivity disorder (ADHD) faces many difficulties in social as well as academic performances. School teachers knowledge and attitude towards ADHD play a vital role in early detection and referral of the child to treatment centers. Few existing reports, however, indicate the alarming rate at which the problem is highly neglected in sub-Saharan Africa. The present study is designed to determine the knowledge, attitude, and factors that affecting elementary school teachers about ADHD.
Methods: An institutional-based cross-sectional study design was conducted in Gondar town and other towns nearby Gondar from February 24 to March 24, 2020. Data were collected through structured self - administered questionnaires using the Knowledge of Attention Deficit Disorders Scale and ADHD-specific attitudes measurement tools. Then, it was entered into Epi-info version 7 and exported to SPSS version 20 for analysis. Bivariable and multivariate logistic regressions were fitted to identify factors associated with the

knowledge and attitude of elementary school teachers. Variables having a p-value < 0.05 at 95% CI were considered statistically significant.
Result: Of 636 respondents, about 44.8% (95% CI 41.2, 48.4) and 84.1% (95% CI 81.0, 86.8) of elementary school teachers had good knowledge and a favorable attitude towards ADHD, respectively. Having a diploma and above (AOR = 3.028, 95% CI 1.630-5.625), reading ADHD leaflets (AOR = 2.035, 95% CI 1.391, 2.950) and search ADHD on the internet (AOR = 1.793, 95% CI 1.090, 2.950) were significantly associated with teachers knowledge to ADHD; whereas, working experience in teaching a child with ADHD (AOR = 1.852, 95% CI 1.195-2.87) and watching ADHD on mass media (AOR = 1.72, 95% CI 1.056-2.8) were positively predicts teachers attitude towards ADHD.
Conclusion: the proportion of teachers knowledge towards ADHD was low; in contrast, their attitude was relatively satisfactory. Strengthening teachers educational upgrading system, frequent and fair distribution of leaflets written to address ADHD, installation of an internet system to the schools, and continuous ADHD awareness creation programs through mass media are highly recommended

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Child Neuropsychol. 2021.

IS EXECUTIVE DYSFUNCTION A POTENTIAL CONTRIBUTOR TO THE COMORBIDITY BETWEEN BASIC READING DISABILITY AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER?

Kibby MY, Newsham G, Imre Z, et al.

Our study is one of the few to analyze executive functioning (EF) in a comprehensive, multi-modal fashion as a potential contributor to the comorbidity between attention-deficit/hyperactivity disorder (ADHD) and basic reading disability (RD). We included multiple, traditional, neuropsychological measures of EF, along with the Behavior Rating Inventory of Executive Function (BRIEF) questionnaire, to assess inhibit, shift, working memory (WM), planning, generation fluency, and problem-solving. Participants included 263 children, ages 8-12 years, with RD, ADHD, RD/ADHD, and typically developing controls. When using the traditional measures in a 2 x 2 MANCOVA, we found both RD and ADHD had poor cognitive EF in most areas at the group level, with phonological loop deficits being more specific to RD and behavioral regulation deficits being more specific to ADHD. Children with RD/ADHD performed comparably to those with RD and ADHD alone. Results were similar on the BRIEF. In contrast, only WM predicted both basic reading and inattention when the data were assessed in a continuous fashion. It also explained the correlations between basic reading and inattention, being worthy of longitudinal research to determine if it is a shared contributor to RD/ADHD. When comparing hypotheses as to the nature of RD/ADHD, we found the multiple deficit hypothesis was better supported by our EF data than the phenocopy hypothesis or the cognitive subtype hypothesis

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Child Psychiatry Hum Dev. 2021 Apr;52:332-42.

MATERNAL SOCIODEMOGRAPHIC FACTORS ARE ASSOCIATED WITH METHYLPHENIDATE INITIATION IN CHILDREN IN THE NETHERLANDS: A POPULATION-BASED STUDY.

Cheung K, El Marroun H, Dierckx B, et al.

Multiple factors may contribute to the decision to initiate methylphenidate treatment in children such as maternal sociodemographic factors of which relatively little is known. The objective was to investigate the association between these factors and methylphenidate initiation. The study population included 4243 children from the Generation R Study in the Netherlands. Maternal sociodemographic characteristics were tested as determinants of methylphenidate initiation through a time-dependent Cox regression analysis. Subsequently, we stratified by mother-reported ADHD symptoms (present in 4.2% of the study population). When ADHD symptoms were absent, we found that girls (adjusted HR 0.25, 95%CI 0.16–0.39) and children born to a mother with a non-western ethnicity (compared to Dutch-Caucasian) (adjusted HR 0.42, 95%CI 015–0.68) were less likely to receive methylphenidate. They were more likely to receive methylphenidate when their mother completed a low (adjusted HR 2.29, 95%CI 1.10–4.77) or secondary (adjusted HR 1.71, 95%CI 1.16–2.54) education.

In conclusion, boys and children born to a mother of Dutch-Caucasian ethnicity were more likely to receive methylphenidate, irrespective of the presence of ADHD symptoms

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Child Psychiatry Hum Dev. 2021 Apr;52:191-99.

VALIDITY OF SLUGGISH COGNITIVE TEMPO IN TURKISH CHILDREN AND ADOLESCENTS.

Basay Ö, Çiftçi E, Becker SP, et al.

The internal and external validity of sluggish cognitive tempo (SCT) relative to attention-deficit/hyperactivity disorder inattention (ADHD-IN) was evaluated with Turkish children and adolescents. Parents completed the SCT, ADHD-IN, ADHD-hyperactivity/impulsivity (HI), oppositional defiant disorder (ODD), callous-unemotional (CU), anxiety, depression, social impairment, and academic impairment scales of the Child and Adolescent Behavior Inventory (CABI) on 1015 Turkish children and adolescents (56% girls; ages 6–15 years; Mage = 10.05, SDage = 2.32), including 762 recruited from the community and 253 recruited from outpatient psychiatric clinics. SCT symptoms demonstrated excellent internal validity with the ADHD-IN symptoms. SCT symptoms also showed invariance across boys and girls as well as across community and clinical samples. SCT showed stronger first-order and unique associations than ADHD-IN with anxiety and depression whereas ADHD-IN showed stronger first-order and unique associations than SCT with ADHD-HI, ODD, and academic impairment. SCT and ADHD-IN showed equal associations with CU behaviors and social impairment. The current study is the first to support the validity of CABI SCT scores with Turkish children and adolescents and also replicates the findings from similar studies with children from South Korea, Spain, and United States. These findings thus further strengthen the transcultural validity of CABI SCT scale scores

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Child Health Care. 2021.

THE RELATIONSHIPS OF PARENT- AND CHILD-RELATED PSYCHIATRIC CONDITIONS WITH OPPOSITIONAL DEFIANT DISORDER AND CONDUCT DISORDER SYMPTOMS IN CHILDREN WITH ADHD.

Bilgic A, Uzun N, et al.

This cross-sectional study evaluated the impacts of maternal and paternal affective temperament traits, maternal and paternal ADHD, depression and anxiety symptoms, parenting styles, child's depression and anxiety disorder symptoms, and child's autistic traits on the oppositional defiant disorder (ODD) and conduct disorder (CD) symptoms of children with attention-deficit/hyperactivity disorder (ADHD). Analysis showed a positive relation of maternal anxious and irritable temperament and child inattention, hyperactivity-impulsivity and obsessive-compulsive disorder (OCD) scores on ODD scores. However, there was a negative relationship between parental acceptance/involvement and ODD scores. Regarding CD scores, maternal irritable and paternal cyclothymic and hyperthymic temperament scores and child ODD and autistic trait scores showed a positive relationship, whereas maternal ADHD showed a negative relationship on CD scores. Certain parental affective temperaments, parenting styles, child's OCD and autistic traits, and maternal ADHD may be important for the severity of disruptive behavioral disorder symptoms in children with ADHD

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Clin EEG Neurosci. 2021.

BEHAVIORAL AND NEUROPHYSIOLOGICAL MARKERS OF ADHD IN CHILDREN, ADOLESCENTS, AND ADULTS: A LARGE-SCALE CLINICAL STUDY.

Munger M, Candrian G, Kasper J, et al.

This study aimed to re-evaluate the possible differences between attention-deficit/hyperactivity disorder (ADHD) subjects and healthy controls in the context of a standard Go/NoGo task (visual continuous performance test [VCPT]), frequently used to measure executive functions. In contrast to many previous studies, our sample comprises children, adolescents, and adults. We analyzed data from 447 ADHD patients and 227 healthy controls. By applying multivariate linear regression analyses, we controlled the group

differences between ADHD patients and controls for age and sex. As dependent variables we used behavioral (number of omission and commission errors, reaction time, and reaction time variability) and neurophysiological measures (event-related potentials [ERPs]). In summary, we successfully replicated the deviations of ADHD subjects from healthy controls. The differences are small to moderate when expressed as effect size measures (number of omission errors: d = 0.60, reaction time variability: d = 0.56, contingent negative variation (CNV) and P3 amplitudes: 0.35 < d < 0.47, ERP latencies: 0.21 < d < 0.29). Further analyses revealed no substantial differences between ADHD subtypes (combined, inattentive, and hyperactive/impulsive presentation), subgroups according to high- and low-symptomatic burden or methylphenidate intake for their daily routine. We successfully replicated known differences between ADHD subjects and controls for the behavioral and neurophysiological variables. However, the small-to-moderate effect sizes limit their utility as biomarkers in the diagnostic procedure. The incongruence of self-reported symptomatic burden and clinical diagnosis emphasizes the challenges of the present clinical diagnosis with low reliability, which partially accounts for the low degree of discrimination between ADHD subjects and controls

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Clinical Epigenetics. 2021;13.

DNA METHYLATION OF GFI1 AS A MEDIATOR OF THE ASSOCIATION BETWEEN PRENATAL SMOKING EXPOSURE AND ADHD SYMPTOMS AT 6 YEARS: THE HOKKAIDO STUDY ON ENVIRONMENT AND CHILDREN'S HEALTH.

Miyake K, Miyashita C, Ikeda-Araki A, et al.

Background: Prenatal smoking exposure has been associated with childhood attention-deficit/hyperactivity disorder (ADHD). However, the mechanism underlying this relationship remains unclear. We assessed whether DNA methylation differences may mediate the association between prenatal smoking exposure and ADHD symptoms at the age of 6 years.

Results: We selected 1150 mother-infant pairs from the Hokkaido Study on the Environment and Children's Health. Mothers were categorized into three groups according to plasma cotinine levels at the third trimester: non-smokers (0.21 ng/mL), passive smokers (0.21-11.48-áng/mL), and active smokers (11.49 ng/mL). The children's ADHD symptoms were determined by the ADHD-Rating Scale at the age of 6 years. Maternal active smoking during pregnancy was significantly associated with an increased risk of ADHD symptoms (odds ratio, 1.89; 95% confidence interval, 1.14-3.15) compared to non-smoking after adjusting for covariates. DNA methylation of the growth factor-independent 1 transcriptional repressor (GFI1) region, as determined by bisulfite next-generation sequencing of cord blood samples, mediated 48.4% of the total effect of the association between maternal active smoking during pregnancy and ADHD symptoms. DNA methylation patterns of other genes (aryl-hydrocarbon receptor repressor [AHRR], cytochrome P450 family 1 subfamily A member 1 [CYP1A1], estrogen receptor 1 [ESR1], and myosin IG [MYO1G]) regions did not exert a statistically significant mediation effect.

Conclusions: Our findings demonstrated that DNA methylation of GFI1 mediated the association between maternal active smoking during pregnancy and ADHD symptoms at the age of 6-áyears

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Clin Neurophysiol. 2021;132:1163-72.

RELATIONSHIP BETWEEN GABA LEVELS AND TASK-DEPENDENT CORTICAL EXCITABILITY IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Harris AD, Gilbert DL, Horn PS, et al.

Objective: Compared to typically developing (TD) peers, children with attention deficit hyperactivity disorder (ADHD) manifest reduced short interval cortical inhibition (SICI) in the dominant motor cortex measured with transcranial magnetic stimulation (TMS). This multimodal study investigates the inhibitory neurophysiology and neurochemistry by evaluating the relationship between SICI and amino butyric acid (GABA+) levels, measured with magnetic resonance spectroscopy (MRS).

Methods: Across two sites, 37 children with ADHD and 45 TD children, ages 8-12 years, participated. Single and paired pulse TMS to left motor cortex quantified SICI during REST and at times of action selection (GO) and inhibition (STOP) during a modified Slater-Hammel stop signal reaction task. MRS quantified GABA+

levels in the left sensorimotor cortex. Relationships between SICI and GABA+, as well as stopping efficiency and clinical symptoms, were analyzed with correlations and repeated-measure, mixed-models.
Results: In both groups, higher GABA+ levels correlated with less SICI. In TD children only, higher GABA+ levels correlated with larger TMS motor evoked potentials (MEPs) at REST. In GO and STOP trials, higher GABA+ was associated with smaller MEP amplitudes, for both groups. Overall, GABA+ levels did not differ between groups or correlate with ADHD clinical symptoms.
Conclusions: In children with higher motor cortex GABA+, motor cortex is less responsive to inhibitory TMS (SICI). Comparing the relationships between MRS-GABA+ levels and responses to TMS at REST vs. GO/STOP trials suggests differences in inhibitory neurophysiology and neurotransmitters in children with ADHD. These differences are more prominent at rest than during response inhibition task engagement. Significance: Evaluating relationships between GABA+ and SICI may provide a biomarker useful for understanding behavioral diagnoses

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CNS Drugs. 2021.
PHARMACOTHERAPY FOR PRESCHOOL CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD): CURRENT STATUS AND FUTURE DIRECTIONS.
Young JR, Yanagihara A, Dew R, et al.
In this review, we consider issues relating to the pharmacological treatment of young children with attention deficit hyperactivity disorder (ADHD). ADHD in preschool-age children has a profound impact on psychosocial function and developmental trajectory. Clinical studies on pharmacotherapies for ADHD in young children have expanded rapidly in the past 2 decades, providing some evidence of efficacy for both psychostimulant and non-psychostimulant medications. However, preschool children may be more susceptible to adverse effects of medications, including growth reduction and cardiovascular side effects. Many questions remain regarding the long-term safety and effectiveness of these interventions; thus more research is needed to help clinicians evaluate the risk-benefit ratio for preschoolers with ADHD. As this body of knowledge grows, providers should consider the level of impairment caused by current symptoms in the risk-benefit analysis. Families should be educated not just about potential effects of medication but known complications of untreated ADHD; parents will likely not fully appreciate the long-term psychological effects of chronic behavioral problems and underachievement on a young child. A blanket wait and see approach should be avoided, in order to prevent a permanent loss of self-esteem and motivation that may affect some children throughout their lifespan

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CNS Spectr. 2021.
SYSTEMATIC REVIEW OF TRANSDERMAL TREATMENT OPTIONS IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: IMPLICATIONS FOR USE IN ADULT PATIENTS.
Correll CU, Starling BR, Huss M.
Objective: Adults with attention-deficit/hyperactivity disorder (ADHD) often face delays in diagnosis and remain untreated, despite significant negative impacts. To evaluate the safety and efficacy of transdermal treatment options in children, adolescents, and adults, a systematic literature review was conducted, with a focus on the implications of transdermal therapies for ADHD in adults.
Methods: A MEDLINE, Embase, BIOSIS, and SCOPUS database search was conducted December 4, 2019, for English-language articles of interventional clinical trials using transdermal formulations for the treatment of ADHD with no publication date limit. Assessed outcomes included efficacy, safety, adherence, abuse potential, cost efficacy, and HRQoL.
Results: Of 23 eligible publications, 18 were in children or adolescents (n=1,699; range 23-305), and 5 in adults (n=274; range 14-90); all included methylphenidate transdermal system (MTS). All 7 pediatric publications reporting change in ADHD symptomology from baseline reported a significant improvement with MTS treatment. Similarly, in three adult publications, ADHD symptoms improved significantly with MTS treatment. Safety findings in pediatric and adult studies were comparable; the most frequently reported treatment-emergent adverse events (TEAEs; headache, decreased appetite, and insomnia) were reported

in 13/16 (81%) of publications reporting specific TEAEs. MTS-related dermal reactions were mostly mild and transient. Discontinuation due to dermal reactions was reported in 10 studies (range 0-7.1% [1 of 14 patients]). MTS compliance was high when assessed (97-99%).
Conclusions: Transdermal therapies may provide a much-needed treatment formulation for ADHD patients. Studies of MTS and other transdermal formulations, such as amphetamine, in adult patients are needed in this underserved patient population

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Cortex. 2021;138:329-40.
WHITE MATTER TRACT SIGNATURES OF FIBER DENSITY AND MORPHOLOGY IN ADHD.
Fuelscher I, Hyde C, Anderson V, et al.
Previous studies investigating white matter organization in attention deficit hyperactivity disorder (ADHD) have adopted diffusion tensor imaging (DTI). However, attempts to derive pathophysiological models from this research have had limited success, possibly reflecting limitations of the DTI method. This study investigated the organization of white matter tracts in ADHD using fixel based analysis (FBA), a fiber specific analysis framework that is well placed to provide novel insights into the pathophysiology of ADHD. High angular diffusion weighted imaging and clinical data were collected in a large paediatric cohort (N = 144; 76 with ADHD; age range 9ΓÇô11 years). White matter tractography and FBA were performed across 14 white matter tracts. Permutation based inference testing (using FBA derived measures of fiber density and morphology) assessed differences in white matter tract profiles between children with and without ADHD. Analysis further examined the association between white matter properties and ADHD symptom severity. Relative to controls, children with ADHD showed reduced white matter connectivity along association and projection pathways considered critical to behavioral control and motor function. Increased ADHD symptom severity was associated with reduced white matter organization in fronto-pontine fibers projecting to and from the supplementary motor area. Providing novel insight into the neurobiological foundations of ADHD, this is the first research to uncover fiber specific white matter alterations across a comprehensive set of white matter tracts in ADHD using FBA. Findings inform pathophysiological models of ADHD and hold great promise for the consistent identification and systematic replication of brain differences in this disorder

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Environ Int. 2021 Apr;149:106403.
PRENATAL PHTHALATE EXPOSURES AND EXECUTIVE FUNCTION IN PRESCHOOL CHILDREN.
Choi G, Villanger GD, Drover SSM, et al.
BACKGROUND: Prenatal phthalate exposure has been linked with altered neurodevelopment, including externalizing behaviors and attention-deficit hyperactivity disorder (ADHD). However, the implicated metabolite, neurobehavioral endpoint, and child sex have not always been consistent across studies, possibly due to heterogeneity in neurodevelopmental instruments. The complex set of findings may be synthesized using executive function (EF), a construct of complex cognitive processes that facilitate ongoing goal-directed behaviors. Impaired EF can be presented with various phenotypes of poor neurodevelopment, differently across structured conditions, home/community, or preschool/school. We evaluated the relationship between prenatal phthalate exposure and comprehensive assessment of preschool EF.
METHODS: Our study comprised 262 children with clinically significant/subthreshold ADHD symptoms and 78 typically developing children who were born between 2003 and 2008 and participated in the Preschool ADHD Substudy, which is nested within a population-based prospective cohort study, the Norwegian Mother, Father, and Child Cohort (MoBa). Twelve phthalate metabolites were measured from urine samples that their mothers had provided during pregnancy, at 17 weeks' gestation. All children, at approximately 3.5-years, took part in a detailed clinical assessment that included parent-and teacher-rated inventories and administered tests. We used instruments that measured constructs related to EF, which include a parent- and teacher-reported Behavior Rating Inventory of Executive Function-Preschool (BRIEF-P) and three performance-based tests: A Developmental NEuroPSYchological Assessment (NEPSY), Stanford-Binet intelligence test V (SB5), and the cookie delay task (CDT). The standard deviation change in test score per interquartile range (IQR) increase in phthalate metabolite was estimated with multivariable linear regression.

We applied weighting in all models to account for the oversampling of children with clinically significant or subthreshold symptoms of ADHD. Additionally, we assessed modification by child sex and potential co-pollutant confounding.
RESULTS: Elevated exposure to mono-benzyl phthalate (MBzP) during pregnancy was associated with poorer EF, across all domains and instruments, in both sex. For example, an IQR increase in MBzP was associated with poorer working memory rated by parent (1.23 [95% CI: 0.20, 2.26]) and teacher (1.13 [0.14, 2.13]) using BRIEF-P, and administered tests such as SB5 (no-verbal: 0.19 [0.09, 0.28]; verbal: 0.13 [0.01, 0.25]). Adverse associations were also observed for mono-n-butyl phthalate (MnBP) and mono-iso-butyl phthalate (MiBP), although results varied by instruments. EF domains reported by parents using BRIEF-P were most apparently implicated, with stronger associations among boys (e.g., MnBP and inhibition: 2.74 [1.77, 3.72]; MiBP and inhibition: 1.88 [0.84, 2.92]) than among girls (e.g., MnBP and inhibition: -0.63 [-2.08, 0.83], interaction p-value: 0.04; MiBP and inhibition: -0.15 [-1.04, 0.74], interaction p-value: 0.3). Differences by sex, however, were not found for the teacher-rated BRIEF-P or administered tests including NEPSY, SB5, and CDT.
CONCLUSION AND RELEVANCE: Elevated mid-pregnancy MBzP, MiBP, and MnBP were associated with more adverse profiles of EF among preschool-aged children across a range of instruments and raters, with some associations found only among boys. Given our findings and accumulating evidence of the prenatal period as a critical window for phthalate exposure, there is a timely need to expand the current phthalate regulations focused on baby products to include pregnancy exposures

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Environ Int. 2021;152.

METAL AND ESSENTIAL ELEMENT CONCENTRATIONS DURING PREGNANCY AND ASSOCIATIONS WITH AUTISM SPECTRUM DISORDER AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN CHILDREN.

Skogheim TS, Weyde KVF, Engel SM, et al.

Background: Prenatal exposure to toxic metals or variations in maternal levels of essential elements during pregnancy may be a risk factor for neurodevelopmental disorders such as attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) in offspring.
Objectives: We investigated whether maternal levels of toxic metals and essential elements measured in mid-pregnancy, individually and as mixtures, were associated with childhood diagnosis of ADHD or ASD.
Methods: This study is based on the Norwegian Mother, Father and Child Cohort Study and included 705 ADHD cases, 397 ASD cases and 1034 controls. Cases were identified through linkage with the Norwegian Patient Registry. Maternal concentrations of 11 metals/elements were measured in blood at week 17 of gestation; cadmium; cesium; cobalt; copper; lead; magnesium; manganese; selenium; zinc; total arsenic; and total mercury. Multivariable adjusted logistic regression models were used to examine associations between quartile levels of individual metals/elements and outcomes. We also investigated non-linear associations using restricted cubic spline models. The joint effects of the metal/element mixture on ASD and ADHD diagnoses were estimated using a quantile-based g-computation approach.
Results: For ASD, we identified positive associations (increased risks) in the second quartile of arsenic [OR = 1.77 (CI: 1.26, 2.49)] and the fourth quartiles of cadmium and manganese [OR = 1.57 (CI: 1.07 2.31); OR = 1.84 (CI: 1.30, 2.59)], respectively. In addition, there were negative associations between cesium, copper, mercury, and zinc and ASD. For ADHD, we found increased risk in the fourth quartiles of cadmium and magnesium [OR = 1.59 (CI: 1.15, 2.18); [OR = 1.42 (CI: 1.06, 1.91)]. There were also some negative associations, among others with mercury. In addition, we identified non-linear associations between ASD and arsenic, mercury, magnesium, and lead, and between ADHD and arsenic, copper, manganese, and mercury. There were no significant findings in the mixture approach analyses.
Conclusion: Results from the present study show several associations between levels of metals and elements during gestation and ASD and ADHD in children. The most notable ones involved arsenic, cadmium, copper, mercury, manganese, magnesium, and lead. Our results suggest that even population levels of these compounds may have negative impacts on neurodevelopment. As we observed mainly

similarities among the metals and elements impact on ASD and ADHD, it could be that the two disorders share some neurochemical and neurodevelopmental pathways. The results warrant further investigation and replication, as well as studies of combined effects of metals/elements and mechanistic underpinnings

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Eur Arch Psychiatry Clin Neurosci. 2021.

ASD SYMPTOMS IN ADULTS WITH ADHD: A PRELIMINARY STUDY USING THE ADOS-2.

Hayashi W, Hanawa Y, Yuriko I, et al.

Attention-deficit/hyperactivity disorder (ADHD) has long been regarded as disparate and mutually exclusive to autism spectrum disorder (ASD) in the Diagnostic and Statistical Manual of Mental Disorders (DSM)-III-R and DSM-IV. However, this idea has become obsolete due to a growing body of evidence suggesting numerous phenotypic and genetic similarities between ADHD and ASD. ASD symptoms or autistic traits in individuals with ADHD have been examined; however, most studies were conducted on children and relied on self- or parent- reports. ASD symptoms assessed with more direct, objective measures, such as the Autism Diagnostic Observation Schedule, Second Edition (ADOS-2) in adults with ADHD, remain understudied. In the present study, we used the ADOS-2 to evaluate ASD symptoms in adults with ADHD who were not clinically diagnosed with ASD. Fifty-six adults (mean age 33.9 years, 35 males, intelligence quotient 85), who were diagnosed with ADHD based on the DSM-5 criteria, completed Module 4 of the ADOS-2. Autism Spectrum Quotient (AQ), Conners Adult ADHD Rating Scale (CAARS), and Wechsler Adult Intelligence Scale (WAIS)-III were also administered to assess self-rated ASD symptoms, ADHD symptoms, and intelligence, respectively. Overall, 23.3% of participants met the ASD diagnostic classification on the ADOS-2. Social reciprocal interaction scores tended to be higher, while restricted and repetitive behavior scores were low. The scoring patterns and possible overlapping and differing phenotypic characteristics of ADHD and ASD are discussed

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Eur Child Adolesc Psychiatry. 2021.

CHILD ATTACHMENT AND ADHD: A SYSTEMATIC REVIEW.

Wylock JF, Borghini A, Slama H, et al.

Attention Deficit/Hyperactivity Disorder-á(ADHD) is a frequent neurodevelopmental disorder in children. ADHD has a multifactorial origin, combining genetic and environmental factors. Several studies suggested an influence of early parent-child relationships on the symptomatic expression of ADHD. In this review, we examine the studies that have investigated the links between attachment and ADHD in children. We searched for studies published between January 2000 and November 2019 on PsychInfo, PubMed, and Scopus. Selected studies included a theoretically based measure of attachment and an explicit measure of ADHD symptoms or an ADHD diagnosis. Studies that included children from adoption, institutionalization, or mistreatment were not included. We found only 26 studies meeting the inclusion criteria. Almost all these studies indicated a link between the attachment type and the presence of attentional difficulties and hyperactivity. However, associations were better explained, in several studies, by confounding factors such as comorbidities, cognitive difficulties, or contextual factors. The method used to assess attachment and parental mental health also had an impact. An increasing number of studies show a link between the type of attachment and the presence of attentional difficulties and hyperactivity in children. However, the nature of this link remains unclear. Implications for future research are discussed

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Eur Child Adolesc Psychiatry. 2021.

CHARACTERIZING THE HETEROGENEOUS COURSE OF INATTENTION AND HYPERACTIVITY-IMPULSIVITY FROM CHILDHOOD TO YOUNG ADULTHOOD.

Vos M, Rommelse NNJ, Franke B, et al.

To advance understanding of the heterogeneity in the course of ADHD, joint symptom trajectories of inattention and hyperactivity-impulsivity from childhood to young adulthood were modelled and associated

with genetic, demographic, and clinical characteristics. Data were obtained from the NeuroIMAGE cohort which includes 485 individuals with ADHD, their 665 siblings, and 399 typically developing children. Trajectories were based on scores of the Conners Parent Rating Scale Revised and estimated over seven homogeneous age bins (from 5 to 28-áyears) using parallel process latent class growth analysis on data collected across 2-4 time points. Multilevel multinomial logistic regression was used to identify characteristics that differentiated between the derived classes. A seven-class solution revealed severe combined stable (4.8%), severe combined decreasing (13%), severe inattentive stable (4.8%), moderate combined increasing (7.5%), moderate combined decreasing (12.7%), stable mild (12.9%), and stable low (44.3%) classes. Polygenic risk for depression, ADHD diagnosis, ADHD medication use, IQ, comorbid symptom levels (foremost oppositional behaviour), and functional impairment levels differentiated classes with similar ADHD symptom levels in childhood but a diverging course thereafter. The course of ADHD is highly heterogeneous, with stable, decreasing, and increasing trajectories. Overall, severe symptom levels in childhood are associated with elevated-to-severe symptom levels in adolescence and young adulthood, despite substantial symptom reductions. Beyond symptom severity in childhood, genetic, demographic, and clinical characteristics distinguish the heterogeneous course

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Eur J Neurosci. 2021.

CAUDATE AND CEREBELLAR INVOLVEMENT IN ALTERED P2 AND P3 COMPONENTS OF GO/NOGO EVOKED POTENTIALS IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Zarka D, Cebolla AM, Cevallos C, et al.

Previous studies showed reduced activity of the anterior cingulate cortex (ACC) and supplementary motor area during inhibition in children with attention-deficit/hyperactivity disorder (ADHD). This study aimed to investigate deep brain generators underlying alterations of evoked potential components triggered by visual GO/NoGO tasks in children with ADHD compared with typically developing children (TDC). Standardized weighted low-resolution electromagnetic tomography (swLORETA) source analysis showed that lower GO-P3 component in children with ADHD was explained not only by a reduced contribution of the frontal areas but also by a stronger contribution of the anterior part of the caudate nucleus in these children compared with TDC. While the reduction of the NoGO-P3 component in children with ADHD was essentially explained by a reduced contribution of the dorsal ACC, the higher NoGO-P2 amplitude in these children was concomitant to the reduced contribution of the dorsolateral prefrontal cortex, the insula, and the cerebellum. These data corroborate previous findings showed by fMRI studies and offered insight relative to the precise time-related contribution of the caudate nucleus and the cerebellum during the automatic feature of inhibition processes in children with ADHD. These results were discussed regarding the involvement of the fronto-basal ganglia and fronto-cerebellum networks in inhibition and attention alterations in ADHD

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Expert Rev Neurother. 2021.

THE EFFECT OF PHYSICAL ACTIVITY WITH AND WITHOUT COGNITIVE DEMAND ON THE IMPROVEMENT OF EXECUTIVE FUNCTIONS AND BEHAVIORAL SYMPTOMS IN CHILDREN WITH ADHD.

Nejati V, Derakhshan Z.

Background: Purposeful physical activities improve cognitive functions. Two possible mechanisms are available for this intervention including the impact of the physical component of exercise and goal-directedness as a cognitive component. In the present study, we aimed to compare the effect of physical activity with and without cognitive demand on executive functions and behavioral symptoms in children with ADHD.

Methods: Thirty children with ADHD were randomly assigned to two equal groups of physical activity training with and without cognitive demand. Exercise for cognitive improvement and rehabilitation (EXCIR) or running, as an aerobic exercise, were used for intervention in two groups. Executive functions and ADHD symptoms were measured in three sessions including baseline, post-intervention, and follow-up assessments, using 1-back, Wisconsin Card Sorting, and Go/No-Go tests and Conner's Teacher and Parent Rating scales. Repeated measures ANOVAs were used for analysis.

Results: The results showed physical activity with cognitive demand, compared to the physical activity without cognitive demand, has a better and longer impact on the improvement of executive functions and ADHD symptoms.
Conclusions: Cognitive rehabilitation with combined physical and cognitive tasks has a beneficial and lasting impact on impaired executive functions and behavioral symptoms in children with ADHD

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Frontiers in Pediatrics. 2021;9.
VIDEO GAMES IN ADHD AND NON-ADHD CHILDREN: MODALITIES OF USE AND ASSOCIATION WITH ADHD SYMPTOMS.
Masi L, Abadie P, Herba C, et al.
Video game addiction in young children is relevant, but it is especially important for children with ADHD. In order to obtain more data about the use of video games by Canadian children, and in particular by ADHD children, we explored the modalities of use (playtime, addiction score and usage by age) and compared them between ADHD and non-ADHD children. We then examined associations between addiction and ADHD symptoms and explored innovative results about the gender impact. Our study was cross-sectional, multicenter in child psychiatrist departments, exploratory and descriptive. We recruited three groups of children aged 4ΓÇô12 years: the ADHD Group, the Clinical-Control Group and the Community-Control Group. For each group, the material used consisted of questionnaires completed by one of the parents. Data collection took place from December 2016 to August 2018 in Montreal (n = 280). Our study highlighted a vulnerability in ADHD children: they would exhibit more addictive behaviors with respect to video games (Addiction score: 1.1025 in ADHD Group vs. 0.6802 in Community-Control Group) and prolonged periods of use. We also observed a correlation between the severity of ADHD symptoms and excessive use of video games (p = 0.000). Children with severe ADHD showed significantly higher addiction scores and, in a multiple regression analysis a combination of gender and ADHD explained the excessive use of video games

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Frontiers in Physiology. 2020;11.
LINKING ADHD AND BEHAVIORAL ASSESSMENT THROUGH IDENTIFICATION OF SHARED DIAGNOSTIC TASK-BASED FUNCTIONAL CONNECTIONS.
McNorgan C, Judson C, Handzlik D, et al.
A mixed literature implicates atypical connectivity involving attentional, reward and task inhibition networks in ADHD. The neural mechanisms underlying the utility of behavioral tasks in ADHD diagnosis are likewise underexplored. We hypothesized that a machine-learning classifier may use task-based functional connectivity to compute a joint probability function that identifies connectivity signatures that accurately predict ADHD diagnosis and performance on a clinically-relevant behavioral task, providing an explicit neural mechanism linking behavioral phenotype to diagnosis. We analyzed archival MRI and behavioral data of 80 participants (64 male) who had completed the go/no-go task from the longitudinal follow-up of the Multimodal Treatment Study of ADHD (MTA 168) (mean age = 24 years). Cross-mutual information within a functionally-defined mask measured functional connectivity for each task run. Multilayer feedforward classifier models identified the subset of functional connections that predicted clinical diagnosis (ADHD vs. Control) and split-half performance on the Iowa Gambling Task (IGT). A sample of random models trained on functional connectivity profiles predicted validation set clinical diagnosis and IGT performance with 0.91 accuracy and d > 2.9, indicating very high sensitivity and specificity. We identified the most diagnostic functional connections between visual and ventral attentional networks and the anterior default mode network. Our results show that task-based functional connectivity is a biomarker of ADHD. Our analytic framework provides a template approach that explicitly ties behavioral assessment measures to both clinical diagnosis, and functional connectivity. This may differentiate otherwise similar diagnoses, and promote more efficacious intervention strategies

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Global Health. 2021 Apr;17:48.

INFLUENCES OF DIGITAL MEDIA USE ON CHILDREN AND ADOLESCENTS WITH ADHD DURING COVID-19 PANDEMIC.

Shuai L, He S, Zheng H, et al.

OBJECTIVE: To explore the influences of digital media use on the core symptoms, emotional state, life events, learning motivation, executive function (EF) and family environment of children and adolescents diagnosed with attention deficit hyperactivity disorder (ADHD) during the novel coronavirus disease 2019 (COVID-19) pandemic.

METHOD: A total of 192 participants aged 8-16â€‰years who met the diagnostic criteria for ADHD were included in the study. Children scoring higher than predetermined cut-off point in self-rating questionnaires for problematic mobile phone use (SQPMPU) or Young's internet addiction test (IAT), were defined as ADHD with problematic digital media use (PDMU), otherwise were defined as ADHD without PDMU. The differences between the two groups in ADHD symptoms, EF, anxiety and depression, stress from life events, learning motivation and family environment were compared respectively.

RESULTS: When compared with ADHD group without PDMU, the group with PDMU showed significant worse symptoms of inattention, oppositional defiant, behavior and emotional problems by Swanson, Nolan, and Pelham Rating Scale (SNAP), more self-reported anxiety by screening child anxiety-related emotional disorders (SCARED) and depression by depression self-rating scale for children (DSRSC), more severe EF deficits by behavior rating scale of executive function (BRIEF), more stress from life events by adolescent self-rating life events checklist (ASLEC), lower learning motivation by students learning motivation scale (SLMS), and more impairment on cohesion by Chinese version of family environment scale (FES-CV). The ADHD with PDMU group spent significantly more time on both video game and social media with significantly less time spend on physical exercise as compared to the ADHD without PDMU group.

CONCLUSION: The ADHD children with PDMU suffered from more severe core symptoms, negative emotions, EF deficits, damage on family environment, pressure from life events, and a lower motivation to learn. Supervision of digital media usage, especially video game and social media, along with increased physical exercise, is essential to the management of core symptoms and associated problems encountered with ADHD

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IEEE Transactions on Neural Systems and Rehabilitation Engineering. 2021;29:1-10.

DEEP SPATIO-TEMPORAL REPRESENTATION AND ENSEMBLE CLASSIFICATION FOR ATTENTION DEFICIT/HYPERACTIVITY DISORDER.

Liu S, Zhao L, Wang X, et al.

Attention deficit/Hyperactivity disorder (ADHD) is a complex, universal and heterogeneous neurodevelopmental disease. The traditional diagnosis of ADHD relies on the long-Term analysis of complex information such as clinical data (electroencephalogram, etc.), patients' behavior and psychological tests by professional doctors. In recent years, functional magnetic resonance imaging (fMRI) has been developing rapidly and is widely employed in the study of brain cognition due to its non-invasive and non-radiation characteristics. We propose an algorithm based on convolutional denoising autoencoder (CDAE) and adaptive boosting decision trees (AdaDT) to improve the results of ADHD classification. Firstly, combining the advantages of convolutional neural networks (CNNs) and the denoising autoencoder (DAE), we developed a convolutional denoising autoencoder to extract the spatial features of fMRI data and obtain spatial features sorted by time. Then, AdaDT was exploited to classify the features extracted by CDAE. Finally, we validate the algorithm on the ADHD-200 test dataset. The experimental results show that our method offers improved classification compared with state-of-The-Art methods in terms of the average accuracy of each individual site and all sites, meanwhile, our algorithm can maintain a certain balance between specificity and sensitivity

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Int J Environ Res Public Health. 2021;18.

CALLOUS-UNEMOTIONAL TRAITS AMONG ADOLESCENTS WITH AUTISM SPECTRUM DISORDER, ATTENTION-DEFICIT/HYPERACTIVITY DISORDER, OR TYPICAL DEVELOPMENT: DIFFERENCES BETWEEN ADOLESCENTS AND PARENTS VIEWS.

Chang CL, Liu TL, Hsiao RC, et al.

This study examined parent-adolescent agreement on the callous, uncaring, and unemotional dimensions of callous-unemotional (CU) traits and the differences in adolescent-reported and parent-reported CU traits among 126 adolescents with autism spectrum disorder (ASD), 207 adolescents with attention-deficit/hyperactivity disorder (ADHD), and 203 typically developing (TD) adolescents. Adolescent-reported and parent-reported CU traits on the three dimensions of the Inventory of Callous and Unemotional Traits were obtained. The strength of CU traits and the differences between adolescent-reported and parent-reported traits were compared among the three groups using analysis of covariance. Parent-adolescent agreement was examined using intraclass correlation. The results reveal that both adolescent-reported and parent-reported callousness and uncaring traits in the ASD and ADHD groups were significantly stronger than those in the TD group. Parent-adolescent agreement on the uncaring trait was fair across the three groups, whereas that on callousness was poor across all three groups. Parent-adolescent agreement on unemotionality was fair in the TD group but poor in the ADHD and ASD groups. ASD and ADHD groups had significantly greater differences in scores reported by parents and adolescents on the callousness trait than the TD group. The parent-adolescent score differences in the uncaring trait were also larger in the ASD group than in the TD group. Thus, these results support the application of a multiinformant approach in CU trait assessment, especially for adolescents with ASD or ADHD

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Int J Environ Res Public Health. 2021;18.

INCREASED RISK OF TRAUMATIC INJURIES AMONG PARENTS OF CHILDREN WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER: A NATIONWIDE POPULATION-BASED STUDY.

Li DJ, Chen YL, Chen YY, et al.

Children with attention deficit/hyperactivity disorder (ADHD) are vulnerable to traumatic injuries. Parents of children with ADHD experience undesirable impacts more frequently than parents of children without ADHD. The aim of this study was to evaluate whether traumatic injuries are more prevalent in parents of children with ADHD than in parents of children without ADHD. We compared the prevalence of traumatic injuries between parents of children with and without ADHD by using data from the Taiwan Maternal and Child Health Database from 2004 to 2017. The Cox proportional-hazards regression model was used to examine differences in burn injury, fracture, and traumatic brain injury between parents of children with and without ADHD after adjustment for age, urbanicity, and income level. In total, 81,401 fathers and 87,549 mothers who had at least one offspring with ADHD and 1,646,100 fathers and 1,730,941 mothers with no offspring with ADHD were included in the analysis. The results indicated that both fathers and mothers of children with ADHD had higher risks of burn injury, fracture, and traumatic brain injury than fathers and mothers of children without ADHD. Mothers of children with ADHD had higher risks for all kinds of traumatic events than fathers of children with ADHD

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J Am Acad Child Adolesc Psychiatry. 2021 Apr;60:435-37.

EDITORIAL: AN INCONVENIENT FINDING: SCHOOL ACCOMMODATIONS FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

Arnold LE.

In their systematic review, Lovett and Nelson(1) report a worrisome lack of evidence for most school accommodations (eg, additional exam time) for students with attention-deficit/hyperactivity disorder (ADHD). With the exception of reading examination questions aloud to younger children (primary grades), most of the scant evidence of benefit suggests that any benefit of accommodation is not specific to ADHD but would apply to any student. Furthermore, students and support staff "often express ambivalence and dissatisfaction" with accommodations. Finally, it appears that accommodations are being substituted for the

more expensive evidence-based therapeutic interventions. This would be like seating a student with myopia 2 feet from the blackboard instead of fitting refractive lenses or providing a wheelchair instead of corrective surgery and physical therapy. Thus, Lovett and Nelson's(1) findings challenge the wisdom of routine clinical recommendations for accommodations. Such recommendations may even be a disservice, especially if they take precedence over evidence-based interventions. This inconvenient finding has several ramifications and poses some problems in light of the widespread recommendations for and use of school accommodations for ADHD

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J Atten Disord. 2021 Apr;25:885-90.

MIND WANDERING (INTERNAL DISTRACTIBILITY) IN ADHD: A LITERATURE REVIEW.

Lanier J, Noyes E, Biederman J.

Objective: Mind wandering, the unintended shifting of attention from a task, has been previously associated with symptoms of ADHD. To this end, we conducted a literature search to investigate the association between mind wandering and ADHD.

Method: We conducted a systematic search of the literature of relevant articles assessing mind wandering and ADHD in PubMed, PsycINFO/OVID, and Medline. Included were original articles in English that had operationalized definitions of ADHD and mind wandering, adequate sample size, and reliance on statistical evaluation of findings. Excluded were reviews, opinions, and case reports.

Results: Only nine studies met our a priori inclusion and exclusion criteria (N = 8 in adults; N = 1 in pediatrics). Findings suggest that ADHD is frequently associated with spontaneous mind wandering and when present heralds more functional impairments.

Conclusion: The limited research on mind wandering in ADHD indicates that it is prevalent and morbid supporting further research on the subject

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J Atten Disord. 2021 Apr;25:874-84.

PSYCHIATRIC AND NONPSYCHIATRIC COMORBIDITIES AMONG CHILDREN WITH ADHD: AN EXPLORATORY ANALYSIS OF NATIONWIDE CLAIMS DATA IN GERMANY.

Akmatov MK, Ermakova T, BÃ¤tzing J.

Objective: This study examined the full spectrum of comorbid disorders in all statutory-health-insured children aged 5 to 14 years with ADHD in 2017 by using nationwide claims data in Germany.

Method: Children with ADHD (n = 258,662) were compared for the presence of 864 comorbid diseases with a control group matched by gender, age, and region of residence (n = 2,327,958).

Results: Among others, metabolic disorders (odds ratio [OR] = 9.18; 95% confidence interval [CI] = [8.43, 9.99]), viral pneumonia (OR = 4.95; 95% CI = [2.37, 10.33]), disorders of white blood cells (OR = 4.55; 95% CI = [3.83, 5.40]), kidney failure (OR = 3.33; 95% CI = [2.65, 4.18]), hypertension (OR = 3.26; 95% CI = [3.00, 3.55]), obesity (OR = 2.85; 95% CI = [2.80, 2.91]), type 2 diabetes (OR = 2.61; 95% CI = [2.11, 3.23]), migraine (OR = 2.49; 95% CI = [2.37, 2.61]), asthma (OR = 2.19; 95% CI = [2.16, 2.22]), atopic dermatitis (OR = 2.10; 95% CI = [2.16, 2.23]), juvenile arthritis (OR = 1.56; 95% CI = [1.39, 1.76]), glaucoma (OR = 1.51; 95% CI = [1.30, 1.75]), and type 1 diabetes (OR = 1.30; 95% CI = [1.20, 1.40]) were more likely to be diagnosed in ADHD children.

Conclusion: Along with psychiatric diseases, various somatic diseases were more common in ADHD children. The results have direct implications for patient care, including fine-grained diagnostics and personalized therapy

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J Atten Disord. 2021 May;25:933-41.

PREMATURITY AND ADHD IN CHILDHOOD: AN OBSERVATIONAL REGISTER-BASED STUDY IN CATALONIA.

Perapoch J, Vidal R, et al.

Objective: To evaluate the association between prematurity (by the gestational week [gw]) and ADHD during childhood.

Method: Observational, matched cohort study using data from children born in a tertiary-level hospital (Hospital Universitari Vall d'Hebron, Catalonia, Spain) during 1995-2007 and data from the Information System for the Development of Research in Primary Health Care (SIDIAP database, Catalonia, Spain).

Results: Prevalence of ADHD increases as gestational age decreases, 12.7% for those born 28 gw, compared to 3.2% for those born after the 37 gw. The risk of developing ADHD in the non-premature children tends to increase as the gw decreases (35-36 gw, hazard ratio [HR] = 1.70, 95% confidence interval [CI] [1.19, 2.44]; 33-34 gw, HR = 3.38, 95% CI [2.08, 5.50]; 29-32 gw, HR = 2.37, 95% CI [1.54, 3.63]; and 28 gw, HR = 5.57, 95% CI [2.49, 12.46])

Conclusion: Being born preterm is associated with a risk of developing ADHD, also in late preterm children (35-36 gw). Attention when taking care of these infants regarding their mental health must be made

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J Atten Disord. 2021 Apr;25:771-82.

COHORT CHANGE IN THE PREVALENCE OF ADHD AMONG U.S. ADULTS: EVIDENCE OF A GENDER-SPECIFIC HISTORICAL PERIOD EFFECT.

London AS, Landes SD.

Objective: To document inter- and intra-cohort changes in adult ADHD and examine whether changes vary by gender.

Method: We analyze data from the 2007 and 2012 U.S. National Health Interview Survey.

Results: The prevalence of ADHD among adults aged 18 to 64 years increased from 3.41% in 2007 to 4.25% in 2012. As expected, patterns of inter- and intra-cohort change varied by gender. At younger ages, inter-cohort gender differences are more distinct due to a spike in prevalence among boys/men born in or after 1980. Consistent with a gender-specific historical period effect, recent intra-cohort increases among women have narrowed the gender gap.

Conclusion: The gender gap in the prevalence of ADHD among adults decreased by 31.1% from 2007 to 2012 due to increased prevalence among adult women of all ages. We discuss these results in relation to diagnostic practice, adult health and well-being, data limitations and needs, and directions for future research

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J Atten Disord. 2021 May;25:954-64.

TRAJECTORIES OF DEPRESSIVE SYMPTOMS IN ADOLESCENCE: THE INTERPLAY OF MATERNAL EMOTION REGULATION DIFFICULTIES AND YOUTH ADHD SYMPTOMATOLOGY.

Oddo LE, Felton JW, Meinzer MC, et al.

Objective: ADHD and depression co-occur at higher than chance levels in adolescence, but moderators of this association are not well understood. Consistent with a developmental-transactional framework, one such moderator may be maternal emotion regulation (ER) difficulties. Using latent growth curve modeling, the current study examined the independent and interactive effects of adolescent ADHD symptoms and maternal ER difficulties on the trajectory of depressive symptoms across adolescence.

Method: This study included a community sample of 247 adolescents (M(age) = 13.06 years) assessed annually over a 6-year period.

Results: Findings suggested that youth with greater ADHD symptoms whose mothers evidenced more ER difficulties demonstrated steeper increases in depressive symptoms over time relative to their peers with lower ADHD symptoms or whose mothers reported fewer ER difficulties.

Conclusion: This work highlights the importance of maternal ER difficulties in predicting the trajectory of depressive symptoms among adolescents with ADHD symptomatology

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J Atten Disord. 2021 Apr;25:851-64.

EMOTION REGULATION AND CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: THE EFFECT OF VARYING PHONOLOGICAL WORKING MEMORY DEMANDS.

Tarle SJ, Alderson RM, Arrington EF, et al.

Objective: Findings from extant studies of the relationship between ADHD-related emotion regulation and working memory deficits have been equivocal, and their correlational designs preclude inferences about the functional relationship between working memory demands and emotion regulation. This study aimed to experimentally examine the functional relationship between varying working memory demands and ADHD-related emotion regulation deficits.
Method: Overt emotion regulation behaviors were coded while children with and without ADHD completed experimental tasks that manipulated low and high working memory demands.
Results: Compared with typically developing children, children with ADHD exhibited large-magnitude overall emotion expression deficits, disproportionately greater self-criticism during high working memory conditions, and disproportionately greater positive emotion expression during low working memory demand conditions.
Conclusion: These findings suggest that working memory demands are functionally related to emotion regulation deficits exhibited by children with ADHD and may explicate variability of emotion regulation difficulties related to environmental demands

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J Atten Disord. 2021 Apr;25:783-93.

ATTENTION DEFICIT HYPERACTIVITY DISORDER IN CHILDREN AND ADULTS: A POPULATION SURVEY ON PUBLIC BELIEFS.

Speerforck S, Hertel J, Stolzenburg S, et al.

Objective: To investigate beliefs and attitudes of the public toward attention deficit hyperactivity disorder (ADHD) in children and adults.
Method: In a representative population survey in Germany (N = 1,008) using computer-assisted telephone interviews, we asked participants about causal beliefs, illness recognition, treatment recommendations, and beliefs about ADHD, presenting an unlabelled vignette of a child or an adult with ADHD.
Results: The most frequently endorsed causal beliefs for the depicted child with ADHD were "TV or Internet," "lack of parental affection," and "broken home." In comparison with the child vignette, biological causal beliefs were endorsed more often after the adult vignette. In the child vignette, 66% advised against a treatment with stimulant medication. About 90% of respondents had heard of ADHD. Of those, 20% said they believed ADHD to be not a real disease.
Conclusion: Beliefs of the German public partly contradict evidence and should be considered in therapeutical and public contexts

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J Atten Disord. 2021 May;25:1001-09.

TEST-RETEST RELIABILITY OF THE 25-ITEM VERSION OF WENDER UTAH RATING SCALE. IMPACT OF CURRENT ADHD SEVERITY ON RETROSPECTIVELY ASSESSED CHILDHOOD SYMPTOMS.

Lundervold AJ, Vartiainen H, Jensen D, et al.

Objective: To investigate test-retest reliability of the 25-item version of Wender Utah Rating Scale (WURS-25) and factors influencing retrospective reports of childhood behavior in adults with ADHD.
Method: Eighty-five adults with ADHD and 189 controls completed the WURS-25 and the adult ADHD Self-Rating Scale (ASRS) at two time points (mean interval = 7 years) and provided information about dyslexia, somatic, and psychiatric disorders.
Results: The correlation between WURS-25 scores at the two time points was strong, and reports from 60% of the adults with ADHD showed no change in severity level. Reports on the WURS-25 were positively associated with current ADHD symptoms at both time points and the presence of dyslexia and mood disorders, with the strongest association found among adults reporting the most severe WURS-25 score.

Conclusion: Although our study showed an acceptable test-retest reliability of WURS-25, the substantial contribution from current ADHD symptoms to the WURS scores emphasizes the importance of collateral information from family members and others who knew the adult in childhood

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J Atten Disord. 2021 May;25:942-53.

VISUAL ATTENTION, ORTHOGRAPHIC WORD RECOGNITION, AND EXECUTIVE FUNCTIONING IN CHILDREN WITH ADHD, DYSLEXIA, OR ADHD + DYSLEXIA.

Fernàndez-Andres MI, Tejero P, Vélez-Calco X.

Objective: The current study examined the differences in visual selective attention, orthographic word recognition, and executive functioning.

Method: One hundred and forty Ecuadorian children in third and fifth grades of elementary school (8-10 years old) participated in the study-35 with only dyslexia (DD), 35 with the combined type of attention deficit and hyperactivity disorder (ADHD-C), 35 with disorders (DD + ADHD-C), and 35 typical development children (TD).

Results: The Ecuadorian children with DD and/or ADHD-C in this age range usually have difficulties in visual selective attention, and also in orthographic word recognition. The executive functioning results showed that such functioning was worse in the ADHD-C groups (with or without DD), but not in the DD group, supporting the dissociation between DD and ADHD-C in executive functioning in this population.

Conclusion: The DD + ADHD-C comorbidity produces worse deficits compared to DD, but not compared to ADHD-C, supporting the idea that there are common factors in DD and ADHD-C

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J Atten Disord. 2021 May;25:965-77.

EXECUTIVE FUNCTIONING RATING SCALE AS A SCREENING TOOL FOR ADHD: INDEPENDENT VALIDATION OF THE BDEFS-CA.

O'Brien AM, Kivisto LR, Deasley S, et al.

Objective: This study provides independent examination of the validity of the Barkley Deficits of Executive Functioning Scale-Children and Adolescents (BDEFS-CA) in a sample of children diagnosed with ADHD (n = 50) and typically developing controls (n = 50).

Method: Parents of participants completed the BDEFS-CA and the Conners 3 rating scales. Validity of BDEFS-CA was examined using a confirmatory factor analysis, correlational analyses with Conners 3 ratings, and receiver operating characteristic (ROC) curve analysis of diagnostic accuracy.

Results: Findings support the construct, concurrent, and discriminant validity of the BDEFS-CA in a mixed sample.

Conclusion: Findings provide independent examination of the validity of the BDEFS-CA as a measure of executive dysfunction and a screening tool for ADHD

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J Atten Disord. 2021 Apr;25:865-73.

BILINGUALISM MAY BE PROTECTIVE AGAINST EXECUTIVE FUNCTION AND VISUAL PROCESSING DEFICITS AMONG CHILDREN WITH ATTENTION PROBLEMS.

Hardy LM, Tomb M, Cha Y, et al.

Objective: The current study examined how the opposing effects of bilingualism and attention problems operate on executive functioning, visual processing, and verbal fluency in children with clinically significant levels of attention problems.

Method: We tested whether bilingualism moderated associations between attention problems and visual processing, executive functioning, and verbal fluency.

Results: Bilingual children (n = 331) showed visual processing advantages relative to their monolingual peers (n = 165), but only at higher, and not lower, levels of attention problems. Bilingualism did not moderate the association between attention problems and interference control; however, across all children, those with

higher levels of attention problems had more difficulty with interference control. Monolingual children demonstrated advantages in verbal fluency relative to bilingual children, but this did not vary with attention problems.
Conclusion: Visual processing advantages in bilinguals are detected among children with heightened attention problems, but advantages in interference control are not; findings may have implications for classroom interventions

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J Atten Disord. 2021 Apr;25:820-28.
ASSOCIATIONS BETWEEN ADHD SUBTYPE SYMPTOMATOLOGY AND SOCIAL FUNCTIONING IN CHILDREN WITH ADHD, AUTISM SPECTRUM DISORDER, AND COMORBID DIAGNOSIS: UTILITY OF DIAGNOSTIC TOOLS IN TREATMENT CONSIDERATIONS.
Ng R, Heinrich K, Hodges E.
Objective: To assess associations between objective-/caregiver-report measures of attention functioning and social impairment among children with ADHD, autism spectrum disorder (ASD), and co-occurring ASD + ADHD.
Method: Patients with ADHD (N = 27), ASD (N = 23), and ASD + ADHD (N = 44) completed measures of intellectual functioning (Wechsler tests) and attention functioning (Continuous Performance Test-Second Edition [CPT-II]) as part of a neurocognitive assessment. Caregivers completed the Conners Third Edition to assess day-to-day inattentiveness, hyperactivity/impulsivity, and the Social Responsiveness Scale (SRS) to assess social functioning.
Results: Among patients with ADHD, attention measures contributed to 48% of the variance in total SRS scores, with caregiver-reported hyperactivity/impulsivity as the strongest factor. In contrast, among those with ASD + ADHD, attention measures accounted for 40% of the variance, largely due to inattention problems. No associations between domains were observed among patients with ASD.
Conclusion: Differential ADHD symptoms are associated with social impairment among children with ADHD versus ASD + ADHD; whereas, no associations were observed among those with ASD

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J Atten Disord. 2021 May;25:906-19.
TELOMERE LENGTH AND ADHD SYMPTOMS IN YOUNG ADULTS.
Momany AM, Lussier S, Nikolas MA, et al.
Objective: Previous research examining telomeres in individuals with neuropsychiatric disorders shows that greater illness, symptoms, or cognitive impairment are linked with shorter telomeres. However, the relationships of telomere length and neuropsychological processes or psychiatric symptoms are not understood in individuals with Attention Deficit/Hyperactivity Disorder (ADHD).
Method: 390 young adults with and without ADHD completed a multi-informant diagnostic assessment and neuropsychological testing battery. Participant DNA was isolated from saliva samples, and telomere length was determined using qPCR.
Results: Linear regression models demonstrated the only significant association to survive correction for multiple testing was for childhood hyperactivity-impulsivity symptoms and longer telomere length.
Conclusion: Contrary to expectations, longer telomere length in young adults was associated only with childhood ADHD symptoms, particularly hyperactivity-impulsivity, in this sample. These findings are an important demonstration that the neuropsychological deficits and symptoms experienced by individuals diagnosed with ADHD during adulthood may not be negatively associated with telomere length

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J Clin Child Adolesc Psychol. 2021 Mar;50:267-80.

SLUGGISH COGNITIVE TEMPO AND ADHD SYMPTOMS IN A NATIONALLY REPRESENTATIVE SAMPLE OF US CHILDREN: DIFFERENTIATION USING CATEGORICAL AND DIMENSIONAL APPROACHES.

Burns GL, Becker SP.

A nationally representative sample of U.S. children was used to determine the empirical and clinical differentiation of sluggish cognitive tempo (SCT) and attention-deficit/hyperactivity disorder (ADHD) symptoms using both categorical and dimensional approaches. Mothers of children (N = 2,056, M ± SDage = 8.49 ± 2.15 years, 49.3% girls) completed measures of SCT, ADHD, oppositional defiant disorder (ODD), anxiety, depression, sleep difficulties, daily life executive functioning, conflicted shyness, friendship difficulties, and social and academic impairment. Scores greater than the top 5% on SCT and ADHD measures were used to create SCT-only (n = 53, 2.58%), ADHD-only (n = 93, 4.52%), SCT + ADHD (n = 49, 2.38%), and comparison (n = 1,861, 90.52%) groups. Fifty-two percent of the SCT group did not qualify for the ADHD group, whereas 65% of the ADHD group did not qualify for the SCT group. The SCT-only group had higher levels of anxiety, depression, conflicted shyness, and sleep difficulties than the ADHD-only group. In contrast, the ADHD-only group had greater executive functioning deficits and higher ODD than the SCT-only group. SCT-only and ADHD-only groups showed similar levels of friendship, social, and academic impairment. Similar findings emerged when using structural regression analyses to determine the unique clinical correlates of SCT and ADHD dimensions. This is only the second study to examine the distinction of clinically-elevated SCT from ADHD in a national sample of children and extends previous findings to a broader array of functional outcomes. Normative information on the SCT scale also provides a validated rating scale to advance research and clinical care

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Journal of Clinical Neuroscience. 2021;88:22-27.

THE ATTENTION NETWORKS IN BENIGN EPILEPSY WITH CENTROTEMPORAL SPIKES: A LONG-TERM FOLLOW-UP STUDY.

Wu L, Yang X, Wang X, et al.

Purpose: To evaluate the long-term prognosis of attention deficit in children with newly diagnosed benign childhood epilepsy with centrotemporal spikes (BECTS).

Methods: Attention network test (ANT) was performed over a period of 7 years on 42 patients who were newly diagnosed with BECTS, in the Department of Neurology of Anhui Provincial Children's Hospital.

Results: In the patients group, the accuracy of ANT was lower (P = 0.000), the total response time was longer (P = 0.000), and the efficiency of orienting (P = 0.000) and alerting (P = 0.041) networks was lower than that of the control group. Accuracy was positively correlated with age of onset (b = 1.184) and negatively correlated with number of seizures (b = Γêǽ1.321). After 7 years, there was no significant difference in the accuracy (P = 0.385); total response time (P = 0.661); and alerting (P = 0.797), orienting (P = 0.709), and executive control (P = 0.806) network efficiencies between the patients and controls. Accuracy was positively correlated with age of onset (b = 0.8583) and negatively correlated with number of seizures (b = Γêǽ1.017) and duration of antiepileptic drugs therapy (b = Γêǽ3.203).

Conclusions: In our study, the newly diagnosed BECTS patients had impaired attention network, mainly in the alerting and orienting domains. Age of onset, number of seizures, and time of antiepileptic treatment may affect the attention networks. With the remission of BECTS, the attention network dysfunction was reversed

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J Mol Neurosci. 2021.

THE POTENTIAL ROLE OF MIRNAS AS PREDICTIVE BIOMARKERS IN NEURODEVELOPMENTAL DISORDERS.

Juvale IIA, Che Has AT.

Neurodevelopmental disorders are defined as a set of abnormal brain developmental conditions marked by the early childhood onset of cognitive, behavioral, and functional deficits leading to memory and learning problems, emotional instability, and impulsivity. Autism spectrum disorder, attention-deficit/hyperactivity disorder, Tourette syndrome, fragile X syndrome, and DownΓÇÖs syndrome are a few known examples of neurodevelopmental disorders. Although they are relatively common in both developed and developing countries, very little is currently known about their underlying molecular mechanisms. Both genetic and

environmental factors are known to increase the risk of neurodevelopmental disorders. Current diagnostic and screening tests for neurodevelopmental disorders are not reliable; hence, individuals with neurodevelopmental disorders are often diagnosed in the later stages. This negatively affects their prognosis and quality of life, prompting the need for a better diagnostic biomarker. Recent studies on microRNAs and their altered regulation in diseases have shed some light on the possible role they could play in the development of the central nervous system. This review attempts to elucidate our current understanding of the role that microRNAs play in neurodevelopmental disorders with the hope of utilizing them as potential biomarkers in the future

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Journal of Neural Engineering. 2021;18.

PREDICTING DISEASE SEVERITY IN CHILDREN WITH COMBINED ATTENTION DEFICIT HYPERACTIVITY DISORDER USING QUANTITATIVE FEATURES FROM STRUCTURAL MRI OF AMYGDALOID AND HIPPOCAMPAL SUBFIELDS.

Song S, Qiu J, Lu W.

Objective. Volumetric changes in the amygdaloid and hippocampal subfields have been observed in children with combined attention deficit hyperactivity disorder (ADHD-C). The purpose of this study was to investigate whether volumetric changes in the amygdaloid and hippocampal subfields could be used to predict disease severity in children with ADHD-C.

Approach. The data used in this study was from ADHD-200 datasets, a total of 76 ADHD-C patients were included in this study. T1 structural MRI data were used and 64 structural features from the amygdala and hippocampus were extracted. Three ADHD rating scales were used as indicators of ADHD severity. Sequential backward elimination (SBE) algorithm was used for feature selection. A linear support vector regression (SVR) was configured to predict disease severity in children with ADHD-C.

Main results. The three ADHD rating scales could be accurately predicted with the use of SBE-SVR. SBE-SVR achieved the highest accuracy in predicting ADHD index with a correlation of 0.7164 ($p < 0.001$, tested with 1000-time permutation test). Mean squared error of the SVR was 43.6868, normalized mean squared error was 0.0086, mean absolute error was 3.2893. Several amygdaloid and hippocampal subregions were significantly related to ADHD severity, as revealed by the absolute weight from the SVR model.

Significance. The proposed SBE-SVR could accurately predict the severity of patients with ADHD-C based on quantitative features extracted from the amygdaloid and hippocampal structures. The results also demonstrated that the two subcortical nuclei could be used as potential biomarkers in the progression and evaluation of ADHD

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J Am Acad Child Adolesc Psychiatry. 2021.

TRIGEMINAL NERVE STIMULATION FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: COGNITIVE AND ELECTROENCEPHALOGRAPHIC PREDICTORS OF TREATMENT RESPONSE.

Loo SK, Salgari GC, Ellis A, et al.

Objective: The current study applies a precision medicine approach to trigeminal nerve simulation (TNS), a Food and Drug Administration-approved neuromodulation treatment for attention-deficit/hyperactivity disorder (ADHD), by testing secondary outcomes of cognitive and electroencephalographic [EEG] predictors of treatment response among subjects from the original randomized controlled trial.

Method: Children aged 8 to 12 years with ADHD, were randomized to 4 weeks of active or sham TNS treatment, after which the sham group crossed over into 4 weeks of open-label treatment. TNS treatment responders (RESP) had an ADHD Rating Scale (ADHD-RS) Total score reduction of 25%, whereas nonresponders (NR) had <25% reduction posttreatment. Assessments included weekly behavioral ratings and pre-/posttreatment cognitive EEG measures.

Results: The final sample was 25 RESP and 26 NR comprising 34 male and 17 female children, with a mean (SD) age of 10.3 (1.4) years. Baseline measures that significantly differentiated RESP from NR included: lower working memory, lower spelling and mathematics achievement, deficits on behavioral ratings of executive function (BRIEF), and lower resting state EEG power in the right frontal (F4) region (all p values <.05). Compared to NRs, responders showed significantly increased right frontal EEG power with TNS

treatment, which was predictive of improved executive functions and ADHD symptomatology (+¦ = 0.65, p <.001). When EEG findings and behavior were modeled together, the area under the curve (AUC) for BRIEF Working Memory scale was 0.83 (p =.003), indicating moderate prediction of treatment response.
Conclusion: Children with ADHD who have executive dysfunction are more likely to be TNS responders and show modulation of right frontal brain activity, improved/normalized executive functions, and ADHD symptom reduction.
Clinical trial registration information: Developmental Pilot Study of External Trigeminal Nerve Stimulation for ADHD; http://clinicaltrials.gov; NCT02155608

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J Am Acad Child Adolesc Psychiatry. 2021.
PHASIC VERSUS TONIC IRRITABILITY: DIFFERENTIAL ASSOCIATIONS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS.
Cardinale EM, Freitag GF, Brotman MA, et al.
Objective: Irritability is a multifaceted construct in pediatric psychopathology. It has been conceptualized as having a phasic dimension and a tonic dimension. Disruptive mood dysregulation disorder is defined by the presence of both dimensions. Severe irritability, or disruptive mood dysregulation disorder, is highly comorbid with attention-deficit/hyperactivity disorder (ADHD). However, it is unknown whether the presence of ADHD modulates the expression of phasic and tonic irritability.
Method: A data-driven, latent variable approach was used to examine irritability and ADHD symptoms in a transdiagnostic pediatric sample (N = 489) with primary disruptive mood dysregulation disorder, ADHD, subclinical irritability symptoms, or no diagnosis. Using latent profile analyses, we identified 4 classes: high levels of both irritability and ADHD symptoms, high levels of irritability and moderate levels of ADHD symptoms, moderate levels of irritability and high levels of ADHD symptoms, and low levels of both irritability and ADHD symptoms. Confirmatory factor analysis operationalized phasic irritability and tonic irritability.
Results: As expected, the 2 latent classes characterized by high overall irritability exhibited the highest levels of both phasic and tonic irritability. However, between these 2 high irritability classes, highly comorbid ADHD symptoms were associated with significantly greater phasic irritability than were moderately comorbid ADHD symptoms. In contrast, the 2 high irritability groups did not differ on levels of tonic irritability.
Conclusion: These findings suggest that phasic, but not tonic, irritability has a significant association with ADHD symptoms and that phasic and tonic might be distinct, though highly related, irritability dimensions. Future research should investigate potential mechanisms underlying this differential association

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J Am Acad Child Adolesc Psychiatry. 2021.
REVIEW: IDENTIFICATION AND MANAGEMENT OF CIRCADIAN RHYTHM SLEEP DISORDERS AS A TRANSDIAGNOSTIC FEATURE IN CHILD AND ADOLESCENT PSYCHIATRY.
Arns M, Kooij JJS, Coogan AN.
Objective: Sleep disturbances are highly frequent features in a range of child and adolescent psychiatric conditions. However, it is commonly not clear if such sleep problems represent symptomatic features of, comorbidities of, or risk factors for these conditions. It is believed that underlying dysfunction in the daily biological (circadian) clock may play important roles in the etiology of many sleep disorders, and circadian rhythm changes are reported in a number of neuropsychiatric conditions. The aim of this review was to explore the key identifying features of circadian rhythm disorders (CRDs) in child and adolescent psychiatry and address how such disorders may be managed in the clinic.
Method: A narrative review was conducted of the extant literature of CRDs in children and adolescents with psychiatric conditions.
Results: Key biological and social factors that contribute to CRDs in children and adolescents, and the cognitive and neurobehavioral consequences resulting from insufficient sleep were outlined. The roles of melatonin and other chronotherapeutic and behavioral interventions for the management of CRDs were also outlined. Further, the importance of careful investigation of circadian rhythm abnormalities in shaping the most effective treatment plan according to chronobiological principles was highlighted.

Conclusion: CRDs are common in children and adolescents with psychiatric conditions and arise out of complex interactions between biological and social factors. Careful clinical attention to and management of CRDs in child and adolescent psychiatry have the potential for significant benefit not only in the domain of sleep but also in a range of cognitive, affective, and behavioral outcomes

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J Formos Med Assoc. 2021.

SEX DIFFERENCES IN THE DIAGNOSIS OF AUTISM SPECTRUM DISORDER AND EFFECTS OF COMORBID MENTAL RETARDATION AND ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Tang CH, Chi MH, Hsieh YT, et al.

Background/purpose: The association between sex and diagnostic behavior of autism spectrum disorder (ASD), and the effects of comorbid mental retardation (MR) and attention-deficit hyperactivity disorder (ADHD), were explored.

Methods: Based on the Taiwan Longitudinal Health Insurance Database (LHID)-2000 and data from 1996 through 2008, the cumulative incidence of ASD over time was compared between the sexes (both cohorts n = 38,117) using the log-rank test. The effects of comorbid MR and ADHD on the incidence of ASD were evaluated using Cox proportional hazard regression analysis. The age at first diagnosis of ASD in the two sexes was compared using the independent-sample t-test.

Results: The incidence was higher in males than in females (0.0007 vs. 0.0002) across ages. Comorbid MR or ADHD increased the incidence of ASD in both sexes; comorbid MR or ADHD also decreased the male to female hazard ratio of ASD, with no significant differences in the incidence density of ASD between sexes. ADHD delayed diagnosis in both sexes (males: 6.61 vs 5.10, $p < 0.0001$; females: 6.83 vs 4.69, $p = 0.0037$).

Conclusions: The general concept of a higher incidence of ASD among males was noted in this study of a Taiwanese population, but disappeared in those with comorbid MR or ADHD, indicating unique vulnerabilities to MR/ADHD or under-identification of high-functioning females with ASD in childhood. Increasing the diagnostic sensitivity of ASD in those with comorbid ADHD is important due to a delayed diagnostic age in this group

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NeuroImage Clin. 2021;30.

THE DYNAMICS OF THETA-RELATED PRO-ACTIVE CONTROL AND RESPONSE INHIBITION PROCESSES IN AD(H)D.

Adelhofer N, Bluschke A, Roessner V, et al .

Impulsivity and deficits in response inhibition are hallmarks of attention-deficit(-hyperactivity) disorder (AD(H)D), can cause severe problems in daily functioning, and are thus of high clinical relevance. Traditionally, research to elucidate associated neural correlates has intensively, but also quite selectively examined mechanisms during response inhibition in various tasks. Doing so, in-between trial periods or periods prior to the response inhibition process, where no information relevant to inhibitory control is presented, have been neglected. Yet, these periods may nevertheless reveal relevant information. In the present study, using a case-control cross-sectional design, we take a more holistic approach, examining the inter-relation of pre-trial and within-trial periods in a Go/Nogo task with a focus on EEG theta band activity. Applying EEG beamforming methods, we show that the dynamics between pre-trial (pro-active) and within-trial (inhibition-related) control processes significantly differ between AD(H)D subtypes. We show that response inhibition, and differences between AD(H)D subtypes, exhibit distinct patterns of (at least) three factors: (i) strength of pre-trial (pro-active control) theta-band activity, (ii) the inter-relation of pro-active control and inhibition-relation theta band activity and (iii) the functional neuroanatomical region active during theta-related pro-active control processes. This multi-factorial pattern is captured by AD(H)D subtype clinical symptom clusters. The study provides a first hint that novel cognitive-neurophysiological facets of AD(H)D may be relevant to distinguish AD(H)D subtypes

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Neurosci Biobehav Rev. 2021;126:194-212.

OVERLAPPING SLEEP DISTURBANCES IN PERSISTENT TIC DISORDERS AND ATTENTION-DEFICIT HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW AND META-ANALYSIS OF POLYSOMNOGRAPHIC FINDINGS.

Keenan L, Sherlock C, Bramham J, et al.

Introduction: Persistent tic disorders (PTDs) and attention-deficit hyperactivity disorder (ADHD) are common neurodevelopmental conditions which tend to co-occur. Both diagnoses are associated with sleep problems. This systematic review and meta-analysis investigates overlaps and distinctions in objective sleep parameters based on diagnosis (PTD-only, PTD + ADHD, and ADHD-only).

Methods: Databases were searched to identify studies with objective sleep measures in each population. Meta-analyses were conducted using a random effects model.

Results: Polysomnography was the only measure included in all three groups. Twenty studies met final inclusion criteria, combining PTD-only (N = 108), PTD + ADHD (N = 79), and ADHD-only (N = 316). Compared to controls (N = 336), PTD-only and PTD + ADHD groups had significantly lower sleep efficiency and higher sleep onset latency. PTD + ADHD also had significantly increased time in bed and total sleep time. No significant differences were observed between ADHD-only groups and controls.

Discussion: Different sleep profiles appear to characterise each population. PTD + ADHD was associated with more pronounced differences. Further research is required to elucidate disorder-specific sleep problems, ensuring appropriate identification and monitoring of sleep in clinical settings

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Neurotoxic Res. 2021.

NEUROIMAGING OF SUPRAVENTRICULAR FRONTAL WHITE MATTER IN CHILDREN WITH FAMILIAL ATTENTION-DEFICIT HYPERACTIVITY DISORDER AND ATTENTION-DEFICIT HYPERACTIVITY DISORDER DUE TO PRENATAL ALCOHOL EXPOSURE.

Alger JR, et al.

Attention-deficit hyperactivity disorder (ADHD) is common in patients with (ADHD+PAE) and without (ADHD-PAE) prenatal alcohol exposure (PAE). Many patients diagnosed with idiopathic ADHD actually have covert PAE, a treatment-relevant distinction. To improve differential diagnosis, we sought to identify brain differences between ADHD+PAE and ADHD-PAE using neurobehavioral, magnetic resonance spectroscopy, and diffusion tensor imaging metrics that had shown promise in past research. Children 8ΓÇô13 were recruited in three groups: 23 ADHD+PAE, 19 familial ADHD-PAE, and 28 typically developing controls (TD). Neurobehavioral instruments included the Conners 3 Parent Behavior Rating Scale and the Delis-Kaplan Executive Function System (D-KEFS). Two dimensional magnetic resonance spectroscopic imaging was acquired from supraventricular white matter to measure N-acetylaspartate compounds, glutamate, creatine + phosphocreatine (creatine), and choline-compounds (choline). Whole brain diffusion tensor imaging was acquired and used to to calculate fractional anisotropy, mean diffusivity, axial diffusivity, and radial diffusivity from the same superventricular white matter regions that produced magnetic resonance spectroscopy data. The Conners 3 Parent Hyperactivity/Impulsivity Score, glutamate, mean diffusivity, axial diffusivity, and radial diffusivity were all higher in ADHD+PAE than ADHD-PAE. Glutamate was lower in ADHD-PAE than TD. Within ADHD+PAE, inferior performance on the D-KEFS Tower Test correlated with higher neurometabolite levels. These findings suggest white matter differences between the PAE and familial etiologies of ADHD. Abnormalities detected by magnetic resonance spectroscopy and diffusion tensor imaging co-localize in supraventricular white matter and are relevant to executive function symptoms of ADHD

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Nord J Psychiatry. 2021.

ADULTS REFERRED TO A NATIONAL ADHD CLINIC IN ICELAND: CLINICAL CHARACTERISTICS AND FOLLOW-UP STATUS.

Omarsdottir BS, Kjartansdottir SH, Magnusson P, et al.

Objective: Evaluate adults referred to a national ADHD clinic, by comparing those diagnosed with those who were not, and those who screened negative and to evaluate changes among those diagnosed at follow-up.

Method: Data obtained from 531 patients medical records (49.7% males). One hundred thirty-six screened negative, 395 positive and 305 met diagnostic criteria for ADHD. Eighty-three of them were contacted by phone at follow-up.
Results: ADHD diagnosis was associated with lower educational status and more concerns expressed by parents and teachers during childhood. Participants not diagnosed with ADHD more often met diagnostic criteria for dysthymia, agoraphobia and generalized anxiety, and were more likely to be diagnosed with two or more comorbid disorders. At follow-up, all reported a significant reduction of ADHD symptoms, irrespective of medication, but the medicated participants reported fewer symptoms of inattention and better functioning in daily life.
Conclusion: Adults referred to ADHD clinics may have multiple mental health problems, regardless of whether they receive ADHD diagnosis or not. This could have implications for differential diagnoses of ADHD in adults and emphasises the need to have appropriate treatment available for both groups. Psychoeducation about ADHD may be very helpful in decreasing anxiety and ADHD symptoms

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npj Digital Medicine. 2021;4.

EFFECTIVENESS OF A DIGITAL THERAPEUTIC AS ADJUNCT TO TREATMENT WITH MEDICATION IN PEDIATRIC ADHD.

Kollins SH, Childress A, Heusser AC, et al.

STARS-Adjunct was a multicenter, open-label effectiveness study of AKL-T01, an app and video-game-based treatment for inattention, as an adjunct to pharmacotherapy in 8ΓÇô14-year-old children with attention-deficit/hyperactivity disorder (ADHD) on stimulant medication (n = 130) or not on any ADHD medication (n = 76). Children used AKL-T01 for 4 weeks, followed by a 4-week pause and another 4-week treatment. The primary outcome was change in ADHD-related impairment (Impairment Rating Scale (IRS)) after 4 weeks. Secondary outcomes included changes in IRS, ADHD Rating Scale (ADHD-RS). and Clinical Global Impressions Scale-Improvement (CGI-I) on days 28, 56, and 84. IRS significantly improved in both cohorts (On Stimulants: 0.7, $p < 0.001$; No Stimulants: 0.5, $p < 0.001$) after 4 weeks. IRS, ADHD-RS, and CGI-I remained stable during the pause and improved with a second treatment period. The treatment was well-tolerated with no serious adverse events. STARS-Adjunct extends AKL-T01s body of evidence to a medication-treated pediatric ADHD population, and suggests additional treatment benefit

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Nutrients. 2021;13.

EFFICACY AND SAFETY OF POLYUNSATURATED FATTY ACIDS SUPPLEMENTATION IN THE TREATMENT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) IN CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF CLINICAL TRIALS.

Handel MN, Rohde JF, Rimestad ML, et al.

Based on epidemiological and animal studies, the rationale for using polyunsaturated fatty acids (PUFAs) as a treatment for Attention Deficit Hyperactivity Disorder (ADHD) seems promising. Here, the objective was to systematically identify and critically assess the evidence from clinical trials. The primary outcome was ADHD core symptoms. The secondary outcomes were behavioral difficulties, quality of life, and side effects. We performed a systematic search in Medline, Embase, Cinahl, PsycInfo, and the Cochrane Library up to June 2020. The overall certainty of evidence was evaluated using Grades of Recommendation, Assessment, Development, and Evaluation (GRADE). We identified 31 relevant randomized controlled trials including 1755 patients. The results showed no effect on ADHD core symptoms rated by parents (k = 23; SMD: 0.17; 95% CI: 0.32, 0.02) or teachers (k = 10; SMD: 0.06; 95% CI: 0.31, 0.19). There was no effect on behavioral difficulties, rated by parents (k = 7; SMD: 0.02; 95% CI: 0.17, 0.14) or teachers (k = 5; SMD: 0.04; 95% CI: 0.35, 0.26). There was no effect on quality of life (SMD: 0.01; 95% CI: 0.29, 0.31). PUFA did not increase the occurrence of side effects. For now, there seems to be no benefit of PUFA in ADHD treatment; however, the certainty of evidence is questionable, and thus no conclusive guidance can be made. The protocol is registered in PROSPERO ID: CRD42020158453

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Orphanet Journal of Rare Diseases. 2021;16.

ASSESSMENT OF TUBEROUS SCLEROSIS-ASSOCIATED NEUROPSYCHIATRIC DISORDERS USING THE MINI-KID TOOL: A PEDIATRIC CASE-CONTROL STUDY.

Ding Y, Wang J, Zhou H, et al.

Background: The tuberous sclerosis-associated neuropsychiatric disorders (TAND) have not previously been studied in China. We aimed to assess the psychiatric level of individuals with TAND using the Mini International Neuropsychiatric Interview for Children (MINI-KID) in China.

Results: A total of 83.16% of individuals (79/95) had at least one TAND, and 70.53% (67/95) had an intellectual disability. The MINI-KID tool diagnosed 16 neuropsychiatric diseases, the most common of which were attention-deficit/hyperactivity disorder (ADHD) (51.58%, 49/95) and social anxiety disorder (30.53%, 29/95). The number of children with psychiatric diseases in the tuberous sclerosis complex (TSC) group was significantly greater than the number in the typically developing group ($P < 0.0001$). Notably, 69.47% (66/95) had two or more psychiatric disorders. Pervasive developmental disorder (PDD) was often co-morbid with other psychiatric disorders.

Conclusions: This study used the structured and systematic MINI-KID scale to determine the diagnosis of psychiatric co-morbidities in a relatively large sample, suggesting a higher rate. By comparing the status of individuals with TSC with typically developing children, the results suggests that neuropsychiatric co-morbidities are significantly higher in individuals with TSC. Research has revealed the frequent presence of two, three or more neuropsychiatric diseases in individuals with TSC

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Pakistan Journal of Medical and Health Sciences. 2021;15:407-11.

IMPACT OF INTERVENTION PROGRAM ON ATTENTION OF ATTENTION DEFICIT HYPERACTIVITY CHILDREN (ADHD).

Kareem MEA, Latef SAA, Rafaatamin O.

Background: Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a repeated pattern of symptoms that can be recognized in childhood; it presents as inattention and/or hyperactivity-impulsivity.

Aim: To investigate the impact of anintervention program on attention of attention deficit hyperactivity disorder.

Methods: A randomized controlled trial (RCT) was utilized in this study.

Sample: A purposive sample consisted of 50 children who were diagnosed as having ADHD. The study was conducted at the child psychiatric outpatient clinic at the Center of Social and Preventive Medicine, located at AbooElrish children hospital / Japanees Hospital; Faculty of Medicine, Cairo University. There were two tools for data collection: Demographic data sheet andConners' Parenting Rating Scale.

Results: The study showed that there was a highly significantdifference between Conners' Parenting Rating Scaleresults for the study group before and afterimplementing the program than the control group.

Conclusion: the study concluded that, the structuredintervention programproved a significant on improvingthe cognitive adaptation of children with ADHD

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Pediatrics. 2021;147:200.

EMOTIONAL STRESSORS IN EARLY CHILDHOOD MAY HAVE MORE INFLUENCE ON DEVELOPMENT OF ADHD THAN TRAUMA.

Lin SY.

Background: The correlation between Adverse Childhood Events (ACEs) and their effects on patients' development of certain co-morbid conditions has been at the forefront of pediatrics since the late 1990's when a study showed an increased prevalence of smoking, alcoholism, substance abuse, diabetes, depression, and attempted suicide among adults who had a higher number of ACEs. This study also showed an increased number behavioral and developmental disorders in childhood including Attention Deficit Hyperactivity Disorder (ADHD), thought to be due to the increased stress response from these events causing changes in brain development and leading to affect dysregulation (Felitti 1998). Discussions among the pediatric community on whether trauma in early childhood is a precursor to the development of ADHD or

trauma being misdiagnosed as ADHD is ongoing (Szymanski 2001). Below we further study the association of childhood trauma and ADHD.
Methods: Our study explored the idea of an increased incidence of physical trauma in patients diagnosed with ADHD using the CYW Adverse Childhood Experiences Questionnaire (ACE-Q) (Burke 2015). with over 300 patients with an ADHD diagnosis included in the study. In this list of 17 questions asking about possible ACEs, 4 were related to physical trauma exposure including (1) A household member swore at, insulted, humiliated, or put down your child in a way that scared your child OR A household member acted in a way that made your child afraid that s/he might be physically hurt, (2) Someone touched your child's private parts or asked your child to touch their private parts in a sexual way, (3) Someone pushed, grabbed, slapped or threw something at your child OR Your child was hit so hard that your child was injured or had marks, and (4) Your child experienced harassment or bullying at school. A checkmark next to the statement counted as a 'yes' response.
Results: Although there was a correlation between an ADHD diagnosis and a higher number of total ACEs, there was no correlation between ADHD and answering 'yes' to one of the 4 questions related to physical trauma. There was, however, a correlation between an ADHD diagnosis and answering 'yes' to the question about neglect (i.e. More than once, your child went without food, clothing, a place to live, or had no one to protect her/him (p=0.0198)).
Conclusion: Exposure to emotional stressors as opposed to physical trauma in early childhood may be an early inclination toward the development of behavioral disorders such as ADHD. Screening for these stressors may guide pediatricians into early referrals to a behavioral and developmental pediatrician to help these patients develop coping mechanisms to these particular stressors

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Pediatr Pro Praxi. 2021;22:73-78.
VÝSLEDKY MULTICENTRICKÉHO KLINICKÉHO POZOROVÁNÍ: CONCENTRIXFI A JEHO UŽITÍ U PACIENTU S PRÍZNAKY PORUCHY AKTIVITY A POZORNOSTI.
Habalova M, et al.
Attention deficit/hyperactivity disorder is the most common neurodevelopmental disorder of childhood. The clinical symptoms vary with the age of a child. The diagnosis is established by the presence of core symptoms, ie. attention deficit, hyperactivity and impulsivity. The therapy of the disease is multidisciplinary, using regime adjustment, psychotherapy and pharmacological approaches. Based on ethiopathogenesis, which is complex, the use of new nutritional supplements is being tested, in an effort to reduce clinical symptoms. This trend is probably due to the detection of changes in lipid profiles in the nervous system in patients with Attention deficit/ hyperactivity disorder, as well as proven lack of polyunsaturated fatty acids in the diet of these patients. The advantage of nutritional supplements is that they are without the need of prescription by a child psychiatrist. In our work, we present the results of multicenter a multicenter clinical observation in patients with Attention deficit/hyperactivity disorder symptoms on therapy with Concentrix for six months. The Concentrix-« is a new dietary supplement developed to support concentration and congnitive outcome in patients with symptoms of attention deficit and hyperacitivity disorder. Three meetings administered by a psychologist were done during six months. The effectiveness of Concentrix was evaluated by using psychological tests and obtained data were subsequently statistically processed

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PLoS ONE. 2021;16.
ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND OCCUPATIONAL OUTCOMES: THE ROLE OF EDUCATIONAL ATTAINMENT, COMORBID DEVELOPMENTAL DISORDERS, AND INTELLECTUAL DISABILITY.
Jangmo A, Kuja-Halkola R, P+®rez-Vigil A, et al.
Background Individuals with ADHD are at increased risk for poor occupational outcomes. Educational attainment and psychiatric comorbidity may be important contributing factors for these outcomes, but the role of these factors is not well characterized. This study aimed to investigate the associations between ADHD and occupational outcomes, and to examine the influence of educational attainment, comorbid developmental disorders and intellectual disability on these associations.

Methods We linked the Swedish population graduating from compulsory school 1998-2008 (N = 1.2 millions) to population-wide register-based data on clinical psychiatric diagnoses and medications, objective annual measures of educational, and occupational outcomes. Individuals were followed for between 6 to 16 years after graduation.
Results Individuals with ADHD had annually on average 17 percent lower income, ratio = 0.83 (95% CI 0.83-0.84), 12.19 (11.89-12.49) more days of unemployment, and a higher likelihood of receiving disability pension, odds-ratio = 19.0 (18.4-19.6), compared to controls. Comorbid diagnoses of intellectual disability and developmental disorder explained most of the association between ADHD and disability pension, while lifetime educational attainment partially explained associations between ADHD and all occupational outcomes. Analyses of occupational trajectories found that income was lower and unemployment elevated relative to controls with the same educational attainment. Higher educational attainment correlated with higher income similarly among individuals with ADHD and controls after accounting for individual background factors.
Conclusions The occupational burden associated with ADHD is substantial. Comorbid developmental disorders, intellectual disability and educational difficulties (e.g., failing grades) from childhood to adulthood are important factors to consider when designing interventions to improve occupational outcomes in individuals with ADHD. Copyright:

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Progress in Brain Research. 2021.
EFFECTS OF A FIVE-DAY HD-TDCS APPLICATION TO THE RIGHT IFG DEPEND ON CURRENT INTENSITY: A STUDY IN CHILDREN AND ADOLESCENTS WITH ADHD.
Breitling-Ziegler C, Zaehle T, Wellnhofer C, et al.
Impaired executive functions in ADHD are associated with hypoactivity of the right inferior frontal gyrus (IFG). This region was targeted via repetitive applications of anodal, high-definition transcranial direct current simulation (HD-tDCS) on five consecutive days in 33 ADHD patients (10ΓÇô17 years) and in a healthy control group (n = 13, only sham). Patients received either sham (n = 13) or verum tDCS with 0.5 mA (n = 9) or 0.25 mA (n = 11) depending on individual cutaneous sensitivity. During stimulation, participants performed a combined working memory and response inhibition paradigm (n-back/nogo). At baseline, post, and a 4-month follow up, electroencephalography was recorded during this task. Moreover, interference control (flanker task) and spatial working memory (spanboard task) were assessed to explore possible transfer effects. Omission errors and reaction time variability in all tasks served as measures of attention. In the 0.25 mA group increased nogo commission errors indicated a detrimental tDCS effect on response inhibition. After the 5-day stimulation, attentional improvements in the 0.5 mA group were indicated by reduced omission errors and reaction time variability. Variability improvements were still evident at follow up. In all groups, nogo P3 amplitudes were reduced post-stimulation, but in the 0.5 mA group this reduction was smaller than in the 0.25 mA group. Results of the current study suggest distinct effects of tDCS with different current intensities demonstrating the importance of a deeper understanding on the impact of stimulation parameters and repeated tDCS applications to develop effective tDCS-based therapy approaches in ADHD

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Psychiatry Res. 2021;300.
BIOMARKER SUPPORT FOR ADHD DIAGNOSIS BASED ON EVENT RELATED POTENTIALS AND SCORES FROM AN ATTENTION TEST.
Hoñger LA, et al.
ADHD is a heterogeneous neurodevelopmental disorder associated with dysfunctions in several brain systems. Objective markers of brain dysfunction for clinical assessment are lacking. Many studies applying electroencephalography (EEG) and neuropsychological tests find significant differences between ADHD and controls, but the effect sizes (ES) are often too small for diagnostic purposes. This study aimed to compute a diagnostic index for ADHD by combining behavioral test scores from a cued visual go/no-go task and Event Related Potentials (ERPs). Sixty-one children (age 9ΓÇô12 years) diagnosed with ADHD and 69 age- and gender-matched typically developing children (TDC) underwent EEG-recording while tested on a go/no-go

task. Based on comparisons of ERP group-means and task-performance, variables that differed significantly between the groups with at least moderate ES were converted to a five points percentile scale and multiplied by the ES of the variable. The sum-scores of the variables constituted the diagnostic index. The index discriminated significantly between patients and TDC with a large ES. This index was applied to an independent sample (20 ADHD, 21 TDC), distinguishing the groups with an even larger ES. The diagnostic index described has the potential to support assessment. Further research establishing diagnostic indexes for differential diagnoses is needed

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Psychol Med. 2021 Mar;51:645-52.

DISENTANGLING NATURE FROM NURTURE IN EXAMINING THE INTERPLAY BETWEEN PARENT–CHILD RELATIONSHIPS, ADHD, AND EARLY ACADEMIC ATTAINMENT.

Sellers R, Harold GT, Smith AF, et al.

Background: Attention deficit hyperactivity disorder (ADHD) is highly heritable and is associated with lower educational attainment. ADHD is linked to family adversity, including hostile parenting. Questions remain regarding the role of genetic and environmental factors underlying processes through which ADHD symptoms develop and influence academic attainment.

Method: This study employed a parent-offspring adoption design (N = 345) to examine the interplay between genetic susceptibility to child attention problems (birth mother ADHD symptoms) and adoptive parent (mother and father) hostility on child lower academic outcomes, via child ADHD symptoms. Questionnaires assessed birth mother ADHD symptoms, adoptive parent (mother and father) hostility to child, early child impulsivity/activation, and child ADHD symptoms. The Woodcock–Johnson test was used to examine child reading and math aptitude.

Results: Building on a previous study (Harold et al., 2013, Journal of Child Psychology and Psychiatry, 54(10), 1038–1046), heritable influences were found: birth mother ADHD symptoms predicted child impulsivity/activation. In turn, child impulsivity/activation (4.5 years) evoked maternal and paternal hostility, which was associated with children's ADHD continuity (6 years). Both maternal and paternal hostility (4.5 years) contributed to impairments in math but not reading (7 years), via impacts on ADHD symptoms (6 years).

Conclusion: Findings highlight the importance of early child behavior dysregulation evoking parent hostility in both mothers and fathers, with maternal and paternal hostility contributing to the continuation of ADHD symptoms and lower levels of later math ability. Early interventions may be important for the promotion of child math skills in those with ADHD symptoms, especially where children have high levels of early behavior dysregulation

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Psychol Neurosci. 2021 Apr.

COGNITIVE AND SOCIOECONOMIC PREDICTORS OF STROOP PERFORMANCE IN CHILDREN AND DEVELOPMENTAL PATTERNS ACCORDING TO SOCIOECONOMIC STATUS AND ADHD SUBTYPE.

Arán Filippetti V, Richaud MC, Krumm G, et al.

Objectives: We conducted three empirical studies with the aim at (a) examining the cognitive predictors (i.e., working memory, inhibition, cognitive flexibility, reading, and intelligence) of each Stroop Color and Word Test (SCWT) condition (i.e., Word, Color, and Color–Word) and the convergent and divergent validity among measures, (b) examining the socioeconomic predictors of SCWT performance, further establishing normative values according to socioeconomic status (SES) and age, and (c) analyzing the distinctive patterns of performance according to SES and Attention Deficit and Hyperactivity Disorder (ADHD) subtype.

Methods: A large sample of typically developing (TD) children from Middle- (n = 779) and Low- (n = 129) SES and ADHD children (n = 44), inattentive versus combined subtype, was evaluated. Multivariate analysis of variances (MANOVAs), Pearson's correlations, and hierarchical and stepwise regressions analyses were performed.

Results: Study 1 results indicated that SCWT conditions are selectively associated with reading speed and executive functions (EFs), and that the former would not depend on child's IQ. Study 2 findings revealed

distinct patterns of SCWT performance according to SES and selective associations between socioeconomic indicators and SCWT conditions, being maternal education and housing conditions the main predictors. Finally, Study 3 results revealed distinctive patterns of SCWT performance according to ADHD subtype, with no differences on the interference measure among groups.
Conclusions: Our findings support the validity of the SCWT as a measure of inhibition in TD children. However, when the pattern of SCWT performance is different from the typical expected one (i.e., Word score higher than Color score and this, in turn, higher than Color–Word score), the interference measure should be interpreted with caution but without disregarding the relevant and distinctive information provided by each SCWT condition.
To the authors' knowledge, there are neither studies establishing differentiated norms according to SES for children nor research examining the cognitive and socioeconomic predictors of SCWT performance and its convergent and divergent validity in children. Besides, no study has examined the SCWT sensitivity with ADHD Spanish-speaking children according to inattentive versus combined subtypes. Having knowledge of those factors that could influence SCWT performance, and further setting normative data adjusted for age and SES do become of great relevance for the neuropsychological assessment of TD children

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Qatar Medical Journal. 2021;2021.
IMPACT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER AND GENDER DIFFERENCES ON ACADEMIC AND SOCIAL DIFFICULTIES AMONG ADOLESCENTS IN QATARI SCHOOLS.
Kamal M, Al-Shibli S, Shahbal S, et al.
Background: To evaluate the social and academic impact of adolescents with Attention Deficit Hyperactivity Disorder (ADHD) and gender differences compared with their non-ADHD peers.
Methods: A cross-sectional descriptive study using a standardized rating scale of teacher observations was conducted in the schools of Qatar from 7th to 12th grades. Teachers completed Swanson, Nolan, and Pelham (SNAP-IV) rating scale questionnaires for the ADHD core symptoms together with nine questions to evaluate the academic and social difficulties in all participants.
Results: A total of 1775 students (mean age: 15^1.5 years; boys/girls: 717/1058) were included in this study. Based on the SNAP-IV rating scale, 150 students were showing core symptoms of ADHD and classified as having ADHD (8.5%; boys/girls; 93/57) and 1625 students as non-ADHD peers (91.5%; boys/girls; 624/1001). Prevalence of ADHD among adolescent students is 8.5%, and it varied significantly between genders with 13% of boys and 5.4% of girls affected by this disorder. Adolescents with ADHD had more academic and social difficulties than their non-ADHD peers, the boys more so than the girls. Boys with inattentive subtype of ADHD had more academic difficulties than girls, while girls had more social difficulties than boys.
Conclusion: The results of this study revealed that ADHD among adolescents is substantially associated with academic and social difficulties in the school environment. Gender differences among students with ADHD should be considered in the school and clinical environment

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Res Dev Disabil. 2021;113.
THE RELATIONSHIP BETWEEN MOTOR MILESTONE ACHIEVEMENT AND CHILDHOOD MOTOR DEFICITS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) AND CHILDREN WITH DEVELOPMENTAL COORDINATION DISORDER.
Lee J, Mayall LA, Bates KE, et al.
Background: The prevalence of motor impairment is high in ADHD, but we do not know if this stems from infancy. Aims: 1) to compare the acquisition of motor milestones across three groups: Typically Developing (TD), Attention Deficit Hyperactivity Disorder (ADHD) and Developmental Coordination Disorder (DCD); 2) to determine the relationship between current motor ability and ADHD characteristics in children with ADHD.
Methods and procedures: The parents of children aged 8ΓÇô16 years (ADHD, N = 100; DCD, N = 66; TD, N = 40) completed three online questionnaires: Motor milestone questionnaire; Developmental Coordination

Disorder Questionnaire (DCDQ'07) (concurrent motor ability); Conners 3 Parent Rating Scale Long Form (ADHD characteristics).
Outcome and results: When considered as a group, the ADHD group achieved motor milestones within a typical timeframe, despite concurrent motor impairments. Motor ability was not associated with ADHD characteristics. Latent Profile Analysis demonstrated that 56 % of the ADHD group and 48 % of the DCD group shared the same profile of motor milestone achievement, concurrent motor ability and ADHD characteristics.
Outcomes and conclusions: Unlike children with DCD, the motor impairment often observed in ADHD is not evident from infancy. It is also not part of the ADHD phenotype. Individual differences analysis demonstrated the broad heterogeneity of the ADHD phenotype

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Res Dev Disabil. 2021;113.

HEALTH-RELATED QUALITY OF LIFE IN MOTHERS OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER IN TAIWAN: THE ROLES OF CHILD, PARENT, AND FAMILY CHARACTERISTICS.

Liang SHY, Lee YC, Kelsen BA, et al.

Background: No study has examined how child and maternal psychopathological difficulties and family factors contribute to the health-related quality of life (HRQOL) of mothers of children with attention deficit hyperactivity (ADHD).
Aims: To investigate the impact of children's diagnosis of ADHD, children's and maternal psychopathology and significant sociodemographic variables of the children, parents and family on HRQOL of mothers of children with ADHD and those of children with typical development (TD) in Taiwan.
Methods and procedures: Children with ADHD (n = 257) and children with typical development (n = 324) and their mothers were recruited from a psychiatric clinic of a medical center and 10 elementary schools and four high schools in northern Taiwan. Maternal HRQOL was assessed with the World Health Organization Quality of Life BREF, while the other factors were screened using the Chinese version of the Childhood Autism Spectrum Test for autistic traits, the Swanson, Nolan, and Pelham, version IV scale for ADHD symptoms, the Child Behavior Checklist for behavioral and emotional problems, The Center for Epidemiologic Studies Depression Scale for maternal depression and interpersonal problems, the Adult ADHD Self-report Scale for maternal ADHD symptoms, and the Family APGAR for family support.
Outcomes and results: Mothers of children with ADHD had significantly worse HRQOL in all four domains compared with those of children with typical development. Multiple regressions found that factors consistently related to the HRQOL of mothers of children with ADHD and those of children with TD were maternal depression and perceived family support after controlling for several familial, parental and child variables. HRQOL of mothers of children with ADHD and those of children with TD was more closely related to her own and family factors rather than mother- or teacher-rated ADHD symptoms, clinical diagnosis of ADHD or psychopathology of the child.
Conclusions and implications: Screening for maternal HRQOL, depressive symptoms and family support systems and mental health services for mothers of children with ADHD are warranted based on these findings

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Res Dev Disabil. 2021;113.

PROGRAM FOR ATTENTION REHABILITATION AND STRENGTHENING (PARS) IMPROVES EXECUTIVE FUNCTIONS IN CHILDREN WITH ATTENTION DEFICIT- HYPERACTIVITY DISORDER (ADHD).

Nejati V.

Attention is improved through cognitive rehabilitation. The purpose of the present study was the evaluation of the effect of a paper and pencil program for attention rehabilitation and strengthening (PARS) in children with ADHD. Thirty children with ADHD were randomly divided into two equal intervention and control groups. The intervention group received 12-15 sessions of intervention through PARS. Sustained, selective, and shifting attention, inhibitory control, and working memory were assessed by Persian attention registration, Stroop, color trail making, Go/No-Go, and 1- back tests. Analyses indicated that the experimental group, in comparison with the control group, showed improved selective and sustained attention and the training

effects transfers to executive functions, inhibitory control and working memory. The result is discussed in the light of transferability of training effects from attention to executive functions

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Systematic Reviews in Pharmacy. 2021;12:552-78.

EFFECT OF A DESIGNED NURSING INTERVENTION PROTOCOL FOR MOTHERS ON OUTCOME OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Shattla SI, Hassan GA, Arrab MM, et al.

Background: The behaviour disorder of attention deficit hyperactivity disorder (ADHD) is characterized by hyperactivity, impulsivity, and inattention. The symptoms of ADHD that the child displays can be difficult for parents to manage and their understanding of these behaviors is often limited. Parenting programs provide techniques that parents can use to manage their child's challenging behaviors.

Purpose: To determine the effects on the outcome of children with attention deficit hyperactivity disorders of the Designed Essential Intervention Protocol for Mothers.

Methods: A convenience sample of 65 mothers and their school-age children who suffering from ADHD were selected from the child psychiatric unit and pediatric outpatient clinics at Menoufia University Hospital, Menoufia governorate, Egypt. A Quasi-experimental design was utilized. Tools of the study: Information of Attention Deficit Disorders Scale, Alabama parenting Questionnaire and Diagnostic and Statistical Manual of Mental Disorders-5th edition.

Results: There was a statistically significant improvement in mother's knowledge and practice while dealing with their children after protocol implementation. There was a statistically significant decrease in ADHD symptoms among the children post-intervention than pre-intervention.

Conclusion\ Implication for practice: a Designed nursing intervention Protocol for mothers of children with Attention Deficit Hyperactivity Disorder had a positive effect on mothers knowledge and practice and their children symptoms. So, a designed nursing protocol must be should be integrated as routine care of education and practice for all mothers and their children with attention deficit hyperactivity during regular care and medical follow up in the pediatric and psychiatric clinic

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Transl Psychiatry. 2021;11.

GRAY MATTER NETWORKS ASSOCIATED WITH ATTENTION AND WORKING MEMORY DEFICIT IN ADHD ACROSS ADOLESCENCE AND ADULTHOOD.

Duan K, Jiang W, Rootes-Murdy K, et al.

Attention-deficit/hyperactivity disorder (ADHD) is a childhood-onset neuropsychiatric disorder and may persist into adulthood. Working memory and attention deficits have been reported to persist from childhood to adulthood. How neuronal underpinnings of deficits differ across adolescence and adulthood is not clear. In this study, we investigated gray matter of two cohorts, 486 adults and 508 adolescents, each including participants from ADHD and healthy controls families. Two cohorts both presented significant attention and working memory deficits in individuals with ADHD. Independent component analysis was applied to the gray matter of each cohort, separately, to extract cohort-inherent networks. Then, we identified gray matter networks associated with inattention or working memory in each cohort, and projected them onto the other cohort for comparison. Two components in the inferior, middle/superior frontal regions identified in adults and one component in the insula and inferior frontal region identified in adolescents were significantly associated with working memory in both cohorts. One component in bilateral cerebellar tonsil and culmen identified in adults and one component in left cerebellar region identified in adolescents were significantly associated with inattention in both cohorts. All these components presented a significant or nominal level of gray matter reduction for ADHD participants in adolescents, but only one showed nominal reduction in adults. Our findings suggest although the gray matter reduction of these regions may not be indicative of persistency of ADHD, their persistent associations with inattention or working memory indicate an important role of these regions in the mechanism of persistence or remission of the disorder

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Zhongguo Zhen Jiu. 2021 Apr;41:400-04.

EFFECT OF COMBINATION OF ACUPUNCTURE AND PSYCHOLOGICAL INTERVENTION ON ATTENTION, RESPONSE INHIBITION AND CEREBRAL BLOOD FLOW IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Zhang HJ, Dong XL, Zhang YF, et al.

OBJECTIVE: To observe the clinical curative effect on attention deficit hyperactivity disorder (ADHD) and explore the relevant mechanism of acupuncture in treatment.

METHODS: A total of 100 ADHD children were randomized into an observation group (50 cases, 2 cases dropped off) and a control group (50 cases, 1 case dropped off). In the control group, the routine psychological intervention was used. In the observation group, on the base of the treatment as the control group, acupuncture was applied to Taichong (LR 3), Neiguan (PC 6), Shenmen (HT 7), Sanyinjiao (SP 6), Baihui (GV 20), Sishencong (EX-HN 1), etc., once daily, for 3 months. The Cambridge neuropsychological tests automated battery (CANTAB) was adopted to evaluate attention and response inhibition in two groups before and after treatment. Digi-Lite color transcranial Doppler was used to measure cerebral arterial blood velocity. The therapeutic effect was compared between the two groups.

RESULTS: Regarding evaluation of attention, the mean delay time in the observation group after treatment was shorter than that before treatment and that in the control group separately (P<0.05), and rapid visual information processing A' statistics (RVP A') value was higher than that before treatment and that in the control group separately (P<0.05). For evaluation of response inhibition, the number of Go signal error, the time of stop signal response and the number of stop Go signal error after treatment were all reduced as compared with those before treatment in the two groups (P<0.05). The number of stop signal error was also reduced after treatment as compared with that before treatment in the observation group (P<0.05). The number of Go signal error and the number of stop signal error in the observation were lower than those in the control group (P<0.05). After treatment, the average flow velocity of bilateral posterior cerebral artery (PCA) was increased than that before treatment in the two groups (P<0.05). The average flow velocity of the left middle cerebral artery (MCA-L) and bilateral anterior cerebral artery (ACA) after treatment was increased than that before treatment in the observation group (P<0.05), and the average flow velocity of left PCA, MCA-L and bilateral ACA in the observation group was faster than that in the control group (P<0.05). The total effective rate was 90.5% (19/21) in the observation group, remarkably higher than 50.0% (11/22) in the control group in children with attention deficit (P<0.05). The total effective rate was 83.3% (40/48) in the observation group, also higher than 63.3% (31/49) in the control group (P<0.05).

CONCLUSION: Acupuncture combined with psychological intervention may improve attention and response inhibition in ADHD children, which is possibly related to the regulation of cerebral blood flow

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CLINICAL AND NEUROPHYSIOLOGICAL HETEROGENEITY OF ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Chutko LS, Yakovenko EA, Surushkina SYu, et al.

Objective. To determine clinical/neurophysiological characteristics of different forms of attention deficit hyperactivity disorder (ADHD) and the efficacy of treatment with cerebrolysin.

Material and methods. Sixty children, aged 9 to 12 years, with ADHD were examined using clinical and electroencephalographic methods. Idiopathic and residual-organic forms were compared.

Results and Conclusion. The study shows significantly higher levels of impulsivity and hyperactivity in children with residual-organic form of the disease. There were significant differences in the amplitude component of engaging in action (P3 Go) and the amplitude of the action suppression component (P3 NOGO) in patients with different forms of ADHD. The high clinical efficacy (improvement in 70.0% of patients with idiopathic form of ADHD and 86.7% of patients with residual-organic form of the disease) was found

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Zh Nevrologii Psihiatrii im S S Korsakova. 2020;120:29-35.

ATTENTION DEFICIT HYPERACTIVITY DISORDER IN CHILDREN AND ADOLESCENTS.

Zavadenko NN, Suvorinova NY.

Objective. To evaluate the level of adaptive functioning in patients with attention deficit hyperactivity disorder (ADHD).

Materials and methods. One hundred children and adolescents with ADHD (79 male and 21 female) were examined using M. Weiss functional impairment rating scale (WFIRS). The total score on the ADHD-DSM-IV was at least 24 and ADHD severity was rated as Moderately ill or Markedly ill on CGI-S-ADHD scale.

Results. Typical for ADHD difficulties with adaptive functioning in Family, Learning and school, Life skills, Social activities domains are more pronounced in Markedly ill patients compared to Moderately ill and increase during the transition from childhood to adolescence. Comorbid disorders (oppositional defiant disorder and anxiety disorders) lead to a significant increase in adaptive functioning impairments in most domains of daily life, including Family, Learning and school, Child's self concept, Social activities and Risky activities.

Conclusion. It is necessary not only to assess core symptoms in the follow-up of patients with ADHD, but also evaluate comorbid disorders and the level of functional impairment across the main domains of daily life

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Quality of life improvement in children with Attention-Deficit Hyperactivity Disorder reduces family's strain: a structural equation model approach

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CONFLICT OF INTERESTS

The authors have no conflicts of interest to disclosure

ABSTRACT

Objectives: To analyse how the quality of life of children diagnosed with attention-deficit/hyperactivity disorder (ADHD) impacts the relationship between disease severity and family burden.

Method: The data collected by a longitudinal, observational study involving 1,478 children with ADHD residing in 10 European countries (aged 6 to 18 years) were analysed to evaluate the relationships between ADHD severity, the children's quality of life, and family burden.

Results: The disorder's severity directly and indirectly affected the children's health-related quality of life (HRQoL) and family burden. The degree of family burden was modulated by the children's HRQoL.

Conclusions: One of the primary causes of the stress experienced by parents of children with ADHD is their perception of the child's reduced HRQoL and not the symptom severity itself. Efforts to minimize symptom severity cannot alone reduce family burden.

KEYWORDS

ADHD, family burden, health-related quality of life, children

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; ADORE, adhd observational research in Europe; CGAS, children's global assessment scale; CGI-S, clinical global impression-severity; CHIP-CE, child health and illness profile-child edition; CSDR, Clinical Study Data Request; DSM, Diagnostic and Statistical Manual of Mental Disorders; FSI, family strain index; GFI, Goodness of fit index; HRQoL, health-related quality of life; IQR, interquartile range; PSI-SF, parenting stress index short form; RMSEA, root mean square error of approximation; SD, standard deviation; SDQ, strengths and difficulties questionnaire; SEM, structural equation model; SRMS, standardized root mean square residual.

1 | INTRODUCTION

Attention Deficit Hyperactivity disorder (ADHD) is one of the most common childhood neurobehavioral conditions (Boyle et al., 2011). ADHD symptoms usually become more evident in school-aged children, are more frequent in boys than in girls, and tend to persist into adulthood (Centers for Disease Control and Prevention, 2013). The prevalence range reported is quite wide (from 0.2 to 34.5%), and heterogeneity in the methodological approaches used have contributed to these differences (Polanczyk et al., 2015). When case definition is based on a clinical evaluation, the overall ADHD prevalence is 2.9% (range: 1.1–16.7) (Reale & Bonati, 2018). The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) defines core ADHD symptoms as: difficulty in paying attention, inability to focus and to control behaviour and being hyperactive. Symptoms such as these, which can only lead to a significant impairment at school (Spencer, 2006) and in the activities of daily life (Pineda et al., 1998), often persist into adolescence and adulthood, causing personal, social, occupational and even leisure time dysfunctions (Resnick, 2005).

According to the American Psychiatric Association, the severity of symptoms is pivotal for diagnosing and establishing the severity of the disorder (American Psychiatric Association, 2013). The clinical picture is frequently (in approximately 75% of cases) complicated by other mental disorders or multiple comorbid mental disorders (in approximately 60%) that adversely affect the prognosis and may necessitate specific therapeutic measures (Banaschewski et al., 2017). In short, ADHD symptoms result in a complex pattern of behaviours characterized by inattention and or impulsivity and hyperactivity leading to increased demands on parents' time and contributing to their level of stress (Heath et al., 2014). While families of children with ADHD-usually face more challenging caregiver situations, their children's difficult behaviours

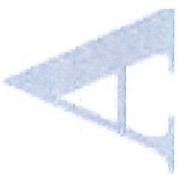
may undermine parents' confidence and well-being with respect to their caregiving role (Counts et al., 2005).

Several studies have confirmed that ADHD severity has an important impact on family strain (Mash & Johnston, 1983; Breen & Barkley, 1988; Harrison & Sofronoff, 2002). A significant positive correlation was found between the severity of the disorder, measured using the Children's Global Assessment Scale (CGAS) scores, and parent's' stress scores, measured using the Parenting Stress Index Short Form (PSI-SF) (Narkunam et al., 2014). The findings emerging when instruments other than the PSI-SF were used (Johnson & Reader, 2002) likewise suggest that an optimal management of a child diagnosed with ADHD requires more than just minimizing the core symptoms; other interventions, for both the child and the parents, are needed to reduce family burden (Narkunam et al., 2014).

It has been found that health-related quality of life (HRQoL) is lower in ADHD children compared to that in healthy children (Danckaerts et al., 2010), and the same has been reported for the members of their families (Dey et al., 2019). The severity of the symptoms may increase the impact of ADHD on the children's HRQoL and family distress (Cappe et al., 2017). Treatments (pharmacological and/or psychological) may have a positive effect, even if it may be only short lived and negligible, on HRQoL of both children and parents (Coghill, 2010; Bundgaard Larsen et al., 2020).

The current study set out to analyse the data of a longitudinal observational multi-country study focusing on children with ADHD in the attempt to evaluate the association between the symptom severity, the HRQoL of the children and the family burden.

We hypothesized that children's HRQoL can mediate the impact of ADHD severity on family burden.



2 | METHODS

2.1 | Participants and Procedure

We submitted a research proposal through the Clinical Study Data Request (CSDR) website (https://clinicalstudydatarequest.com) to gain access to the original data sets of the ADHD Observational Research in Europe (ADORE) project (Ralston & Lorenzo, 2004), a prospective, non-interventional study involving 1,478 children with hyperactive/inattentive/impulsive symptoms but not yet formally diagnosed with ADHD. The children were observed by 244 investigators residing in 10 European countries: Austria, Denmark, France, Germany, Iceland, Italy, the Netherlands, Norway, Switzerland, and the UK. Patient recruitment was begun in June 2003 and completed in December 2004. After submitting a signed Data Sharing Agreement, we were furnished with access to anonymized patient-level data and supporting documentation in a secure data access system, known as the SAS Clinical Trial Data Transparency system.

2.2 | Measures

2.2.1 | Time lived in the disorder

Children with ADHD symptomatology who had never been formally diagnosed with the disorder were eligible to participate in the study. As symptoms can arise at different ages, time of onset might influence their severity and therefore the children's quality of life. The time lived in/with the disorder was defined as the length of time between the onset of the first symptoms and enrolment in the study.

2.2.2 | Treatment

The children with more severe symptoms were receiving pharmacological, psychological, occupational, or speech therapy, educational interventions in school, psychomotor/physiotherapy or herb/homeopathy; some were being taught relaxation techniques or were undergoing electroencephalogram biofeedback or hypnosis, others were simply following a diet. Treatment variable was dichotomized as received (at least one type) and not received (none).

2.2.3 | Severity and impairment

The evaluation of the children with ADHD took into consideration a wide range of factors in the attempt to establish a complete psychopathological profile. The following scales were utilized to assess the children's emotional, psychological and social status:

- The Children's Global Assessment Scale (CGAS), a numeric scale used by clinicians to rate the general functioning of a child. Scores range from 1 (most impaired) to 100 (best level of adaptive functioning) (Schaffer et al., 1983; Kratochvil et al., 2007). A CGAS score of >70 is generally accepted to indicate good overall functioning and a score of <60 indicates poor functioning that will generally require intervention;
- The Clinical Global Impression-Severity (CGI-S) scale, another numeric scale used by clinicians to learn more about the patient's global functioning. Scores range from 1 (normal, not at all ill) to 7 (very severely ill) (Busner & Targum, 2007). A score of 4 indicates moderately ill and a score of 5 indicates markedly ill;
- The ADHD Rating Scale IV Edition (ADHD-RS-IV) is a validated instrument to assess ADHD symptoms; each of its 18 items corresponds to one of the items on the Diagnostic and Statistical Manual of Mental Disorders, IV edition (DSM-IV) diagnostic criteria (DuPaul et al.,1998). The patient's parent responds to the scale's items during a semi-

structured interview with a clinician. Severity is rated on a 4-point Likert scale ranging from 0 (never or rarely) to 3 (very often), with higher scores indicative of greater ADHD-related behaviour;

- The parent-reported version of the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), a brief psychopathology screening tool which consists of 25 items regarding five subscales: emotional symptoms, conduct problems, hyperactivity-inattention, peer relationship problems and prosocial behaviour. Only the hyperactivity-inattention subscale was considered in the present study. A score <6 identifies "normal" subjects;
- The patient's comorbidities were also investigated. The pathologies considered were: anxiety, asthma, bipolar disorder, conduct disorder, coordination problems, depression, epilepsy, learning disorder, obsessive compulsive disorder, oppositional defiant disorder, psychosis, tics, Tourette's syndrome. For anxiety, depression, conduct disorder and oppositional defiant disorder, the investigator was requested to assess severity in single-item questions in Likert scale format; for other problems, the investigator was requested to simply state if the problem is present in single item questions (Ralston & Lorenzo, 2004). Comorbidity variable was defined as the number of comorbid disorders reported by the investigator.

These five scores were transformed into dichotomous variables using validated cut-offs (CGAS≤40: serious/severe problems; CGI≥5: markedly ill or worse; Number of comorbidities≥1; ADHD-RS-IV≥41; SDQ-hyperactivity≥8). (Döpfner et al., 2006; Reale et al., 2017; Overgaard et al., 2019) and then they were used to define the "child's severity and impairment" latent factor. Higher scores in "child's severity and impairment" latent factor indicate more severe health conditions.

2.2.4 | Quality of life

Children's Health-Related Quality of Life (HRQoL) was assessed using the Standard Parent Report Form of the Child Health and Illness Profile-Child Edition (CHIP-CE). The 76 items on the questionnaire examine all aspects of a child's life and primarily his/her family and school life that could affect his/her HRQoL (Riley et al., 2006).

The scores on the five domains (i.e., Satisfaction, Comfort, Resilience, Risk Avoidance and Achievement), which range from 0 (worst) to 5 (best), were used to measure the "Quality of life" factor. Higher scores indicate better quality of life.

2.2.5 | Family strain

The stress and pressure on the parents and families of ADHD children were assessed using the Family Strain Index (FSI). The FSI includes: two "emotional" items, which measure the affective and emotional stress associated with being a caregiver of a child with ADHD, and four "restriction" items, assessing those limitations in the family's social activities resulting from living with a child with this disorder (Riley et al., 2006). Parents were asked to rate the frequency of each item over the past four weeks on a 5-point Likert scale: 0 = never, 1 = almost never, 2 = sometimes, 3 = almost always, and 4 = always. A total score was obtained by summing the scores of the six items (possible range 0–24); higher scores indicate more emotional distress or interruption of normal activities due to the child's problems.

2.3 | Data Analysis

The social, demographic, and clinical variables were summarized using descriptive statistics: categorical variables are presented as percentages; continuous variables as mean and standard deviation (SD) or median and interquartile range (IQR), according to the normality assumption, which was tested using the Shapiro-Wilk test.

Pearson's correlation was calculated to verify the association between the five variables considered to assess ADHD severity and impairment: CGAS, CGI-S, ADHD-RS-IV and SDQ scores, as well as the number of comorbidities.

A structural equation model (SEM) approach was used to examine the relationships between family strain, the child's severity/impairment and quality of life, and the effect of the child's sex, treatment, and time lived in the disorder. The hypothesised relationships are represented in Figure 1. Observed variables are indicated by squares, latent variables by circles and effects by arrows. The observed variables of CGAS, CGI, ADHD-RS-IV, comorbidities, and SDQ contributed to the latent construct "Child's severity and impairment"; the scores on the five CHIP-CE domains (i.e., Satisfaction, Comfort, Resilience, Risk Avoidance and Achievement) defined the latent construct "child's quality of life".

Missing data was imputed using the full information maximum likelihood method of the CALIS procedure (Yung & Zhang, 2011), which has been shown to be superior to ad hoc methods for treating incomplete observations (Muthén et al., 1987) for both normal (Enders & Bandalos, 2001) and non-normal distributions (Enders, 2001).

The following goodness-of-fit indices and thresholds were used: the Standardized Root Mean Square Residual (SRMS, < 0.08), the Root Mean Square Error of Approximation (RMSEA, < 0.08), and the Goodness of Fit Index (GFI, ≥ 0.90). All analyses were performed using SAS version 9.4.

3 | RESULTS

The sociodemographic characteristics of the 1,478 children with ADHD who participated in the study are outlined in Table 1. The majority of the participants were male (84.10%) and between the ages of 6 and 9 (67.13%). The age of the child when his/her parents first became

aware of the hyperactive/inattentive symptoms/problems was younger than 5 for 44.58% of the participants.

The mean scores on the subscales of the CHIP-CE score range between 2.9 (Achievement domain) and 4.0 (Comfort domain), showing a deviation from a standard population, while the mean FSI score was 10.4 (SD=5.4), indicating a moderate level of emotional distress or interruption of normal activities due to the child's problems. The mean CGAS score was 55.2 (SD=10.6), indicating that the child's functioning was variable and that there were sporadic difficulties or symptoms in several but not all social areas. The mean CGI score was 4.4 (SD=0.9), denoting overt symptoms causing noticeable, but modest, functional impairment or distress; the symptom level probably warranted medication.

The CGAS and CGI scores were significantly correlated to one another (r=-0.537) and to the number of comorbidities, the ADHD-RS-IV score, and the SDQ hyperactivity score, with Pearson's coefficients falling into the low to moderate range (absolute values between 0.274 and 0.382) (Table 2).

The standardized structural coefficients of the model depicted in Figure 1 are presented in Table 3. A good model–data fit was found (SRMSR=0.0498, RMSEA=0.0824, GFI=0.9307).

Data analysis uncovered that symptom severity was influenced by both the time lived in the disorder and the treatment utilized. The longer a child lived with the disorder, in fact, the more his/her symptoms worsened. Moreover, the children with more severe symptoms had a higher probability of receiving some treatment or therapy, which did not, however, significantly improve their quality of life. Treatment had only an indirect effect on the children's HRQoL, which was mediated by symptom severity. The children who received treatment of some kind were those who displayed more severe symptoms, and therefore whose HRQoL was lower.

The severity of symptoms and impairments strongly affected the live of the whole family: the symptom severity produced the strongest observed effect on the child's quality of life (-0.7530)

and a direct and indirect effect on family strain. The family's burden increased proportionally with the worsening of symptoms (total effect=0.6273), primarily due to the mediating effect of the child's quality of life (indirect effect=0.4339). The finding suggests that the stress experienced by parents is mainly caused by their perception of their child's reduced quality of life rather than by symptom severity itself.

4 | DISCUSSION

The aim of this study was to investigate the interrelationships between the severity of the symptoms of ADHD, the child's HRQoL, and family burden. Some studies have reported that the severity of a child's ADHD symptoms and the parents' perception of his/her impairment across emotional, cognitive, and behavioural domains are a source of anxiety for them (Graziano et al., 2011). The current study set out to investigate these variables in the effort to gain greater insight into the causes and effects of the child's HRQoL and family burden.

As expected (Reale et al., 2017), ADHD severity and impairment were found to be key factors affecting the children and their families' lives. Indeed, in agreement with previous investigations, the findings of the present study strongly suggest that worse symptoms were associated, on the one hand, with worse HRQoL (Klassen et al., 2004; Coghill & Hodgkins, 2016) and, on the other, with higher parenting stress (Muñoz-Silva et al., 2017; Cappe et al., 2017).

The model used here made it possible to confirm these direct effects of ADHD severity and impairment as well as to identify its indirect effect on family burden. Indeed, what emerged was the mediating role of the children's HRQoL which in turn negatively affected parental stress.

This result highlights the parents' growing perception of their children's low HRQoL and of their own helplessness and sense of loss (Galloway & Newman, 2017). In the light of these

findings, it is clear that health care systems should invest in programs not only aiming to reduce symptoms severity in children diagnosed with ADHD, but also to improve their well-being and quality of life. The efficacy of pharmacological treatments in managing ADHD core symptoms has long been recognised (Kaplan & Sadock, 1988), and some psychosocial interventions have recently proven to be effective. Parent training programs could also help to teach parents how to manage their children's challenging behaviours (Zwi et al., 2011; Coates et al., 2015; Bundgaard Larsen, 2020). The present study found that psychosocial measures had only scarce effects on the HRQoL of ADHD patients (Danckaerts et al., 2010; Kousha & Abbasi Kakrodi, 2019), and medication also had a limited effect (Coghill & Hodgkins, 2016). In fact, some treatments had only a weak, indirect effect on the HRQoL.

Long-term comparative studies have investigated a variety of pharmacological and/or non-pharmacological treatments utilized to aid ADHD children manage their behavior and parents deal with their stress. Further studies are necessary to identify what characteristics, besides symptom severity, are usually found in the patients who benefit from those treatments.

4.1 | Limitations and strengths

The study presents some limitations. First, data regarding some parameters were missing, although for a small proportion of patients, which has not introduced bias thanks to the estimation method adopted. Secondly, the contribution of each participating country was different and not proportional to the target national population. This implies that our findings refer to a general European population of 6-17 years old ADHD patients and their families.

As far as its strengths are concerned, the study examined the data of a sizable number of patients, and it used a large battery of well known, reliable scales/questionnaires to evaluate the patients' neuropsychiatric status. The consistency and reliability of the ADORE dataset

used in the present work have, moreover, been assessed by several studies. (Ralston & Lorenzo, 2004, Döpfner et al., 2006).

The impact that ADHD and its severity has on the children and their parents' wellbeing warrant further study. Efforts in any case to help these families need to be two sided: the children require help to manage their symptoms and the parents need to learn better parenting skills and, perhaps even more importantly to deal with their feelings of guilt and anxiety.

KEY MESSAGES

- The symptoms of children with attention-deficit/hyperactivity disorder (ADHD) dynamically contribute to generating high levels of distress in their parents.
- The parents' emotional distress can be explained by multiplicity of factors, including symptom severity.
- A sizable part of family strain is attributable to the child's health-related quality of life (HRQoL).
- Some interventions should be designed to alleviate parents' burden.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are not publicly available but can be requested from the Clinical Study Data Request (CSDR) website (https://clinicalstudydatarequest.com). To obtain access to anonymized patient-level data and supporting documentation in a secure data access system, it is necessary to submit a research proposal and sign a Data Sharing Agreement.

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Table 1 Participant characteristics

	% of sample	N	
Age at baseline, years		1445	
6-9	67.13		
10-12	22.00		
13-17	10.87		
Age at first awareness, years		1310	
0-4	44.58		
5-6	30.15		
7-9	19.70		
10-17	5.57		
Prescribed pharmacotherapy (Yes)	3.26	1473	
Prescribed psychotherapy (Yes)	18.37	1475	
Other prescribed treatment (Yes)	43.79	1459	
Sex (Male)	84.10	1453	
	Median [IQR]	[Range]	N
CGAS	55.0 [11.0]	[30-92]	1206
CGI	4.0 [1.0]	[1-7]	1472
Number of comorbidities	3.0 [2.0]	[0-7]	1473
ADHD-RS	36.0 [13.0]	[7-54]	1476
SDQ	9.0 [3.0]	[4-37]	1459
CHIP-CE: Satisfaction domain	3.6 [0.8]	[1.27-5.00]	1464
CHIP-CE: Comfort domain	4.0 [0.6]	[2.27-5.00]	1463
CHIP-CE: Resilience domain	3.7 [0.6]	[1.95-4.89]	1467
CHIP-CE: Risk Avoidance domain	3.6 [0.9]	[1.29-4.92]	1462
CHIP-CE: Achievement domain	2.9 [0.8]	[1.00-4.80]	1414
Family Strain (FSI)	10.0 [8.0]	[0-24]	1444

Table 2 Pearson's correlation between the 5 indices (CGAS, CGI, Number of Comorbidities, ADHD-RS-IV, SDQ) considered to assess ADHD severity and impairment

	CGAS	CGI	Number of Comorbidities	ADHD-RS-IV	SDQ
CGAS		-0.537 (n=1204)	-0.274 (n=1202)	-0.285 (n=1206)	-0.342 (n=1195)
CGI	-0.537 (n=1204)		0.300 (n=1468)	0.335 (n=1470)	0.382 (n=1453)
Number of Comorbidities	-0.274 (n=1202)	0.300 (n=1468)		0.172 (n=1471)	0.274 (n=1454)
ADHD-RS-IV	-0.285 (n=1206)	0.335 (n=1470)	0.172 (n=1471)		0.495 (n=1457)
SDQ	-0.342 (n=1195)	0.382 (n=1453)	0.274 (n=1454)	0.495 (n=1457)	

All the correlation coefficients are statistically significant ($p<0.0001$)

Table 3 Standardized estimated parameters for the structural model: direct, indirect and total effects

	Direct	Indirect	Total
Effects on Child's Severity			
Time lived in the disorder	0.1114*	-	0.1114*
Treatment/therapy	0.1123*	-	0.1123*
Sex	0.0264	-	0.0264
Effects on Child's QoL			
Child's Severity	-0.7530*	-	-0.7530*
Time lived in the disorder	-0.1006*	-0.0838*	-0.1844*
Treatment/therapy	0.0416	-0.0846*	-0.0430
Sex	0.0046	-0.0198	-0.0152
Effects on Family's strain			
Child's QoL	-0.5763*	-	-0.5763*
Child's Severity	0.1934*	0.4339*	0.6273*
Time lived in the disorder	-0.0057	0.1278*	0.1221*
Treatment/therapy	-0.0481*	0.0465	-0.0016
Sex	0.0163	0.0139	0.0302

*$p<0.0001$

QoL: Quality of Life

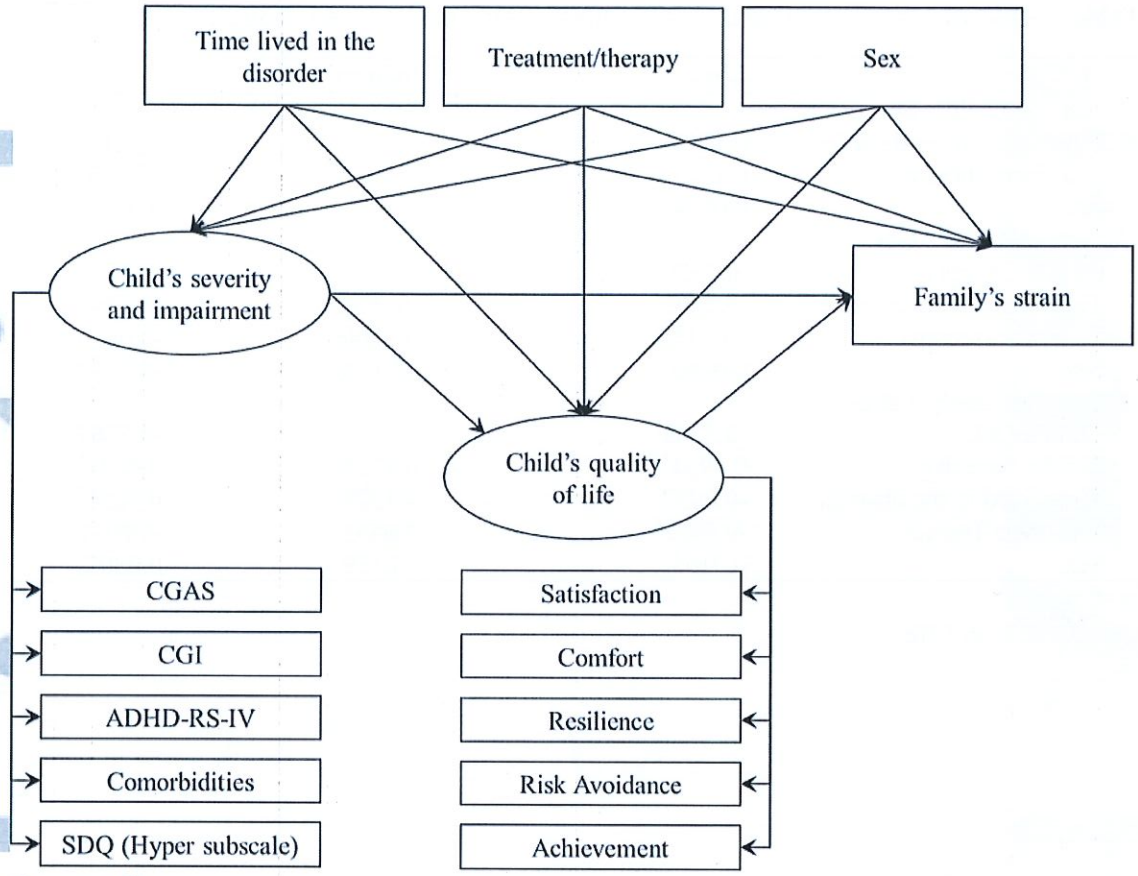

Figure 1 Hypothesized structural model for child's severity and quality of life, and family's strain

SINPIA
Società Italiana di Neuropsichiatria dell'Infanzia e dell'Adolescenza

Al Presidente del Consiglio
Prof Mario Draghi

Al Ministro della Salute
On Roberto Speranza

Al Ministro dell'Istruzione
Prof Patrizio Bianchi

Al Ministro per le Pari Opportunità e la Famiglia
On Elena Bonetti

Al Ministro per le Disabilità
Sen. Erika Stefani

Al Ministro dell'Economia
Prof Daniele Franco

Gentilissimi,

L'emergenza salute mentale infanzia e adolescenza, nelle ultime settimane sempre più presente nei media, è stata resa maggiormente evidente dall'impatto della pandemia ma è purtroppo attuale ormai da molto tempo e richiede interventi tempestivi, mirati e coordinati a tutti i livelli, educativo, sociale e sanitario.

E' necessario agire subito per promuovere il benessere psichico, ridurre al minimo le conseguenze della pandemia sulla salute mentale della generazione più giovane e per individuare il più precocemente possibile i segnali di "allarme" e di disturbi conclamati, al fine di poter offrire risposte rapide e appropriate al bisogno.

Per quanto riguarda i bisogni più specificamente sanitari, la situazione è purtroppo ormai drammatica. Negli ultimi 10 anni si è osservato il **raddoppio degli utenti seguiti nei servizi di neuropsichiatria infantile e dell'adolescenza (NPIA).** In nessun'altra area della medicina si è assistito a un aumento degli accessi ai servizi così rilevante, a parità di personale, e senza comunque riuscire a garantire le risposte adeguate agli utenti.

Già prima della pandemia:

- 200 bambini e ragazzi su 1000 avevano un disturbo neuropsichico, ovvero 1.890.000 minorenni
- Solo 60 su 200 riuscivano ad accedere ad un servizio territoriale di NPIA
- Solo 30 su 200 riuscivano ad avere risposte terapeutico-riabilitative appropriate

- 7 su 1000 si recavano al pronto soccorso per un disturbo psichiatrico
- 5 su 1000 venivano ricoverati per un disturbo neurologico o psichiatrico

- Solo 1 su 5 riusciva ad essere ricoverato in un reparto di NPIA
- 4 su 5 venivano purtroppo ricoverati in reparti non appropriati, di cui 1in reparto psichiatrico per adulti

La perdurante mancanza di un sistema informativo nazionale per la salute mentale dei minori rende difficile poter analizzare nel dettaglio i dati delle attività territoriali a livello nazionale, ma **l'andamento in aumento dei ricoveri negli ultimi anni è purtroppo ormai un indicatore evidente della carenza di risposte appropriate**. Tra il 2017 e il 2018 (ultimi dati disponibili!), i ricoveri per disturbi neurologici tra 0 e 17 anni sono aumentati dell'11% e quelli per disturbi psichiatrici sono aumentati del 22%. Di 43.863 ricoveri nel 2018, solo 13.757 sono avvenuti in reparto NPIA e hanno pertanto ricevuto l'assistenza di cui avrebbero avuto necessità. Molti ragazzi in grave stato di bisogno non hanno ricevuto alcuna risposta e sono stati rimandati a casa dal Pronto Soccorso o hanno dovuto rivolgersi privatamente. **Per molti altri, il ricovero si è reso indispensabile per il peggioramento dei sintomi conseguente alla carenza di risposte con adeguata intensità assistenziale nel territorio**.

A fronte del continuo aumento della domanda già evidenziato, permane infatti la **grave disomogeneità nell'organizzazione della rete dei servizi di NPIA nelle diverse regioni italiane**, che determina disomogeneità nei percorsi e rende complesso garantire equità di risposte e uniformità della raccolta dei dati e della programmazione. In molte regioni non è stato strutturato un sistema di servizi di NPIA: quando esistenti, essi non sempre sono integrati in una rete coordinata di cura.

In particolare, mancano non solo i letti di ricovero dedicati, ma soprattutto le strutture semiresidenziali terapeutiche, indispensabili per garantire interventi a maggiore complessità e intensità e per prevenire, per quanto possibile, il ricorso al ricovero ospedaliero e alla residenzialità terapeutica.

Nei servizi territoriali, spesso non sono previste e adeguatamente presenti tutte le figure multidisciplinari necessarie per i percorsi diagnostici, terapeutici e riabilitativi (si pensi alle continue segnalazioni delle Associazioni dei familiari delle persone con Disturbi dello Spettro Autistico) e **vi sono significative difficoltà nel garantire la presenza anche solo delle figure mediche indispensabili**, già sottodimensionate e di cui molte verranno collocate a riposo a breve senza che vi sia un numero sufficiente di neospecialisti per sostituirle.

La pandemia e le strategie indispensabili per il suo contenimento non solo hanno aumentato lo stress e il sovraccarico su bambini e ragazzi e sulle loro famiglie, in particolare sulle situazioni più vulnerabili, ma hanno reso non più praticabili le strategie di tamponamento che venivano messe in atto in precedenza, sia dai singoli che dalla collettività.

Pronto soccorso, degenze pediatriche e degenze di psichiatria dell'adulto sono saturi di altri bisogni, e non sono più in grado di gestire neanche transitoriamente le situazioni critiche. Ai miseri 325 letti di NPIA esistenti a livello nazionale si chiede di garantire risposte per più del doppio dei pazienti che sarebbero in grado di assorbire, a cui si aggiungono le nuove criticità portate dalla pandemia, e senza alcuna possibilità di fare affidamento su adeguati interventi intensivi nel territorio.

In alcune realtà si è assistito ad un raddoppio degli accessi per tentati suicidi o atti autolesivi gravi, in altre le richieste sono in aumento, ma paiono ancora compatibili con il trend precedente. **E' ancora difficile prevedere le effettive conseguenze della pandemia sulla salute mentale dei bambini e degli adolescenti, sia nell'immediato che in futuro, ma certamente è già evidente che la tipologia e qualità delle risposte messe in atto e delle concrete esperienze di vita incontrate in questo anno così complesso determinano differenze molto significative.**

Le risposte date nel corso delle prime fasi dell'emergenza sanitaria per riuscire a mantenere la funzionalità della rete dei servizi di NPIA hanno rappresentato non solo un impegno di carattere etico e di responsabilità sanitaria per tutti gli operatori, ma **hanno consentito di generare forme nuove, incoraggianti, di risposta ai bisogni**. Tuttavia, non solo l'applicazione è stata molto disomogenea

nelle diverse realtà locali, con numerose amministrazioni che non sono state in grado di mettere a disposizione la strumentazione tecnologica per attivare interventi di telemedicina e teleriabilitazione o addirittura che si sono rifiutate di farlo nonostante le chiare indicazioni in questo senso, interrompendo a lungo il servizio per l'utenza, ma particolarmente critico è stato e continua ad essere il riavvio delle attività dopo il lockdown, che richiede di affrontare molti nuovi problemi clinico-organizzativi e che evidenzia ovunque come **l'asimmetria tra domanda e risposta non sia più gestibile**.

Le criticità preesistenti alla pandemia sono state già ampiamente descritte nel documento di intesa in Conferenza Unificata "Linee di indirizzo sui disturbi neuropsichiatrici e neuropsichici dell'infanzia e della adolescenza" (Atti n. 70/CU del 25 luglio 2019), ove sono chiaramente indicati anche gli obiettivi e le azioni prioritarie che è indispensabile mettere in campo, mentre quelle conseguenti alla pandemia sono approfondite nel Rapporto ISS COVID-19 n. 43/2020 - *Indicazioni ad interim per un appropriato sostegno della salute mentale nei minori di età durante la pandemia COVID-19*.

Dato lo scenario descritto, **riteniamo fondamentale includere nel piano nazionale di ripresa e di resilienza iniziative mirate all'area della salute mentale in infanzia e adolescenza**, che consentano, tra le altre cose:

- di colmare al più presto la mancanza di **dati epidemiologici nazionali** sulle patologie neurologiche, psichiatriche e del neurosviluppo della fascia 0-17 anni, attraverso la creazione di **flussi informativi specifici e uniformi**, centralizzati presso il Ministero della Salute, che permettano una più precisa programmazione della rete dei servizi di NPIA in base ai bisogni di salute della popolazione;

- di **potenziare i servizi territoriali di NPIA**, garantendo almeno un unità complessa ogni 150.000-250.000 abitanti e prevedendo necessariamente la **presenza dell'equipe multidisciplinare completa** (neuropsichiatri, psicologi, logopedisti, terapisti della neuropsicomotricità dell'età evolutiva, infermieri, assistenti sociali, educatori professionali) con un dimensionamento sufficiente per poter garantire tutte le 4 diverse tipologie di attività (neurologia, psichiatria, disabilità complessa, disturbi specifici), e in stretto raccordo con i servizi di psichiatra dell'adulto, per le dipendenze e per la disabilità per l'età di transizione;

- di **attivare un Centro Diurno Terapeutico integrato con equipe per interventi intensivi** in ciascun servizio territoriale, per i disturbi psichiatrici in adolescenza e per i gravi disturbi del neurosviluppo nei primi anni di vita (si presume siano necessarie circa 250 strutture);

- di **implementare il numero di posti letto di NPIA** per garantire risposte appropriate agli utenti con disturbi sia neurologici che psichiatrici, attraverso la trasformazione di posti letto esistenti e sottooccupati di atre discipline o l'attivazione di nuovi posti. Sono necessari circa 150 posti letto oltre a quelli già esistenti;

- di **adeguare ciascun servizio di NPIA dal punto di vista informatico,** delle connessioni di rete e delle piattaforme per telemedicina e teleriabilitazione, inclusa una dotazione di materiali utilizzabili in comodato d'uso per utenti e famiglie con difficoltà di accesso alle tecnologie;

- di riconoscere la possibilità di **effettuare percorsi integrati tra attività in presenza ed attività in telemedicina e teleriabilitazione** nei servizi;

- di strutturare **network coordinati di cura** per i principali disturbi, trasversali a più servizi di NPIA, su base regionale o per le regioni più piccole anche interregionale. Si tratta di un modello evoluto di rete integrata, in cui il raccordo e l'integrazione tra Centri di Riferimento, Servizi Ospedalieri e Servizi Territoriali è costante, e riduce la necessità di spostare i pazienti;

- di **incrementare i posti in specialità di Neuropsichiatria Infantile**, per raggiungere i 400 posti annui per almeno i prossimi 3 anni.

Riteniamo inoltre fondamentale che vengano incluse nel PNRR azioni che sviluppino strategie più generali di promozione della salute mentale, diffuse e condivise nella società civile, che riportino bambini e adolescenti al centro degli investimenti per il futuro, in stretto raccordo tra ambito educativo e scolastico, sociale e con le diverse realtà dell'ambito sanitario, non solo NPIA ma pediatria, servizi per le dipendenze patologiche, servizi consultoriali, servizi psichiatrici per l'adulto. Particolarmente prezioso ad esempio sviluppare o potenziare modalità che rispondano alle esigenze delle famiglie con bambini piccoli e sostenere genitori e caregiver nel loro ruolo, in particolare in contesti vulnerabili; sostenere bambini e ragazzi nello sviluppare strategie emotive e cognitive per fare fronte a questo lungo periodo di incertezza e soprattutto coinvolgere attivamente gli adolescenti, perché possano essere direttamente protagonisti dello sviluppo di nuove modalità che consentano di mantenere in sicurezza le relazioni con i pari indispensabili per la crescita.

Nel ringraziarvi fin d'ora per l'attenzione che vorrete dare a temi così rilevanti e con l'auspicio di avviare un confronto su quanto esposto, si inviano cordiali saluti

Milano, 15 aprile 2021

Antonella Costantino
Presidente
Società Italiana di Neuropsichiatria
dell'Infanzia e dell'Adolescenza

Per ricevere la newsletter iscriversi al seguente indirizzo:
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Iniziativa nell'ambito del Progetto di Neuropsichiatria dell'Infanzia e dell'Adolescenza
(Delibera n. 406 - 2014 del 04/06/2014 Progetti NPI)
Il Progetto è realizzato con il contributo, parziale, della Regione Lombardia
(in attuazione della D.G. sanità n. 3798 del 08/05/2014, n. 778 del 05/02/2015, n. 5954 del 05/12/2016, N. 1077 del 02/02/2017 N. 1938 del 15/02/2019) Capofila Progetto: UONPIA Azienda Ospedaliera "Spedali Civili di Brescia"
"*Percorsi diagnostico-terapeutici per l'ADHD*".

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