NEWSLETTER

INDICE:

BIBLIOGRAFIA ADHD GENNAIO 2021

Addict Disord Treat. 2021.

MANAGING COMORBID ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) IN ADULTS WITH SUBSTANCE USE DISORDER (SUD): WHAT THE ADDICTION SPECIALIST NEEDS TO KNOW.

Johnson J, Morris S, George S.

Attention deficit hyperactivity disorder (ADHD) and substance use disorder (SUD) often co-exist and the link between the 2 is bidirectional, with higher rates of ADHD symptoms found in the SUD population and higher rates of SUD found among the ADHD population. Some possible mechanisms which could explain the increased risk of developing a SUD in those who have ADHD include self-medication, both ADHD and SUD arising from dysregulation of 1 or more of the dopaminergic circuits, genetic factors as well exposure to parental SUD. Given the complex relationship between ADHD and SUD, those working in SUD services should be vigilant to ADHD as a possible comorbid diagnosis and refer to a specialist ADHD service for further assessment where appropriate. On the basis of a detailed clinical assessment, it has to be decided whether SUD or ADHD should be the priority for treatment or if they both ought to be; in either case, ADHD and SUD treatment services must work collaboratively. The recommended first line pharmacological treatment option for adolescents and adults with ADHD is a stimulant medication, with nonstimulants being reserved as a second or third line option. In the brief review paper, the authors further discuss the various medications for treatment of ADHD, the benefits and risks of treating ADHD in those with SUD, discuss the role of specialist ADHD treatment services, and illustrate these with the help of 2 anonymized case vignettes

……..

……..

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.

Am J Psychiatry. 2021 Jan;178:65-76.

DIAGNOSTIC CLASSIFICATION FOR HUMAN AUTISM AND OBSESSIVE-COMPULSIVE DISORDER BASED ON MACHINE LEARNING FROM A PRIMATE GENETIC MODEL.

Zhan Y, Wei J, Liang J, et al.

OBJECTIVE: Psychiatric disorders commonly comprise comorbid symptoms, such as autism spectrum disorder (ASD), obsessive-compulsive disorder (OCD), and attention deficit hyperactivity disorder (ADHD), raising controversies over accurate diagnosis and overlap of their neural underpinnings. The authors used noninvasive neuroimaging in humans and nonhuman primates to identify neural markers associated with DSM-5 diagnoses and quantitative measures of symptom severity.

METHODS: Resting-state functional connectivity data obtained from both wild-type and methyl-CpG binding protein 2 (MECP2) transgenic monkeys were used to construct monkey-derived classifiers for diagnostic classification in four human data sets (ASD: Autism Brain Imaging Data Exchange [ABIDE-I], N=1,112; ABIDE-II, N=1,114; ADHD-200 sample: N=776; OCD local institutional database: N=186). Stepwise linear regression models were applied to examine associations between functional connections of monkey-derived classifiers and dimensional symptom severity of psychiatric disorders.

RESULTS: Nine core regions prominently distributed in frontal and temporal cortices were identified in monkeys and used as seeds to construct the monkey-derived classifier that informed diagnostic classification in human autism. This same set of core regions was useful for diagnostic classification in the OCD cohort but not the ADHD cohort. Models based on functional connections of the right ventrolateral prefrontal cortex with the left thalamus and right prefrontal polar cortex predicted communication scores of ASD patients and compulsivity scores of OCD patients, respectively.

CONCLUSIONS: The identified core regions may serve as a basis for building markers for ASD and OCD diagnoses, as well as measures of symptom severity. These findings may inform future development of machine-learning models for psychiatric disorders and may improve the accuracy and speed of clinical assessments

……..

American Journal of Case Reports. 2020;21:1-4.

SEDATION AFTER A TRIAL OF MIXED AMPHETAMINE SALTS IN A BOY WITH ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER.

Awami RA, Albanna A.

Unusual or unexpected effect of treatment Attention-deficit/hyperactivity disorder (ADHD) is a common neurodevelopmental disorder that manifests in early childhood. Pharmacotherapy, including psychostimulants, is considered the cornerstone of ADHD man-agement. Although stimulants have been associated with adverse effects, sedation following the administration of an amphetamine-based stimulant is an extremely rare adverse effect. We report the case of a 6-year-old boy presenting with ADHD and a history of autism spectrum disorder (ASD). After discussing treatment options with his parents, he was started on a low dose of a methylphenidate med-ication. He was unable to tolerate the medication due to anorexia, insomnia, and irritability despite multiple adjustments in the dosages. A trial of immediate-release mixed amphetamine salts was initiated, starting from a low dose. The boy developed sedation and lethargy shortly after the administration of this medication. Sedation is a rare adverse drug reaction to mixed amphetamine salts. Clinicians should proactively monitor for the possible adverse effects in patients with ASD and ADHD, including unexpected symptoms such as se-dation. Reporting of adverse drug reactions should be encouraged to promote the post-marketing surveillance of medications

……..

Arch Psychiatry Psychother. 2021;22:32-39.

COMPARISON OF THE EFFECTS OF DIFFERENT DOSES OF MEMANTINE IN COMBINATION WITH METHYLPHENIDATE IN CHILDREN AFFECTED BY ADHD.

Riahi F, Tashakori A, Enayatollahi M.

Introduction: Children with Attention-Deficit/ Hyperactivity Disorder (ADHD) respond differently to methylphenidate treatment. Memantine has been considered for the treatment of these patients and its prescriptive dose is discussed by researchers. The aim of present study was to investigate the effect of adding different doses of memantine to methyphenidate in the treatment of children with children with ADHD.
Material and Methods: In a double blind clinical trial, 72 patients with ADHD were evaluated. Patients randomly divided into two groups. Group one received lower doses of memantine (0.1-0.25 mg/kg) and Methylphenidate; group two received higher doses of memantine(0.25-0.5 mg/kg) and Methylphenidate for six weeks. 39 patients who continued the study until the end, at the week zero, second, fourth and sixth, their demographic and clinical information were assessed by demographic questionnaire and Conners Parent Questionnaire. SPSS version 20 was used for statistical analysis.
Results: The mean age of patients was 9.51 -¦ 2.29 years and their weight was 27.38 -¦ 8.31 kg and 12.8% of them were female. A total of 16 patients in group one and 23 patients in group two completed the study. Two patients of group one and three patients of group two were excluded due to drug complications, which, all of whom were male. The mean score of the Conners at the baseline of study was 23.84 -¦ 2.44 and in the sixth week, it was 12.58 -¦ 2.89. Moreover, no significant difference was found at any time range: Baseline (p=0.275), second week (p=0.921), fourth week (p=0.7) and sixth week (p=0.966). The Conners score in both groups was significantly reduced over a 6-week period of treatment. also, the mean heart rate of the patients in group two in the 4th week (p=0.01) and the 6th week (p=0.02) was significantly lower than group one while the systolic blood pressure in group two after six weeks of treatment was significantly increased (p=0.01).
Conclusion: Memantine was effective in the treatment of patients with hyperactivity disorder, and constantly reduced patients' Conners score over a 6-week period. However, no significant difference was observed between patients receiving higher dose of memantine and patients given lower dose of memantine. Therefore, given the increased risk of the related side effects, it is advisable to prescribe a lower dose of memantine along with methylphenidate

……..

Assessment. 2021 Jan;28:86-99.

MEASUREMENT INVARIANCE OF THE ADHD RATING SCALE–IV HOME AND SCHOOL VERSIONS ACROSS AGE, GENDER, CLINICAL STATUS, AND INFORMANT.

Dobrean A, Pasarelu CR, Balazsi R, et al.

The present study aimed to investigate the measurement invariance across age, gender, clinical status, and informant of the Attention-Deficit/Hyperactivity Disorder Rating Scale–IV (ADHD-RS-IV) Home and School versions. The participants were 1,106 Romanian children and adolescents (mean age = 12.74 years, standard deviation = 2.84, age range 6-18 years). Both parents and teachers assessed ADHD symptoms. The factorial structure of the scale was assessed using confirmatory factor analysis, and measurement invariance was assessed using multigroup confirmatory factor analysis. The results supported the reliability of the ADHD-RS-IV, with high internal consistency coefficients for both versions. Confirmatory factor analysis validated a two-factor model. Multigroup confirmatory factor analysis confirmed the measurement invariance of ADHD-RS-IV across age, gender, clinical status, and informant. ADHD-RS-IV had good psychometric properties in a sample of Romanian children and adolescents. It is a reliable instrument given its strong invariance. Implications for evidence-based assessment of ADHD are discussed

……..

Assessment. 2021 Jan;28:73-85.

ROC ANALYSES OF RELEVANT CONNERS 3–SHORT FORMS, CBCL, AND TRF SCALES FOR SCREENING ADHD AND ODD.

Gomez R, Vance A, Watson S, et al.

Receiver operating characteristic curve analysis was used to examine and compare the diagnostic accuracy of the Conners 3–Parent Short Form (C 3-P(S)), and the Conners 3–Teacher Short Form (C 3-T(S)) inattention and hyperactivity/impulsivity scales, and the Child Behavior Checklist (CBCL) and Teacher's Report Form (TRF) attention problems scales, to distinguish those with and without attention deficit/hyperactivity disorder (ADHD). It also examined and compared the diagnostic accuracy of the C 3-P(S) and C 3-T(S) Aggression (AG) scales, and the CBCL and TRF Aggressive Behavior (AB) scales, to distinguish those with and without oppositional defiant disorder (ODD). The study used archival data (N = 150-261) involving a large group of clinic-referred children aged between 6 and 11 years who had been interviewed for clinical diagnosis of ADHD and ODD using the Anxiety Disorders Interview Schedule for Children (ADISC-IV) as the reference standard, and then administered one or more of the screening measures. The findings provided empirical support for the use of the C 3-P(S) and CBCL for identifying ADHD and ODD, with the CBCL aggressive behavior scale having better ability to detect ODD. The implications of the findings for using the screening scales for diagnoses of ADHD and ODD are discussed

……..

Basic and Clinical Pharmacology and Toxicology. 2020;127:79.

THE FEASIBILITY OF DOTS AND SURFACES CLASSIFICATION RESEARCH IN INVESTIGATING ATTENTION DEFICIT HYPERACTIVITY DISORDERS.

Li Y, Zhou X, Lan S, et al.

Objectives: Attention deficit hyperactivity disorders (ADHD) is a disease that is widespread among children (10%). Subjective clinical evaluation is the major diagnostic method, but it also is necessary to apply objective methods. The objective diagnostic methods proposed in current academic research are mainly through complex tasks such as attention processing, inhibitory control, imitation and empathy, memory and language. However, because children's minds are not mature, and their language skills and communication skills are relatively poor, this diagnostic method cannot be applied to them. Therefore, we tried to develop a diagnostic system that can reach a wider audience and, meanwhile, can be applied to children and adults (a visual test based on dots and surfaces classification).

Methods: Firstly, two tasks, dots classification and surfaces classification, were designed based on relative surveys and literature. Subjects consisted of 12 subjects with ADHD and 13 healthy subjects. We collected ERP data when subjects performed dots classification and surfaces classification tasks, and then analyzed the ERP data, namely N1, P1, and P3 data. By comparing the electroencephalogram (EEG) data collected from tasks and experiments in different groups of subjects, something special of the EEG data of ADHD patients was obtained.

Results: There is no significant change in P1. Compared with the dots classification, the surfaces classification task takes a shorter time to cause the N1 response and has a larger amplitude. P3 has the biggest difference. P3 data collected from the surfaces classification task are much lower. The EEG data collected from the dots classification task do not change with age, while N1 in the surfaces classification task changes slightly with age. In terms of groups, the P1 amplitude obtained by the experimental group is lower and it takes a longer time. The N1 amplitude is larger and faster. P3 has the most significant change in the experimental results, with a significant reduction in amplitude.

Conclusions: The dots classification task is less difficult than the surfaces classification task and is not affected by age. Therefore, the dots classification task can be recommended as a evaluation method that reaches a wider audience. The dots classification task, based on ERP collection of brain waves, can help the diagnosis of ADHD. The research data support the versatility of the evaluation system, which can enhance the accuracy of clinical examination and diagnosis through an objective assessment of changes in brain waves (most notably P3) of patients with ADHD

……..

Behav Ther. 2021.

PATTERNS OF PARENTAL ADHERENCE AND THE ASSOCIATION TO CHILD AND PARENTING OUTCOMES FOLLOWING A MULTICOMPONENT SCHOOL-HOME INTERVENTION FOR YOUTH WITH ADHD.

Dvorsky MR, Friedman LM, Spiess M, et al.

The goal of the present study was to evaluate the role of parent adherence in the Collaborative Life Skills (CLS) program, a multicomponent school-home intervention, for predicting child and parenting outcomes. A sample of 129 children (63% male; M age = 8.22, SD = 1.10; grades 2-5) with attention-deficit/hyperactivity disorder (ADHD) and their parents participated in CLS, which included 10 weekly behavioral parent training group sessions. Each week, parents provided information on their CLS skill use between sessions (at home) as part of the intervention. Outcome measures included parent and teacher ratings of child behavior and parenting at post-intervention and 6 months follow-up. Growth mixture models examining weekly parent skill use trajectories throughout the intervention significantly predicted parent- and teacher-reported outcomes including parent-rated child behavior, teacher-rated academic competence, and positive parenting behaviors. Fifty-two percent of parents displayed moderate skill use throughout the intervention, whereas the remaining parents had either low (20%) or high (28%) initial levels of use but demonstrated high skill utilization by the middle of the intervention. Results highlight the importance of examining individual differences in parents between session strategy use for behavioral parent training interventions targeting child and parenting outcomes

……..

Behav Ther. 2021.

COMMUNITY IMPLEMENTATION OF MI-ENHANCED BEHAVIOR THERAPY FOR ADOLESCENT ADHD: LINKING FIDELITY TO EFFECTIVENESS.

Sibley MH, Bickman L, Coxe SJ, et al.

Evidence-based behavior therapy for adolescent ADHD faces implementation challenges in real-world settings. The purpose of this trial was to investigate the relationship between implementation fidelity and outcomes among adolescents receiving services in the active treatment arm (N = 114; Motivational Interviewing [MI]-enhanced parent-teen behavior therapy) of a community-based randomized trial of adolescent ADHD treatment. Participants received therapy from community clinicians (N = 44) at four agencies in a large, ethnically diverse metropolitan setting. Therapists provided self-report of session-by-session adherence to content fidelity checklists and audio recordings of sample sessions that were coded for MI integrity. Parents provided report of ADHD symptoms and family impairment at baseline, posttreatment, and follow-up, while academic records were obtained directly from the local school district. Results indicated that content fidelity significantly waned across the 10 manualized sessions (d = -1.23); these trends were steepest when therapy was delivered outside the office-setting and parent attendance was low. Community therapist self-report of content fidelity predicted significantly greater improvements in academic impairment from baseline to follow-up. MI delivery quality was not associated with improved outcomes; contrary to hypotheses, lower MI relational scores predicted significantly greater improvements in family impairment over time. Findings indicate that community-based outcomes for evidence-based ADHD treatment are enhanced when treatment is implemented with fidelity. Future work should revise community-based implementation strategies for adolescent ADHD treatment to prevent declines in fidelity over time, thereby improving outcomes

……..

Biol Psychiatry. 2020.

SHARED AND ANXIETY-SPECIFIC PEDIATRIC PSYCHOPATHOLOGY DIMENSIONS MANIFEST DISTRIBUTED NEURAL CORRELATES.

Linke JO, Abend R, Kircanski K, et al.

Background: Imaging research has not yet delivered reliable psychiatric biomarkers. One challenge, particularly among youth, is high comorbidity. This challenge might be met through canonical correlation analysis designed to model mutual dependencies between symptom dimensions and neural measures. We

mapped the multivariate associations that intrinsic functional connectivity manifests with pediatric symptoms of anxiety, irritability, and attention-deficit/hyperactivity disorder (ADHD) as common, impactful, co-occurring problems. We evaluate the replicability of such latent dimensions in an independent sample.
Methods: We obtained ratings of anxiety, irritability, and ADHD, and 10 minutes of resting-state functional magnetic resonance imaging data, from two independent cohorts. Both cohorts (discovery: n = 182; replication: n = 326) included treatment-seeking youth with anxiety disorders, with disruptive mood dysregulation disorder, with ADHD, or without psychopathology. Functional connectivity was modeled as partial correlations among 216 brain areas. Using canonical correlation analysis and independent component analysis jointly we sought maximally correlated, maximally interpretable latent dimensions of brain connectivity and clinical symptoms.
Results: We identified seven canonical variates in the discovery and five in the replication cohort. Of these canonical variates, three exhibited similarities across datasets: two variates consistently captured shared aspects of irritability, ADHD, and anxiety, while the third was specific to anxiety. Across cohorts, canonical variates did not relate to specific resting-state networks but comprised edges interconnecting established networks within and across both hemispheres.
Conclusions: Findings revealed two replicable types of clinical variates, one related to multiple symptom dimensions and a second relatively specific to anxiety. Both types involved a multitude of broadly distributed, weak brain connections as opposed to strong connections encompassing known resting-state networks

……..

Biological Psychiatry: Cognitive Neuroscience and Neuroimaging. 2020.
VULNERABILITY IN EXECUTIVE FUNCTIONS TO SLEEP DEPRIVATION IS PREDICTED BY SUBCLINICAL ATTENTION-DEFICIT/HYPERACTIVITY DISORDER SYMPTOMS.
Floros O, Axelsson J, Almeida R, et al.
Background: Sleep loss results in state instability of cognitive functioning. It is not known whether this effect is more expressed when there is an increased cognitive demand. Moreover, while vulnerability to sleep loss varies substantially among individuals, it is not known why some people are more affected than others. We hypothesized that top-down regulation was specifically affected by sleep loss and that subclinical inattention and emotional instability traits, related to attention-deficit/hyperactivity disorder symptoms, predict this vulnerability in executive function and emotion regulation, respectively.
Methods: Healthy subjects (ages 17ΓÇô45 years) rated trait inattention and emotional instability before being randomized to either a night of normal sleep (n = 86) or total sleep deprivation (n = 87). Thereafter, they performed a neutral and emotional computerized Stroop task, involving words and faces. Performance was characterized primarily by cognitive conflict reaction time and reaction time variability (RTV), mirroring conflict cost in top-down regulation.
Results: Sleep loss led to increased cognitive conflict RTV. Moreover, a higher level of inattention predicted increased cognitive conflict RTV in the neutral Stroop task after sleep deprivation (r = .30, p = .0055) but not after normal sleep (r = .055, p = .65; interaction effect +¦ = 6.19, p = .065). This association remained after controlling for cognitive conflict reaction time and emotional instability, suggesting domain specificity. Correspondingly, emotional instability predicted cognitive conflict RTV for the emotional Stroop task only after sleep deprivation, although this effect was nonsignificant after correcting for multiple comparisons.
Conclusions: Our findings suggest that sleep deprivation affects cognitive conflict variability and that less stable performance in executive functioning may surface after sleep loss in vulnerable individuals characterized by subclinical symptoms of inattention

……..

BMC Psychiatry. 2021;21.
REGIONAL BRAIN VOLUME PREDICTS RESPONSE TO METHYLPHENIDATE TREATMENT IN INDIVIDUALS WITH ADHD.
Chang JC, Lin HY, Lv J, et al.
Background: Despite the effectiveness of methylphenidate for treating ADHD, up to 30% of individuals with ADHD show poor responses to methylphenidate. Neuroimaging biomarkers to predict medication responses

remain elusive. This study characterized neuroanatomical features that differentiated between clinically good and poor methylphenidate responders with ADHD.
Methods: Using a naturalistic observation design selected from a larger cohort, we included 79 drug-naive individuals (aged 6-42 years) with ADHD without major psychiatric comorbidity, who had acceptable baseline structural MRI data quality. Based on a retrospective chart review, we defined responders by individualsΓÇÖ responses to at least one-month treatment with methylphenidate. A nonparametric mass-univariate voxel-based morphometric analysis was used to compare regional gray matter volume differences between good and poor responders. A multivariate pattern recognition based on the support vector machine was further implemented to identify neuroanatomical indicators to predict an individual's response.
Results: 63 and 16 individuals were classified in the good and poor responder group, respectively. Using the small-volume correction procedure based on the hypothesis-driven striatal and default-mode network masks, poor responders had smaller regional volumes of the left putamen as well as larger precuneus volumes compared to good responders at baseline. The machine learning approach identified that volumetric information among these two regions alongside the left frontoparietal regions, occipital lobes, and posterior/inferior cerebellum could predict clinical responses to methylphenidate in individuals with ADHD.
Conclusion: Our results suggest regional striatal and precuneus gray matter volumes play a critical role in mediating treatment responses in individuals with ADHD

……..

BMJ Open. 2020;10.

EFFECTS OF A PEER CO-FACILITATED EDUCATIONAL PROGRAMME FOR PARENTS OF CHILDREN WITH ADHD: A FEASIBILITY RANDOMISED CONTROLLED TRIAL PROTOCOL.

Mundal I, et al.

Introduction Significant numbers of children with attention deficit hyperactivity disorder (ADHD) display problems that cause multiple disabilities, deficits and handicaps that interfere with social relationships, development and school achievement. They may have multiple problems, which strain family dynamics and influence the child's treatment. Parent activation, described as parents' knowledge, skills and confidence in dealing with their child's health and healthcare, has been shown to be an important factor in improving health outcomes. Research suggests that parents need edification to learn skills crucial to the treatment and management of their children's healthcare. Promoting positive parenting techniques may reduce negative parenting factors in families. This study aims to assess the acceptability, feasibility and estimated sample size of a randomised controlled trial (RCT) comparing an ADHD peer co-led educational programme added to treatment as usual (TAU).
Methods and analysis Using a randomised waitlist controlled trial, parents of children aged 6-12 years newly diagnosed with ADHD, and referred to a child mental health outpatient clinic in Mid-Norway, will receive TAU concomitant with a peer co-facilitated parental engagement educational programme (n=25). Parents in the control group will receive TAU, and the educational programme treatment within a waitlist period of 3-6 months (n=25). Parent activation, satisfaction, well-being, quality of life and treatment adherence, will be assessed at baseline (T0), 2 weeks (T1) pre-post intervention (T2, T3) and at 3 months follow-up (T4). Shared decision making, parents preferred role in health-related decisions and involvement, parent-reported symptoms of ADHD and child's overall level of functioning will be assessed at T0 and T4. Such data will be used to calculate the required sample size for a full-scale RCT.
Ethics and dissemination Approval was obtained from the Regional Committee for Medicine and Health Research Ethics in Mid-Norway (ref: 2018/1196). The findings of this study are expected to provide valuable knowledge about how to optimise family education and management of ADHD and will be disseminated through presentations at conferences and publication in peer-reviewed journals.
Trial registration number NCT04010851

……..

BMJ Paediatrics Open. 2020;4.

WHAT FAMILIES IN THE UK USE TO MANAGE ATTENTION-DEFICIT/HYPERACTIVITY DISORDER (ADHD): A SURVEY OF RESOURCE USE.

Fibert P, Relton C.

Objective To identify interventions being used to manage attention-deficit/hyperactivity disorder (ADHD) in the UK. Design A survey within the Sheffield Treatments for ADHD Research project. A convenience sample of participants in the UK who consented to join an observational cohort were asked closed questions about medication, behavioural change programmes and service use, and an open-ended question about what else they used.

Setting A broad variety of non-National Health Service, non-treatment seeking settings throughout the UK, including local authority organisations, schools, ADHD and autism spectrum condition support groups and social media.

Participants Families of children aged 5-18 with carer reported ADHD and Conners Global Index (CGI) T scores of 55+.

Results Responses from 175 families were analysed. The mean age of the children was 10.21 (2.44), and two-thirds (n=114) had additional diagnoses. The majority used medications to manage ADHD (n=120) and had participated in a parenting class (n=130). Just over a quarter (28%, n=49) did not use ADHD medications, and used sleep medications. Just under half had consulted psychologists (n=83), and 32 had participated in other talking therapies such as psychotherapy, counselling and cognitive-behavioural therapy. A few used aids such as reward charts or fiddle toys (n=17) and participated in activities (mostly physical) (n=14). A substantial minority (78/175) had used non-mainstream treatments, the most popular being homoeopathy (n=32), nutritional interventions (n=21) and bodywork such as massage or cranial osteopathy (n=9).

Conclusions Families reported use of a wide variety of treatments to help with management of their children with ADHD in addition to their use of mainstream treatments

……..

Brain Behav. 2021.

ASSOCIATION BETWEEN ATTENTION DEFICIT HYPERACTIVITY DISORDER AND AGGRESSION SUBSCALES IN ADOLESCENTS.

Yoo HJ, Han JM, Kim K, et al.

Introduction: The aim of this study is to identify the association between Attention Deficit Hyperactivity Disorder (ADHD) proneness and aggressive propensity in adolescents.

Methods: A quantitative, large-scale, cross-sectional study was performed from April to May 2016 in Korea. The survey questionnaire included overall health behaviors, as well as scales for assessing ADHD proneness (revised short form of the Conners-Wells Adolescent Self-Report Scale; CASS[S]) and aggressive behavior (Buss-Perry Aggression Questionnaire; BPAQ) in adolescents. Area under the receiver operator characteristic (AUROC) curves was constructed to determine the cut-off value of total aggression score for discriminating ADHD proneness.

Results: A total of 2,432 students participated in the survey, and 1,872 of them completed the questionnaire, indicating a response rate of 77.0%. Based on CASS(S), 33 (1.8%) subjects were classified as the ADHD group. AUROC curve analysis showed that a score of 68.5 points had higher sensitivity (83.3%) and specificity (69.4%) to discriminate ADHD proneness. ADHD proneness was significantly associated with higher aggression subdomain scores (physical, verbal, anger, and hostility). Especially, anger and hostility had a stronger relationship with ADHD proneness than did physical and verbal aggression. A multivariable analysis demonstrated that ADHD proneness was significantly related to body mass index in the top 10% of the study population, alcohol consumption, gastrointestinal trouble, daytime sleepiness, and total aggression score of 68.5 points or higher. Adolescents who had total aggression scores of 68.5 points or higher showed a 9.8-fold (95% confidence interval [CI] 3.3-28.8) higher risk of ADHD compared with those who had scores less than 68.5 points.

Conclusions: Our results demonstrated that ADHD proneness was significantly associated with aggression propensity. In particular, anger and hostility were more closely associated with ADHD proneness than were other aggression subdomains

……..

Brain Sciences. 2021;11:1-21.

"MY BRAIN CAN STOP": AN ERP STUDY OF LONGITUDINAL PREDICTION OF INHIBITORY CONTROL IN ADOLESCENCE.

Einziger T, Ben-Shachar MS, Devor T, et al.

We examined the longitudinal predictors of electrophysiological and behavioral markers of inhibitory control in adolescence. Participants were 63 adolescent boys who have been followed since birth as part of a prospective longitudinal study on the developmental pathways to attention-deficit hyperactivity disorder (ADHD). At 17 years of age, they completed the stop-signal task (SST) while electroencephalography (EEG) was continuously recorded. Inhibitory control was evaluated by the stop-signal reaction time (SSRT) as well as by the amplitude of the event-related potential (ERP) component of N2 during successful inhibition. We found that higher inattention symptoms throughout childhood predicted reduced amplitude (i.e., less negative) of the N2 in adolescence. Furthermore, the N2 amplitude was longitudinally predicted by the early precursors of child familial risk for ADHD and early childhood temperament. Specifically, fatherΓÇÖs inattention symptoms (measured in the childΓÇÖs early infancy) and childΓÇÖs effortful control at 36 months of age directly predicted the N2 amplitude in adolescence, even beyond the consistency of inattention symptoms throughout development. The SSRT was predicted by ADHD symptoms throughout childhood but not by the early precursors. Our findings emphasize the relevance of early familial and temperamental risk for ADHD to the prediction of a later dysfunction in inhibitory control

……..

Brain Sciences. 2021;11:1-14.

EFFECTS OF SLEEP ON THE ACADEMIC PERFORMANCE OF CHILDREN WITH ATTENTION DEFICIT AND HYPERACTIVITY DISORDER.

Villalba-Heredia L, Rodr+¡guez C, Santana Z, et al.

Attention deficit and hyperactivity disorder (ADHD) is commonly associated with disordered or disturbed sleep and the association of sleep problems with ADHD is complex and multidirectional. The purpose of this study was to analyze the relationship between sleep and academic performance, comparing children with ADHD and a control group without ADHD. Academic performance in Spanish, mathematics, and a foreign language (English) was evaluated. Different presentations of ADHD were considered as well as the potential difference between weekday and weekend sleep habits. The sample consisted of 75 children aged 6ΓÇô12 in primary education. Accelerometry was used to study sleep, and school grades were used to gather information about academic performance. The results showed that ADHD influenced the amount of sleep during weekends, the time getting up at the weekends, weekday sleep efficiency, as well as academic performance. Given the effects that were seen in the variables linked to the weekend, it is necessary to consider a longitudinal design with which to determine if there is a cause and effect relationship

……..

Brain Sciences. 2021;11:1-12.

PRECISION MEDICINE CARE IN ADHD: THE CASE FOR NEURAL EXCITATION AND INHIBITION.

Mamiya PC, Arnett AB, Stein MA.

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder that has become increasingly prevalent worldwide. Its core symptoms, including difficulties regulating attention, activity level, and impulses, appear in early childhood and can persist throughout the lifespan. Current pharmacological options targeting catecholamine neurotransmissions have effec-tively alleviated symptoms in some, but not all affected individuals, leaving clinicians to implement trial-and-error approach to treatment. In this review, we discuss recent experimental evidence from both preclinical and human studies that suggest imbalance

of excitation/inhibition (E/I) in the fronto-striatal circuitry during early development may lead to enduring neuroanatomical abnormality of the circuitry, causing persistence of ADHD symptoms in adulthood. We propose a model of precision medicine care that includes E/I balance as a candidate biomarker for ADHD, development of GABA-modulating medications, and use of magnetic resonance spectroscopy and scalp electrophysiology methods to monitor the effects of treatments on shifting E/I balance throughout the lifespan

……..

Cereb Cortex. 2021 Jan;31:547-61.

A WHOLE-BRAIN AND CROSS-DIAGNOSTIC PERSPECTIVE ON FUNCTIONAL BRAIN NETWORK DYSFUNCTION.

Spronk M, Keane BP, Ito T, et al.

A wide variety of mental disorders have been associated with resting-state functional network alterations, which are thought to contribute to the cognitive changes underlying mental illness. These observations appear to support theories postulating large-scale disruptions of brain systems in mental illness. However, existing approaches isolate differences in network organization without putting those differences in a broad, whole-brain perspective. Using a graph distance approach—connectome-wide similarity—we found that whole-brain resting-state functional network organization is highly similar across groups of individuals with and without a variety of mental diseases. This similarity was observed across autism spectrum disorder, attention-deficit hyperactivity disorder, and schizophrenia. Nonetheless, subtle differences in network graph distance were predictive of diagnosis, suggesting that while functional connectomes differ little across health and disease, those differences are informative. These results suggest a need to reevaluate neurocognitive theories of mental illness, with a role for subtle functional brain network changes in the production of an array of mental diseases. Such small network alterations suggest the possibility that small, well-targeted alterations to brain network organization may provide meaningful improvements for a variety of mental disorders

……..

Child Psychiatry Hum Dev. 2020 Dec;51:969-77.

CLINICAL SUBTYPES IN CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER ACCORDING TO THEIR CHILD BEHAVIOR CHECKLIST PROFILE.

Katsuki D, Yamashita H, Yamane K, et al.

This study sought to identify subgroups of attention-deficit hyperactivity disorder (ADHD) defined by specific patterns of emotional and behavioral symptoms according to the parent-rated Child Behavior Checklist (CBCL). Our clinical sample comprised 314 children (aged 4 to 15 years) diagnosed with ADHD according to the DSM-5. In addition, comorbid psychiatric disorders, general functioning, and medication status were assessed. Cluster analysis was performed on the CBCL syndrome subscales and yielded a solution with four distinct subgroups. The 'High internalizing/externalizing' group displayed an overlap between internalizing and externalizing problems in the CBCL profile. In addition, the 'High internalizing/externalizing' group revealed a high rate of comorbid autism spectrum disorder and elevated autistic traits. The 'Inattention and internalizing' group revealed a high rate of the predominantly inattentive presentation according to ADHD specifier from the DSM-5. The 'Aggression and externalizing' group revealed a high rate of comorbid oppositional defiant disorder and conduct disorder. The 'Less psychopathology' group scored low on all syndrome scales. Children with ADHD were subdivided into four distinct subgroups characterized by psychopathological patterns, with and without internalizing and externalizing problems. The overlap between internalizing and externalizing problems may be mediated with emotional dysregulation and associated neurobiological bases

……..

Clin EEG Neurosci. 2020;51:NP7.

INFLUENCE OF PREFRONTAL TRANSCRANIAL OSCILLATORY DIRECT CURRENT STIMULATION (TODCS) DURING SLOW-WAVE SLEEP ON EXECUTIVE FUNCTIONS IN ADHD.

Prehn-Kristensen A, Munz M, Thielking F, et al.

Background. Behavioral inhibition, which is a later-developing executive function (EF) and anatomically located in prefrontal areas, is impaired in attention deficit hyperactivity disorder (ADHD). While optimal EFs have been shown to depend on efficient sleep in healthy subjects, the impact of sleep problems, frequently reported in ADHD, remains elusive. Findings of macroscopic sleep changes in ADHD are inconsistent, but there is emerging evidence for distinct microscopic changes with a focus on prefrontal cortical regions and non-rapid eye movement (non-REM) slow-wave sleep. Recently, slow oscillations (SO) during non-REM sleep were found to be less functional and, as such, may be involved in sleep-dependent memory impairments in ADHD.

Objective. By augmenting slow-wave power through bilateral, slow oscillating transcranial direct current stimulation (so-tDCS, frequency = 0.75 Hz) during non-REM sleep, we aimed to improve daytime behavioral inhibition in children with ADHD.

Methods. Fourteen boys (10-14 years) diagnosed with ADHD were included. In a randomized, double-blind, crossover design, patients received so-tDCS either in the first or in the second experimental sleep night. Inhibition control was assessed with a visuomotor go/no-go task. Intrinsic alertness was assessed with a simple stimulus response task. To control for visuomotor performance, motor memory was assessed with a finger sequence tapping task.

Results. SO power was enhanced during early non-REM sleep, accompanied by slowed reaction times and decreased standard deviations of reaction times, in the go/no-go task after so-tDCS. In contrast, intrinsic alertness, and motor memory performance were not improved by so-tDCS.

Conclusion. Since behavioral inhibition but not intrinsic alertness or motor memory was improved by so-tDCS, our results suggest that lateral prefrontal SO during sleep might play a specific role for executive functioning in ADHD

……..

Clin EEG Neurosci. 2020;51:NP7.

MODULATION OF INTERFERENCE CONTROL IN ADOLESCENTS WITH ADHD USING TDCS.

Breitling C, et al.

Transcranial direct current stimulation (tDCS) can induce changes in intracortical excitability, plasticity and neuronal activity. Patients with attention deficit hyperactivity disorder (ADHD) show deficits in interference control that are linked to decreased activity of the right inferior prefrontal cortex. We investigated if tDCS of this area can induce enhanced interference control in ADHD patients and healthy subjects. Therefore 21 male adolescents with ADHD and 21 healthy controls aged 13 to 17 years underwent 3 separate sessions of tDCS (anodal, cathodal, and sham) while completing a Flanker task. Since all participants showed significant learning effects across sessions, we focused in our analysis on the first session. During sham stimulation ADHD patients showed impaired interference control compared with healthy control participants. Anodal stimulation, however, improved the performance in the patient group with no effect on performance in the control group. Importantly, anodal tDCS restored interference control in adolescents with ADHD to the level of healthy controls. It is worth noting that the reduction of error rates was comparable to the effect methylphenidate had on the commission error rate in a flanker task, demonstrating the potential therapeutic relevance of tDCS in ADHD treatment

……..

Clin EEG Neurosci. 2020;51:NP23.

COMPARISON OF NEUROFEEDBACK WITH MEDICAL METHODS FOR THE TREATMENT OF CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT AND HYPERACTIVITY DISORDER.

Unubol H, et al.

In this study, control group was composed of children and adolescent patients aged between 7 and 16 years who have applied to the Child and Adolescent Psychiatric Center and were diagnosed with attention deficit hyperactivity disorder (ADHD) according to DSM-5 criteria. The aim was to compare neurofeedback and medical methods for the treatment of children and adolescents diagnosed with attention deficit hyperactivity disorder, and in this respect, examine and evaluate the treatment results with attention deficit hyperactivity disorder symptoms checklist, Conners parent rating scale, and Continuous Performance Test (CPT). The best result in the control of behaviors associated with ADHD are obtained with multiple treatment models where all parental and social resources are employed. Multiple treatment approaches involving medical treatment, behavioral modification therapy and neurofeedback treatment are of concern in the treatment of ADHD. ADHD treatment helps control major symptoms of ADHD, including inattention, hyperactivity, and impulsivity. Effectiveness of neurofeedback therapy in the treatment of ADHD has been observed specifically for children and adolescents diagnosed with ADHD in cases where drug therapy is not preferred by the parents either in the first place or due to its accompanying side effects. A significant correlation with neurofeedback in the treatment of ADHD has been detected at the end of the study. Data obtained with the study have been analyzed and interpreted using NCSS (Number Cruncher Statistical System) 2007 and PASS (Power Analysis and Sample Size) 2008 Statistical Software (Utah, USA) statistical software

……..

Clin EEG Neurosci. 2020;51:NP16.

NIRS-NEUROFEEDBACK IN ADHD.

Fallgatter A, Barth B, Ehlis AC.

Objectives. Psychiatric disorders like attention deficit hyperactivity disorder (ADHD) are currently mainly treated with pharmacotherapeutic and, to a lesser extent, with psychotherapeutic methods. The success measured as improvement of symptoms under is surprisingly good with high effect sizes (0.8) in randomized controlled trials, in particular for pharmacological treatment with stimulants. However, there is still room and need for improvement.

Methods. Neurofeedback methods based on EEG and fMRI methods are increasingly applied as an alternative or add-on therapeutic approach. The rationale behind these therapies is to show the subjects an immediate feedback of their brain activity. So they can learn how to regulate their brain activity and transfer this ability to real life situations.

Results. We established a neurofeedback protocol for regions of the prefrontal cortex based on measurements of brain activity with near-infrared spectroscopy (NIRS). This NIRS-neurofeedback was applied in children and adults with ADHD with promising results.

Conclusion. Because of its high ecological validity, NIRSneurofeedback might develop to an alternative or add-on therapy also for ADHD patients in future

……..

Computer Methods and Programs in Biomedicine. 2021;200.

AUTOMATED DETECTION OF CONDUCT DISORDER AND ATTENTION DEFICIT HYPERACTIVITY DISORDER USING DECOMPOSITION AND NONLINEAR TECHNIQUES WITH EEG SIGNALS.

Tor HT, Ooi CP, Lim-Ashworth NS, et al .

Background and objectives: Attention deficit hyperactivity disorder (ADHD) is often presented with conduct disorder (CD). There is currently no objective laboratory test or diagnostic method to discern between ADHD and CD, and diagnosis is further made difficult as ADHD is a common neuro-developmental disorder often presenting with other co-morbid difficulties; and in particular with conduct disorder which has a high degree of associated behavioural challenges. A novel automated system (AS) is proposed as a convenient supplementary tool to support clinicians in their diagnostic decisions. To the best of our knowledge, we are

the first group to develop an automated classification system to classify ADHD, CD and ADHD+CD classes using brain signals.
Methods: The empirical mode decomposition (EMD) and discrete wavelet transform (DWT) methods were employed to decompose the electroencephalogram (EEG) signals. Autoregressive modelling coefficients and relative wavelet energy were then computed on the signals. Various nonlinear features were extracted from the decomposed coefficients. Adaptive synthetic sampling (ADASYN) was then employed to balance the dataset. The significant features were selected using sequential forward selection method. The highly discriminatory features were subsequently fed to an array of classifiers.
Results: The highest accuracy of 97.88% was achieved with the K-Nearest Neighbour (KNN) classifier. The proposed system was developed using ten-fold validation strategy on EEG data from 123 children. To the best of our knowledge this is the first study to develop an AS for the classification of ADHD, CD and ADHD+CD classes using EEG signals.
Potential application: Our AS can potentially be used as a web-based application with cloud system to aid the clinical diagnosis of ADHD and/or CD, thus supporting faster and accurate treatment for the children. It is important to note that testing with larger data is required before the AS can be employed for clinical applications

……..

Current Nutrition Reports. 2021.
ADHD and Risk of Childhood Adiposity: a Review of Recent Research.
Turan S, et al.
Purpose of Review: Attention deficit/hyperactivity disorder (ADHD) is considered as a risk factor for childhood adiposity and obesity. Studies on ADHD have provided limited data concerning the connections between eating habits, body mass index, and obesity. The purpose of this review was to examine the current literature regarding recent cohort and cross-sectional studies to determine the links between ADHD and childhood adiposity. Recent Findings: Studies in this review were classified into dietary features, nutritional status, neuroimaging findings, genetic overlapping, behavioral, cognitive, and neurocognitive aspects that play a role in mediating and moderating the relationship between ADHD and obesity. Summary: While ADHD, childhood adiposity, and overweight/obesity co-occur in children and adolescents, this relationship is largely explained by a variety of multidirectional factors

……..

Current Psychiatry Research and Reviews. 2020;16:132-37.
THE QUALITY OF LIFE IN MOTHERS OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER: A COMPARATIVE STUDY IN TEHRAN, IRAN.
Vafaee-Shahi M, Purfallah M, Shirazi E, et al.
Background: Attention deficit hyperactivity disorder (ADHD) is the most common mental health disorder among young children that affects the mothers lifestyles The aim of the present study was to consider the quality of life in Iranian mothers with ADHD children.
Objective: In this comparative study, we compared the quality of life between mothers of ADHD children and mothers of normal children.
Methods: In this descriptive study (2018-2019), a total of 75 mothers with ADHD children and 75 mothers with normal children, who were referred to referral educational hospital (Rasoul Hospital; Tehran, Iran) were evaluated. ADHD criteria were assessed by means of the SNAP-IV questionnaire, while the quality of life was evaluated by the SF-36 questionnaire. All data were analyzed by SPSS software. The environmental, mental, social physical, health and quality of life were compared between 2 groups.
Results: The economic situation of mothers with normal children was average (73.3%) to good (16%), while in mothers with ADHD children the economic situation was average (45.3%) to poor (37.3%). Mothers employment in normal children group was 41.3%, but it was 14.6% in mothers with ADHD children. A significant difference was reported between two groups in the mean of environmental health score ($p < 0.05$), social relationships ($p < 0.05$), mental health ($p < 0.05$), physical health ($p < 0.01$) and quality of life ($p < 0.01$).

The mean score of environmental health, social relationships, mental health, physical health and quality of life in ADHD mothers was significantly lower than mothers with normal children.
Conclusion: The difficulties in the management of ADHD children negatively affect the quality of mothers lifestyles. Therefore, preventive, educational and therapeutic interventions are recommended to improve the mental health and the quality of life of mothers

……..

Drug Alcohol Depend. 2021;219.

BEHAVIORAL SYMPTOMS OF CHILD MENTAL DISORDERS AND LIFETIME SUBSTANCE USE IN ADOLESCENCE: A WITHIN-FAMILY COMPARISON OF US SIBLINGS.

Kim S, Kim D.

Background: Childhood attention deficit hyperactivity disorder (ADHD) is found to be a risk factor for substance use in adolescence, but literature has suggested that the observed influence of ADHD may be driven by the comorbid conduct disorder (CD) or oppositional defiance disorder (ODD). We examine whether childhood ADHD and CD influence lifetime use of substances, independent of other comorbid mental problems and familial risk factors.
Methods: A total of 712 sibling pairs from a nationally representative US longitudinal survey were followed from 1997 to 2015. The Behavior Problems Index (BPI) was used to measure mental disorders in children. The hyperactive, antisocial, headstrong, anxious/depressed subscales of the BPI for ADHD, CD, ODD, anxiety/depression of children were assessed by their biological mothers who were the primary caregiver. Lifetime substance use by age 18 was measured by self-reports. A within-family design was used to minimize confounding.
Results: After controlling for mother fixed effects and comorbid mental disorders, symptoms of ADHD were not associated with lifetime substance use in adolescence except for regular smoking, while those of CD were positively and significantly associated with heightened risk for lifetime use of cannabis, regular smoking, cocaine, barbiturates, tranquilizers, hallucinogens, and inhalants in adolescence.
Conclusions: The results suggest that the association observed between childhood ADHD and substance use in adolescence may be driven by comorbid CD whose influences are robust to other mental disorders or unobserved familial factors

……..

Duzce Med J. 2020;22:196-200.

SERUM ZONULIN LEVELS AND SOCIAL COGNITION IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Yurteri N, et al.

Aim: Alterations in gut-brain axis of patients with attention deficit hyperactivity disorder (ADHD) have been indicated in recent studies. The aim of this study was to determine whether serum level of zonulin, considered to be a regulator of permeability in both gut-blood and blood-brain barriers, was associated with ADHD symptoms, and to evaluate the relationship between zonulin and social cognition in children with ADHD.
Material and Methods: Serum level of zonulin was analyzed by enzyme-linked immunosorbent assay (ELISA) in 40 treatment-naive children with ADHD, and age and gender matched 40 healthy children as control group. DuPaul ADHD Rating Scale was used for ADHD symptoms and reading the mind in the eyes test (RMET) was administered by the clinician to examine the social cognitive abilities.
Results: We found that serum zonulin levels were significantly higher in ADHD group compared to control group ($p=0.010$). Also, children with ADHD have significantly lower RMET scores ($p=0.007$). Furthermore, we found statistically significant positive correlations between serum zonulin levels and ADHD symptoms ($p<0.001$) and a negative correlation between serum zonulin levels and RMET scores ($p=0.001$) in ADHD group.

Conclusion: The present study is the first to evaluate whether there is a relationship between serum zonulin levels and social cognition in children with ADHD. The results of our study indicate that zonulin may be associated with ADHD and social cognition. Further studies with larger samples are required to determine the role of zonulin in ADHD

……..

Environ Health Perspect. 2020;128:1-9.

THE ASSOCIATION BETWEEN RESIDENTIAL GREEN SPACE IN CHILDHOOD AND DEVELOPMENT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER: A POPULATION-BASED COHORT STUDY.

Thygesen M, Engemann K, Holst GJ, et al.

BACKGROUND: Access to green space has been hypothesized to have a beneficial impact on children's mental well-being and cognitive development. The underlying mechanisms of the mental health benefits of green space are not fully understood, but different pathways have been suggested, such as the psychologically restoring capacities of green space, the ability to facilitate physical activity and social cohesion, and the mitigation of exposure to air pollution.

OBJECTIVES: In this nationwide cohort study, we investigated associations between residential green space in early childhood and a clinical diagnosis of attention deficit hyperactivity disorder (ADHD).

METHODS: The cohort included individuals, who were born in Denmark between 1992 and 2007 (n = 814,689) and followed for a diagnosis of ADHD from age 5, during the period 1997-2016. We used the normalized difference vegetation index (NDVI) as a measure of vegetation greenness surrounding each residential address in a quadratic area of 210 m 210 m in which the residence was located in the center of the quadrate. Individual exposure to green space was calculated as the average of NDVI surrounding each individual s residential address (or addresses if more than one) between birth and the fifth birthday. Multilevel modeling was used to estimate the incidence rate ratios (IRRs) with 95% confidence intervals (CI) for ADHD, according to exposure level and adjusted for calendar time, age, sex, parental socioeconomic status, neighborhood level socioeconomic status, and urbanicity. **RESULTS**

: Individuals living in areas defined by sparse green vegetation (lowest decile of NDVI) had an increased risk of developing ADHD, com-pared with individuals living in areas within the highest decile of NDVI (IRR = 1:55; 95% CI: 1.46, 1.65). Adjusting for the known confounders atte-nuated the result, but the association remained (IRR = 1:20; 95% CI: 1.13, 1.28).

CONCLUSION: Our findings suggest that lower levels of green space in residential surroundings, during early childhood, may be associated with a higher risk of developing ADHD

……..

Epilepsy Behav. 2021;115.

METHYLPHENIDATE FOR ATTENTION PROBLEMS IN EPILEPSY PATIENTS: SAFETY AND EFFICACY.

Leeman-Markowski BA, Adams J, Martin SP, et al.

Children with attention deficit hyperactivity disorder (ADHD) have an increased risk of seizures, and children with epilepsy have an increased prevalence of ADHD. Adults with epilepsy often have varying degrees of attentional dysfunction due to multiple factors, including anti-seizure medications, frequent seizures, interictal discharges, underlying lesions, and psychiatric comorbidities. Currently, there are no approved medications for the treatment of epilepsy-related attentional dysfunction. Methylphenidate (MPH) is a stimulant, FDA-approved for the treatment of ADHD, and often used for ADHD in the setting of pediatric epilepsy. Large database and registry studies indicate safety of MPH in children with ADHD and epilepsy, with no significant effect on seizure frequency. Small single-dose and open-label studies suggest efficacy of MPH in adults with epilepsy-related attention deficits. Methylphenidate represents a possible treatment for attentional dysfunction due to epilepsy, but large, randomized, placebo-controlled, double-blinded studies are needed

……..

Eur Child Adolesc Psychiatry. 2021.

OVERVIEW OF CAPICE CHILDHOOD AND ADOLESCENCE PSYCHOPATHOLOGY: UNRAVELLING THE COMPLEX ETIOLOGY BY A LARGE INTERDISCIPLINARY COLLABORATION IN EUROPEAN EU MARIE SKODOWSKA-CURIE INTERNATIONAL TRAINING NETWORK.

Rajula HSR, Manchia M, Agarwal K, et al.

The Roadmap for Mental Health and Wellbeing Research in Europe (ROAMER) identified child and adolescent mental illness as a priority area for research. CAPICE (Childhood and Adolescence Psychopathology: unravelling the complex etiology by a large Interdisciplinary Collaboration in Europe) is a European Union (EU) funded training network aimed at investigating the causes of individual differences in common childhood and adolescent psychopathology, especially depression, anxiety, and attention deficit hyperactivity disorder. CAPICE brings together eight birth and childhood cohorts as well as other cohorts from the EArly Genetics and Life course Epidemiology (EAGLE) consortium, including twin cohorts, with unique longitudinal data on environmental exposures and mental health problems, and genetic data on participants. Here we describe the objectives, summarize the methodological approaches and initial results, and present the dissemination strategy of the CAPICE network. Besides identifying genetic and epigenetic variants associated with these phenotypes, analyses have been performed to shed light on the role of genetic factors and the interplay with the environment in influencing the persistence of symptoms across the lifespan. Data harmonization and building an advanced data catalogue are also part of the work plan. Findings will be disseminated to non-academic parties, in close collaboration with the Global Alliance of Mental Illness Advocacy Networks-Europe (GAMIAN-Europe)

……..

Eur Child Adolesc Psychiatry. 2021.

ADVERSE CHILDHOOD EXPERIENCES AND TRAUMATIC BRAIN INJURY AMONG ADOLESCENTS: FINDINGS FROM THE 2016-2018 NATIONAL SURVEY OF CHILDREN'S HEALTH.

Jackson DB, Posick C, Vaughn MG, et al.

Exposure to adverse childhood experiences (ACEs) is a significant public health issue for-áyouth. However, traumatic brain injury (TBI) has been almost entirely overlooked in the ACEs and health outcomes literature, which has largely focused on the significant mental and behavioral health impact of ACEs. The goal the current study is to examine the association between ACEs and TBI among a nationally representative sample of adolescents in the United States and the extent to which ADHD and conduct problems inform this association. To assess this relationship, we use a sample of 42,204 adolescents (ages 12ΓÇô17-áyears) in the United States whose caregivers were surveyed during the three most recent cohorts (2016Γ Çô2018) of the National Survey of ChildrenΓÇÖs Health (NSCH). The results revealed a doseΓÇôresponse relationship between ACEs and TBI, even after accounting for an array of confounding variables. Findings also indicated that associations were of a greater magnitude among youth who are not sports-involved. Supplemental mediation analyses showed that ADHD and conduct problems attenuated associations between ACE exposure and TBI, but only in the absence of youth sports involvement. Given that both ACEs and TBI carry long-term consequences for health and well-being, the findings from this study draw attention to the need for early intervention and prevention programming (e.g. home visiting) that can reduce the prevalence of ACEs and a history of TBI among adolescents

……..

Eur Child Adolesc Psychiatry. 2021.

DIETARY INFLAMMATORY INDEX OF MOTHERS DURING PREGNANCY AND ATTENTION DEFICIT-HYPERACTIVITY DISORDER SYMPTOMS IN THE CHILD AT PRESCHOOL AGE: A PROSPECTIVE INVESTIGATION IN THE INMA AND RHEA COHORTS.

Lertxundi N, Molinuevo A, Valvi D, et al.

Inflammation provides a substrate for mechanisms that underlie the association of maternal diet during pregnancy with Attention Deficit-Hyperactivity Disorder (ADHD) symptoms in childhood. However, no previous study has quantified the proinflammatory potential of maternal diet as a risk factor for ADHD. Thus,

we evaluated the association of maternal dietary inflammatory index (DII®) scores during pregnancy with ADHD symptoms in 4-year-old children born in two Mediterranean regions. We analyzed data from two population-based birth cohort studies-INMA (Environment and Childhood) four subcohorts in Spain (N = 2097), and RHEA study in Crete (Greece) (N = 444). The DII score of maternal diet was calculated based on validated food frequency questionnaires completed during pregnancy (12th and/or 32nd week of gestation). ADHD symptoms were assessed by ADHD-DSM-IV in INMA cohort and by ADHDT test in RHEA cohort, with questionnaires filled-out by teachers and parents, respectively. The associations between maternal DII and ADHD symptoms were analysed using multivariable-adjusted zero-inflated negative binomial regression models in each cohort study separately. Meta-analysis was conducted to combine data across the cohorts for fitting within one model. The DII was significantly higher in RHEA (RHEA = 2.09 [1.94, 2.24]) in comparison to INMA subcohorts (Asturias = - 1.52 [- 1.67, - 1.38]; Gipuzkoa = - 1.48 [- 1.64, - 1.33]; Sabadell = - 0.95 [- 1.07, - 0.83]; Valencia = - 0.76 [- 0.90, - 0.62]). Statistically significant reduced risk of inattention symptomatology (OR = 0.86; CI 95% = 0.77-0.96), hyperactivity symptomatology (OR = 0.82; CI 95% = 0.72-0.92) and total ADHD symptomatology (OR = 0.82; CI 95% = - 0.72 to 0.93) were observed with increased maternal DII in boys. No statistically significant associations were observed in girls between maternal DII and inattention, hyperactivity and total ADHD symptomatology. We found reduced risk of ADHD symptomatology with increased DII only in boys. This relationship requires further exploration in other settings

……..

Eur Child Adolesc Psychiatry. 2021.

FACIAL EMOTION RECOGNITION IMPAIRMENT PREDICTS SOCIAL AND EMOTIONAL PROBLEMS IN CHILDREN WITH (SUBTHRESHOLD) ADHD.

Staff AI, Luman M, Van der Oord S, et al.

Children with attention-deficit/hyperactivity disorder (ADHD) symptoms often experience social and emotional problems. Impaired facial emotion recognition has been suggested as a possible underlying mechanism, although impairments may depend on the type and intensity of emotions. We investigated facial emotion recognition in children with (subthreshold) ADHD and controls using a novel task with childrenΓÇÖs faces of emotional expressions varying in type and intensity. We further investigated associations between emotion recognition accuracy and social and emotional problems in the ADHD group. 83 children displaying ADHD symptoms and 30 controls (6ΓÇô12-áyears) completed the Morphed Facial Emotion Recognition Task (MFERT). The MFERT assesses emotion recognition accuracy on four emotions using five expression intensity levels. Teachers and parents rated social and emotional problems on the Strengths and Difficulties Questionnaire. Repeated measures analysis of variance revealed that the ADHD group showed poorer emotion recognition accuracy compared to controls across emotions (small effect). The significant group by expression intensity interaction (small effect) showed that the increase in accuracy with increasing expression intensity was smaller in the ADHD group compared to controls. Multiple regression analyses within the ADHD group showed that emotion recognition accuracy was inversely related to social and emotional problems, but not prosocial behavior. Not only children with an ADHD diagnosis, but also children with subthreshold ADHD experience impairments in facial emotion recognition. This impairment is predictive for social and emotional problems, which may suggest that emotion recognition may contribute to the development of social and emotional problems in these children

……..

Eur Child Adolesc Psychiatry. 2021.

TESTING THE EVOLUTIONARY ADVANTAGE THEORY OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER TRAITS.

Arildskov TW, Virring A, Thomsen PH, et al.

To reconcile the strong secular persistence of attention-deficit/hyperactivity disorder (ADHD) despite its impairing effects, ADHD traits have been postulated to offer an evolutionary advantage. It has been proposed that such advantages should in particular be observable under time-critical, novel, and resource-depleted conditions requiring response-readiness and high levels of scanning and exploration/foraging. Our objective was to provide the first behavioral test of this hypothesis. Schoolchildren from the general population with

no/few (n = 56), mild (n = 50), moderate (n = 48), and severe (n = 48) ADHD traits, defined according to their ADHD-Rating Scale IV (ADHD-RS-IV) total score, participated in an exploratory foraging and response-readiness laboratory test. Here, children searched for coins hidden in locations of varying obscurity in an unfamiliar room for 1-ámin. Test-performance (number of coins found) adjusted for age, sex, and estimated IQ was analyzed categorically using multiple linear regression analyses and dimensionally by fitting a regression model including the ADHD-RS-IV score as a continuous measure. There were no differences in the mean number of coins between the No/Few (Mean = 7.82), Mild (Mean = 7.76), Moderate (Mean = 7.58), and Severe (Mean = 7.88) groups [F(3,195) = 0.24, p = 0.871]. Furthermore, excluding children with functional impairment, adjusting for verbal working memory and response inhibition, and stratifying for sex did not change these findings. Finally, continuous ADHD traits were not found to be related to test-performance [F(3,195) = 0.73, p = 0.536]. While our results do generally not support the evolutionary advantage theory (i.e., ADHD traits neither conferred an advantage nor a disadvantage), this does not disprove that ADHD traits may have offered advantages via other mechanisms

……..

Eur Child Adolesc Psychiatry. 2021.

MEDICAL DISORDERS IN A DANISH COHORT OF CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Laugesen B, Lauritsen MB, F+ªrk E, et al.

Studies have identified a higher prevalence of co-existing psychiatric and medical disorders in children with ADHD. There is a shortage of longitudinal studies providing an overview of potential medical disorders in children with ADHD. The objective of this study was to provide a broad overview of lifetime prevalence and relative risk of medical disorders in a nationwide Danish cohort of children with and without ADHD during the first 12-áyears of life. A population-based prospective follow-back cohort study used data from Danish national health registries to identify a cohort of all children born in Denmark between 1995 and 2002. The children were followed from birth until 12-áyears of age in two national registries. Children with ADHD had a significantly higher prevalence of recorded diagnoses across all included chapters of medical disorders in the ICD-10, except for neoplasms, where the association with ADHD was non-significant. The highest relative risk was observed for the chapter concerning diseases of the nervous system, with episodic and paroxysmal disorders being the most frequently registered underlying category. The findings indicate that children with ADHD have an increased risk of a broad range of medical disorders compared to the general population during the first 12 years of life, except for neoplasms

……..

Eur Child Adolesc Psychiatry. 2021.

METHYLPHENIDATE AND TBI IN ADHD AND CO-OCCURRING EPILEPSY AND MENTAL DISORDERS: A SELF-CONTROLLED CASE SERIES STUDY.

Chen VCH, Yang YH, Lee CTC, et al.

It is suggested that medication for attention-deficit hyperactivity disorder (ADHD) links to lower risk of traumatic brain injury (TBI). Little is known about whether the beneficial effect of methylphenidate is persistent in individuals with other comorbid mental disorders and epilepsy. We identified 90,634 participants who were less than 18years old and diagnosed with ADHD from Taiwan's National Health Insurance Research Database (NHIRD) from January 1, 2000 to December 31, 2013. Cox proportional hazards models with hazard ratio (HR) and 95% confidence interval were conducted to compare the risks of TBI event between groups of ADHD-only and ADHD with co-occurring other mental disorders. Within-individual comparisons using a self-controlled case series study design were conducted using conditional Poisson regression models with relative incidence (RR) and 95% CI to examine the effect of methylphenidate on TBI with adjustment for medication of psychotropics and anticonvulsants. For children and adolescents with ADHD, we found comorbid mental disorders and epilepsy increase the risk of TBI, with HRs ranged from 1.21 to 1.75. For the effect of MPH, we found reduced risks for TBI in ADHD (RR = 0.83, 95% CI = 0.70ΓÇô0.98). Similar results were found among individuals with co-occurring oppositional defiant disorders or conduct disorder, MDD, tic

disorders and epilepsy. Methylphenidate treatment was linked to lower risk for TBI in patients with ADHD and the inverse association was persistent among those with other comorbid mental disorders and epilepsy

……..

European Journal of Molecular and Clinical Medicine. 2020;7:6051-54.

A CASE OF PAEDIATRIC POST-TRAUMATIC STRESS DISORDER PRESENTING AS ATTENTION DEFICIT HYPERACTIVITY DISORDER: A CASE REPORT.

Raghuram, Ramya, Shanthi, et al.

In the past few years, there has been increased recognition that children, who have faced traumatic incidences, can develop post-traumatic stress disorder (PTSD), just like in adults. We present a case of PTSD in a 7-year-old child who endured three surgical procedures because he was suffering from a congenital cranial stenosis (Pfeiffer) syndrome. Because of repetitive painful episodes, resulting from the syndrome, and then post-surgical complications, the child developed behavioral outbursts, hypervigilence, concentration problems, and irritability. In the past, the child was diagnosed with attention deficit hyperactivity disorder (ADHD) in the realm of his behavioral complaints, and he was already on stimulant medications for last one year. But there was no remarkable effect of pharmacotherapy on child's behavior despite increasing dosages. Ultimately the child's medical and psychiatric history was reviewed and a diagnosis of pediatric PTSD was made. Stimulant medications were discontinued and management was started on the lines of pediatric PTSD, resulting in a remarkable improvement in child's psychiatric outcome

……..

Evidence-Based Practice in Child and Adolescent Mental Health. 2021.

THE EFFICACY OF COGNITIVE VIDEOGAME TRAINING FOR ADHD AND WHAT FDA CLEARANCE MEANS FOR CLINICIANS.

Evans SW, Beauchaine TP, Chronis-Tuscano A, et al.

News of a videogame that received FDA clearance to treat youth with attention-deficit hyperactivity disorder (ADHD) garnered a great deal of media attention and raised questions about the role of digital cognitive training programs for treatment. In order for clinicians and clients to understand this news for the purposes of making treatment decisions one must have an understanding of what it means for a treatment to be considered evidence-based and an understanding of what is required to obtain FDA clearance. Finally, in order to fully inform decisions about treatment, clinicians and parents must be able to consider the evidence supporting cognitive training programs in relation to other treatments available for children with ADHD. A review of these standards and the evidence supporting cognitive training in general, and the new videogame that received recent FDA clearance (EndeavorRXTM) specifically, revealed an overall lack of support for this approach to treatment. There are multiple psychosocial and pharmacological treatment options with much more evidence supporting their effectiveness than any commercially available cognitive training program. The contrast between receiving FDA clearance without evidence of any observable benefits to the child is explained within a description of the FDA process for clearance and approval. Finally, these conclusions are described in the context of clinicians decisions regarding services offered and procedures for explaining this to families who may have seen the media attention related to FDA clearance

……..

Exp Clin Psychopharmacol. 2021 Jan.

AN EVALUATION OF THE EFFECT OF METHYLPHENIDATE ON WORKING MEMORY, TIME PERCEPTION, AND CHOICE IMPULSIVITY IN CHILDREN WITH ADHD.

Campez M, Raiker JS, Little K, et al.

Individuals with Attention-Deficit Hyperactivity Disorder (ADHD) consistently exhibit a stronger preference for immediate rewards than for larger rewards available following a delay on tasks measuring choice impulsivity (CI). Despite this, however, there remains a dearth of studies examining the impact of stimulant treatment on CI as well as associated higher order (e.g., working memory [WM]) and perceptual (e.g., time perception)

cognitive processes. The present study examines the effect of osmotic release oral system methylphenidate (OROS-MPH) on CI, WM and time perception processes as well as the relation among these processes before and after taking a regimen of OROS-MPH. Thirty-five children (aged 7–12 years) with a diagnosis of ADHD participating in a concurrent stimulant medication study were recruited to complete computerized assessments of CI, WM, and time perception. Children completed the assessments after administration of a placebo as well as their lowest effective dose of OROS-MPH following a 2-week titration period. The results from one-sample t-tests indicated that OROS-MPH improves both CI and WM in youth with ADHD but does not impact time perception. Further, results revealed no significant association among the various indices of cognitive performance while taking placebo or OROS-MPH. Overall, the findings suggest that while OROS-MPH improves both CI and WM in youth with ADHD, improvements in CI as a result of OROS-MPH are unlikely to be associated with the improvements in WM given the lack of association among the two. Future studies should consider alternate cognitive, emotional, and motivational mechanisms that may account for the impact of OROS-MPH on CI. (PsycInfo Database Record (c) 2021 APA, all rights reserved)
Public Health Significance—Among children with attention-deficit/hyperactivity disorder (ADHD), the current study indicates that stimulant medication independently improves cognitive functioning in terms of impulsivity and working memory. In contrast, time perception processes were unaffected by stimulant medication suggesting that time perception may be resistant to pharmacological intervention in children with ADHD

……..

Frontiers in Genetics. 2020;11.

THE CO-EXISTENCE OF ADHD WITH AUTISM IN SAUDI CHILDREN: AN ANALYSIS USING NEXT-GENERATION DNA SEQUENCING.

Bogari NM, Al-Allaf FA, Aljohani A, et al.

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders. Several studies have confirmed the co-existence of other neuropsychiatric disorders with ADHD. Out of 106 individuals suspected to have ADHD, eight Saudi Arabian pediatric patients were diagnosed with ADHD using a dual assessment procedure based on highly significant scores from the international criteria for diagnosis; (full form DMS) DSM-5. Then, these patients were examined for the co-existence of autism and ADHD using different international diagnostic protocols. Four patients with combined ADHD and autism and four ADHD patients without autism were examined for the presence of genetic variants. Six variants (chr1:98165091, chr6:32029183, chr6:32035603, chr6:32064098, chr8:2909992, chr16:84213434) were identified in 75% of the patients with ADHD and autism, indicating that these genes may have a possible role in causing autism. Five variants (The chr2:116525960, chr15:68624396, chr15:91452595, chr15:92647645, and chr16:82673047) may increase to the severity of ADHD. This study recommends screening these eleven variants in ADHD cases and their relevant controls to confirm the prevalence in the Saudi population. It is recommended that future studies examine the 11 variants in detail

……..

Front Human Neurosci. 2020 Dec;14.

EXPLORING THE NEURAL STRUCTURES UNDERLYING THE PROCEDURAL MEMORY NETWORK AS PREDICTORS OF LANGUAGE ABILITY IN CHILDREN AND ADOLESCENTS WITH AUTISM SPECTRUM DISORDER AND ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Sanjeevan T, Hammill C, Brian J, et al.

Introduction: There is significant overlap in the type of structural language impairments exhibited by children with autism spectrum disorder (ASD) and children with attention deficit hyperactivity disorder (ADHD). This similarity suggests that the cognitive impairment(s) contributing to the structural language deficits in ASD and ADHD may be shared. Previous studies have speculated that procedural memory deficits may be the shared cognitive impairment. The procedural deficit hypothesis (PDH) argues that language deficits can be explained by differences in the neural structures underlying the procedural memory network. This hypothesis is based

on the premise that the neural structures comprising the procedural network support language learning. In this study, we aimed to test the PDH in children with ASD, ADHD, and typical development (TD).
Methods: One hundred and sixty-three participants (ages 10–21): 91 with ASD, 26 with ADHD, and 46 with TD, completed standardized measures of cognitive and language ability as well as structural magnetic resonance imaging. We compared the structural language abilities, the neural structures underlying the procedural memory network, and the relationship between structural language and neural structure across diagnostic groups.
Results: Our analyses revealed that while the structural language abilities differed across ASD, ADHD, and TD groups, the thickness, area, and volume of the structures supporting the procedural memory network were not significantly different between diagnostic groups. Also, several neural structures were associated with structural language abilities across diagnostic groups. Only two of these structures, the inferior frontal gyrus, and the left superior parietal gyrus, are known to be linked to the procedural memory network.
Conclusions: The inferior frontal gyrus and the left superior parietal gyrus, have well-established roles in language learning independent of their role as part of the procedural memory system. Other structures such as the caudate and cerebellum, with critical roles in the procedural memory network, were not associated with structural language abilities across diagnostic groups. It is unclear whether the procedural memory network plays a fundamental role in language learning in ASD, ADHD, and TD

……..

Frontiers in Pediatrics. 2020;8.
SOCIAL AND BEHAVIORAL DIFFICULTIES IN 10-YEAR-OLD CHILDREN WITH CONGENITAL HEART DISEASE: PREVALENCE AND RISK FACTORS.
Werninger I, Ehrler M, Wehrle FM, et al.
Children with congenital heart disease (CHD) may be at increased risk for neurodevelopmental impairments. Long-term behavioral profiles and respective risk factors are less frequently described. The aim of this study was to evaluate multidimensional behavioral outcomes and associated medical, psychological, and social risk factors in children with complex CHD. At 10-years of age, 125 children with CHD were assessed for general behavioral difficulties, attention deficit hyperactivity disorder (ADHD)-related behavior, and social interaction problems and were compared to normative data. Medical and cardiac factors, IQ, maternal mental health at 4 years of age and parental socioeconomic status were tested as predictors for all behavioral outcomes. Children with CHD showed no significant differences in general behavioral difficulties. However, increased ADHD-related symptoms ($p < 0.05$) and difficulties in social interaction ($p < 0.05$) were observed. In 23% of the children, a combination of ADHD-related symptoms and social interaction problems was reported by parents. In multivariate analyses, IQ ($p < 0.01$) and maternal mental health ($p < 0.03$) at 4 years of age were found to be predictive for all behavioral outcomes at 10 years while medical and cardiac risk factors were not. Our findings reveal significant difficulties in ADHD-related symptoms and social interaction problems with a significant comorbidity. Behavioral difficulties were not detected with a screening tool but with disorder-specific questionnaires. Furthermore, we demonstrate the importance of maternal mental health during early childhood on later behavioral outcomes of children with CHD. This underlines the importance of identifying and supporting parents with mental health issues at an early stage in order to support the family and improve the child's neurodevelopment

……..

Front Psychiatry. 2020;11.
IMPULSIVITY AND VENTURESOMENESS IN AN ADULT ADHD SAMPLE: RELATION TO PERSONALITY, COMORBIDITY, AND POLYGENIC RISK.
Grimm O, Weber H, Kittel-Schneider S, et al.
While impulsivity is a basic feature of attention-deficit/hyperactivity disorder (ADHD), no study explored the effect of different components of the Impulsiveness (Imp) and Venturesomeness (Vent) scale (IV7) on psychiatric comorbidities and an ADHD polygenic risk score (PRS). We used the IV7 self-report scale in an adult ADHD sample of 903 patients, 70% suffering from additional comorbid disorders, and in a subsample

of 435 genotyped patients. Venturesomeness, unlike immediate Impulsivity, is not specific to ADHD. We consequently analyzed the influence of Imp and Vent also in the context of a PRS on psychiatric comorbidities of ADHD. Vent shows a distinctly different distribution of comorbidities, e.g., less anxiety and depression. PRS showed no effect on different ADHD comorbidities, but correlated with childhood hyperactivity. In a complementary analysis using principal component analysis with Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition ADHD criteria, revised NEO Personality Inventory, Imp, Vent, and PRS, we identified three ADHD subtypes. These are an impulsive-neurotic type, an adventurous-hyperactive type with a stronger genetic component, and an anxious-inattentive type. Our study thus suggests the importance of adventurousness and the differential consideration of impulsivity in ADHD. The genetic risk is distributed differently between these subtypes, which underlines the importance of clinically motivated subtyping. Impulsivity subtyping might give insights into the organization of comorbid disorders in ADHD and different genetic background

……..

Front Psychiatry. 2020;11.

LONG-TERM SUICIDE RISK OF CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT AND HYPERACTIVITY DISORDER A SYSTEMATIC REVIEW.

Garas P, Balazs J.

Background: Attention deficit and hyperactivity disorder (ADHD) is one of the most common mental disorders in childhood. Recently, several studies showed the high suicide risk of patients with ADHD; however, most of these studies had a cross-sectional design.

Aims: The aim of the current research is to complete a systematic review of published studies which investigate the suicide risk of ADHD patients with longitudinal design.

Methods: The systematic search was made on OVID Medline, PsychInfo, PubMed, Scopus, and Web of Science. The search terms were (ADHD OR attention deficit hyperactivity disorder) AND (suicide OR suicidal OR suicidality) AND (follow-up OR longitudinal study OR prospective study). The inclusion criteria were as follows: written in English; the participants were under 18 years at baseline; longitudinal, prospective studies; ADHD population at baseline and at follow-up; and suicide behavior as a primary outcome. The exclusion criteria were as follows: the study did not contain empirical data and reviews/meta-analyses and studies which aimed to investigate the drug treatment efficacy of ADHD.

Results: After the screening process, 18 papers were included in the systematic review. Ten articles were altogether published in the last 5 years. The range of follow-up periods varied between 2 and 17 years. Several different assessment tools were used to investigate the symptoms and/or the diagnosis of ADHD and the suicidal risk. Nine studies enrolled children aged under 12 at baseline, and three studies used birth cohort data, where there was no strict age-based inclusion criteria. A total of 17 studies found a positive association between ADHD diagnosis at baseline and the presence of suicidal behavior and/or attempts at the follow-up visits.

Limitations: The main limitation of this review is the methodological heterogeneity of the selected studies. A further limitation is the relatively low number of studies that examined a population with balanced gender ratios. Additionally, only one study published data about the treatment of ADHD. Finally, though we carefully chose the keywords, we still may be missing some relevant papers on this topic.

Conclusions: In spite of the methodological diversity of the included studies, the results of the current systematic review highlight the importance of screening suicidality in the long term in patients with ADHD. Therefore, further studies that compare the suicidal risk of treated and untreated groups of ADHD patients in the long term are needed

……..

Global Advances in Health and Medicine. 2020;9:70.

PHOSPHATIDYLSERINE FOR THE TREATMENT OF PEDIATRIC ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Bruton A, Nauman J, Hanes D, et al.

Purpose: The aim is to examine the evidence for phosphatidylserine for symptoms of attention-deficit/hyperactivity disorder (ADHD) in children.

Methods: Medline, Cochrane Library, and ClinicalTrials.gov were searched from inception through 2011/2018. Standardized mean differences and 95% confidence intervals (CIs) were calculated, and the heterogeneity of the studies was estimated using I2.

Results: Four studies met inclusion criteria for the narrative review (n=230), and 3 for the meta-analysis (n=215). We found very low-quality evidence that phosphatidylserine may be more effective than placebo in reducing total ADHD symptoms (effect size=0.74; 95% CI=-0.10, 1.57), very low-quality evidence that phosphatidylserine may be more effective than placebo in improving symptoms of hyperactivity/ impulsivity (effect size=0.55, 95% CI=-0.21,1.31), and low-quality evidence that phosphatidylserine may be significantly more effective than placebo in improving symptoms of inattention (effect size=0.36, 95% CI=0.07, 0.64).

Conclusion: Phosphatidylserine may be effective for reducing symptoms of ADHD in children, particularly symptoms of inattention. High-quality research in this area is warranted

……..

Global Advances in Health and Medicine. 2020;9:84-85.

RELATIONSHIPS BETWEEN FOOD INSECURITY STATUS, HEI SCORES, AND ADHD SYMPTOM SEVERITY IN A PEDIATRIC ADHD POPULATION.

Bowers E, Stern M, Perez L, et al.

Purpose: Food insecurity occurs in 13.9% of households with children in the United States, and the chance of being diagnosed with Attention Deficit Hyperactive Disorder (ADHD) is nearly 6 times greater in food insecure households. Yet, few studies exist exploring this relationship, particularly from the perspective of dietary patterns and nutrient intake. The purpose of this study is to explore relationships among food insecurity status, Healthy Eating Index (HEI) scores, and ADHD symptoms severity in a pediatric ADHD population.

Methods: These data were collected as part of baseline assessments from a clinical trial investigating an alternative treatment for ADHD in children ages 6 to 12 years (n=91). Household food security status was assessed using the 18- Item US Household Food Security Survey, and symptom severity of ADHD was assessed using the Child andAdolescent Symptom Inventory-5 questionnaire. HEI scores were calculated by administering the Vioscreen Food Frequency Questionnaire. Statistical analyses included 1- way analysis of variance and Wilcoxon Rank Sum tests when appropriate for model assumptions.

Results: Children in food insecure households (n=8) scored higher in hyperactivity symptoms than food secure children (n= 83) (P=.050). The mean cohort total HEI score was 64.7 (SD 9.25), which is higher than reported for the general population of similar age. Children from food insecure households reported decreased HEI score for intake of fatty acids (P=.008) and increased HEI score for empty calorie consumption (P=.036).

Conclusion: Results demonstrate that relationships may exist between severity of symptoms of ADHD and dietary quality as measured by HEI scores in food insecure households. Future analyses should test for existing dietary patterns outside of HEI scores in relationship to food insecurity and ADHD symptoms

……..

Global Advances in Health and Medicine. 2020;9:71-72.

PHOSPHATIDYLSERINE FOR PEDIATRIC ATTENTION-DEFICIT HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Bruton A, Nauman J, Hanes D, et al.

Purpose/Background: Attention-deficit hyperactivity disorder (ADHD) is one of the most commonly diagnosed psychiatric conditions of childhood and can persist into adulthood with numerous adverse health

outcomes. Many children do not receive standard-of-care stimulant medication due to side effects or lack of effectiveness. Other options, including integrative therapies, warrant investigation.
Objective: To examine the evidence for effectiveness of phosphatidylserine supplementation for symptoms of ADHD in children and adolescents. Inclusion/Exclusion: Study participants were children Γëñ18 years old with ADHD. Intervention was phosphatidylserine supplementation in any dose/duration, compared to placebo, wait list, or standard of care. Outcome measures were validated scales of ADHD symptoms. All study designs were included in the narrative review, but only trials were included in the meta-analysis.
Methods: Pubmed/Medline, Pubmed/Ovid, The Cochrane Library, and ClinicalTrials.gov were searched from inception through November 2018. Methodological quality was assessed using the Cochrane Risk of Bias tool. Standardized mean differences and 95% confidence intervals were calculated, and the heterogeneity of the studies was estimated using I2.
Results: Six studies met inclusion criteria for the narrative review (n=1064) and 3 studies for the meta-analysis (n=215). We found very low-quality evidence that phosphatidylserine may be more effective than placebo in reducing total ADHD symptoms (effect size=0.74; 95% CI=-0.10, 1.57). We found very low-quality evidence that phosphatidylserine may be more effective than placebo in improving symptoms of hyperactivity/impulsivity (effect size=0.55, 95% CI=-0.21,1.31) and low-quality evidence that phosphatidylserine may be significantly more effective than placebo in improving symptoms of inattention (effect size=0.36, 95% CI=0.07, 0.64).
Conclusion: Phosphatidylserine may be effective for reducing symptoms of ADHD in children, particularly symptoms of inattention. High-quality research in this area is warranted. Future trials should be randomized, controlled, and adequately powered. Registration: The protocol for this review is registered in the PROSPERO database, # CRD42018093188

……..

Health Qual Life Outcomes. 2021;19.

ASSESSING WHETHER CHILD AND PARENT REPORTS OF THE KINDL QUESTIONNAIRE MEASURE THE SAME CONSTRUCTS OF QUALITY OF LIFE IN CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Alamolhoda M, Farjami M, Bagheri Z, et al.

Background: Discrepancy between child self-report and parent proxy-report has long been documented in the health-related quality of life (HRQoL) measurement of children with chronic health conditions. This study aims to assess whether child and parent reports of the Kinder Lebensqualitt fragebogen (KINDL) questionnaire measure the same construct of HRQoL in children with attention-deficit hyperactivity disorders (ADHD).
Methods: Participants were 122 Iranian children with ADHD and 127 of their parents, who completed the child and parent reports of the KINDL, respectively. Internal consistency of the child and parent reports were assessed by Cronbach's alpha. The intra-class correlation (ICC) coefficient and factor analysis were applied to assess whether the child self-report and the parent proxy-report measured the same construct of HRQoL. Additionally, convergent and discriminant validity were assessed using the Spearman correlation.
Results: The results of factor analysis revealed that the child self-report and parent proxy-report measure two different aspects of HRQoL. Moreover, both versions of the KINDL instrument showed excellent convergent and discriminant validity. The internal consistency was close to or greater than 0.7 for all domains of both child and parent reports.
Conclusions: Although the child self-report and the parent proxy-report of the Persian version of the KINDL have good psychometric properties, they are not interchangeable. This finding indicates that Iranian children with ADHD and their parents evaluate children's HRQoL from their own viewpoints

……..

Indian J Psychiatry. 2020;62:670-77.

TECHNOLOGICAL ADDICTIONS IN ATTENTION DEFICIT HYPERACTIVITY DISORDER: ARE THEY ASSOCIATED WITH EMOTIONAL INTELLIGENCE?

Kaypakli G, Metin O, Varmi D, et al.

Background: The impaired regulation of emotional responses has significant social consequences for patients with attention deficit hyperactivity disorder (ADHD) and can be thought to increase the risk for technological addictions. Aim: Ditto objective of the present research is to investigate the relationship between technological addictions and trait emotional intelligence (EI) in adolescents with ADHD.

Methods: This cross-sectional study was conducted in 150 treatment-na+»ve adolescents with ADHD, aged 12-18 years. The sociodemographic information form, the Emotional Quotient-Inventory: Youth Version (EQ-i: YV), Internet Addiction Test, Smartphone Addiction Scale, and Conners' Parent Rating Scales were used for data collection.

Results: The findings revealed that ADHD-C and female patients have lower mean stress management scores on EQ-i: YV. Patients who have smartphone addiction (SA)/problematic internet usage have lower total EI and stress management scores. The oppositional, hyperactivity, and DSM-total scores were negatively correlated with stress management scores. Intrapersonal and stress management scores were negatively correlated to SA symptoms.

Conclusion: The stress management dimension was the strongest factor related to ADHD and technological addictions. In adolescents with ADHD, stress management may be the key factor to cope with daily problems. Therefore, the interventions to develop EI can be a therapeutic option in ADHD and technological addictions

……

Int J Environ Res Public Health. 2021;18:1-9.

THE INFLUENCE OF METACOGNITIVE STRATEGIES ON THE IMPROVEMENT OF REACTION INHIBITION PROCESSES IN CHILDREN WITH ADHD.

Kajka N, Kulik A.

Background: Low response inhibition underlies attention disorders and hyperactivity. The aim of this study is to check whether these processes will be strengthened by three months of training with metacognitive strategies.

Methodology: Forty-five schoolchildren took part in an experimental study (M = 10.41; SD = 1.42). Each child had been diagnosed with attention deficit hyperactivity disorder (ADHD). The participants were randomly assigned into three groups: the first group was tested for the effect of Mind Maps; the second group, for the effect of Sketchnoting, while the third group was assigned the role of a Control group. All of the groups were examined with the Loud Subtraction 7 test (LS7T) with a distractor before and after the training.

Results: Analysis with the Wilcoxon test showed that children with ADHD made significantly fewer errors in the LS7 Test in the second measurement in the Mind Maps group (M1 = 7.45; SD1 = 4.07; M2 = 5.76; SD2 = 4.68; p = 0.02). In the remaining groups, there were no statistically significant differences in the average number of errors made.

Conclusions: Mind Maps are an effective metacognitive strategy. Regular use of this method strengthens the inhibition of children with ADHD in this study. It can complement the existing forms of support for the child

……

Int J Environ Res Public Health. 2021;18:1-16.

PARTICIPATION PROFILE OF CHILDREN AND YOUTH, AGED 6-14, WITH AND WITHOUT ADHD, AND THE IMPACT OF ENVIRONMENTAL FACTORS.

Shabat T, Fogel-Grinvald H, Anaby D, et al.

Background: Children and youth with attention deficit hyperactivity disorder (ADHD) may experience difficulties in participation, but few studies examine their participation and the environmental factors affecting participation. This study explored the participation and the environmental factors of children and youth, with

and without attention deficit hyperactivity disorder (ADHD), in the following three settings: home, school, and community.
Materials and Methods: Parents of 65 participants aged 6-14 (M = 9.91, SD = 1.87) with and without ADHD completed the Participation and Environment Measure for Children and Youth (PEM-CY) questionnaire, which evaluates participation and environmental factors, along with demographic and screening questionnaires.
Results: The ADHD group (n = 31) scored significantly lower than the non-ADHD group (n = 34) in frequency at home, involvement, and overall environmental support in all settings, with parents expressing a greater desire to change their child's home and community participation. For the ADHD group, a relationship was found between environmental support and involvement in all three settings.
Conclusions: The findings demonstrated differences in the participation of children and youth with ADHD across different settings, compared to those without ADHD, and confirmed the effect of environmental factors on participation, especially involvement. It is essential to consider participation measures and environmental factors when designing interventions for children and youth with ADHD

……..

International Journal of Pharmaceutical Research. 2020;12:3925-28.
PREVALENCE OF ADHD AMONG PRIMARY SCHOOL CHILDREN IN MUDICHUR VILLAGE, INDIA.
Ganapathy Sankar U, Monisha R, Karthikeyan P.
ADHD is having increased recognition and it is a common psychiatric disorder which has its onset in childhood. However there is wide variation in prevalence percentage globally, the estimated prevalence quoted by the researchers is in the range of 5% to 7%. In Indian, the scenario of prevalence of ADHD falls around 5% to 20%. The aim of the current study is to examine the prevalence of ADHD in primary school children in Mudichur, India. This cross-sectional study was conducted among 200 children aged between 5 to 10 years (Grade 1 to 5). Prevalence estimate was collected using Swanson, Nolan and Pelham-IV rating scale (SNAP-IV). After obtaining informed consent signed from the parents and caregivers of children, the study was initiated. Results of the study prove that the prevalence rate of ADHD was 5%. These findings highlight the higher number of children had incidence of ADHD and it highlightsΓÇÖ the significance of screening the ADHD children at primary schools at an early age to plan interventions to rehabilitation children with ADHD

……..

J Am Acad Child Adolesc Psychiatry. 2021 Jan;60:1-2.
LESSONS FROM THE 1918 FLU PANDEMIC: A NOVEL ETIOLOGIC SUBTYPE OF ADHD?
Swanson JM, Volkow ND.
In 2009, Dr. Anthony Fauci stated, "The 1918-1919 influenza pandemic was a defining event in the history of public health."(1) In 2020, a popular medical website suggested that the 1918 pandemic may offer "lasting lessons for the world in the grip of COVID-19."(2) One lesson from the 1918 pandemic relates to residual long-term effects. In his influential book published in 1971, Minimal Brain Dysfunction in Children, Wender(3) reviewed historical accounts of the 1918 pandemic and suggested that viral infection had selective brain effects on catecholamine nuclei, and behavioral sequelae in some children emerged and overlapped with symptoms that now define attention-deficit/hyperactivity disorder (ADHD), and behavioral sequelae emerged in some adults that overlapped with symptoms of Parkinson's disease. Based on this and several excitotoxic models of behavioral disorders (ie, Volpe, Altman, Amsel, Benveniste, and Lou) related to arterial architecture and patterns of blood flow to the brain, previously our group(4) proposed etiologic subtypes of ADHD based on a dopamine-deficit hypothesis and assumption that dopamine neurons might be particularly sensitive to a variety of environmental insults. We speculate that residual effects of 2019 novel coronavirus disease (COVID-19) may selectively affect brain regions underlying attention and motivation deficits associated with ADHD, as documented by positron emission tomography imaging studies of adults (see Volkow etÂ al.(5)), which could increase risk for an infection-triggered etiologic subtype of ADHD

……..

J Am Acad Child Adolesc Psychiatry. 2021 Jan;60:2-6.

SUPPORTING CHILDREN WITH NEURODEVELOPMENTAL DISORDERS DURING THE COVID-19 PANDEMIC.

Summers J, Baribeau D, Mockford M, et al.

Families of children with neurodevelopmental disorders are especially vulnerable during the COVID-19 pandemic. Physical distancing requirements and closure of schools and services in the context of the COVID-19 pandemic are likely challenging to everyone but may be particularly impactful for families with children with neurodevelopmental disorders ([NDDs], eg, intellectual disability, attention-deficit/hyperactivity disorder [ADHD], autism spectrum disorder [ASD]). Although a small number of children may experience less stress or anxiety due to reduced social and academic expectations,(1) for many children with NDDs, and particularly those with ASD, carefully developed behavioral and environmental supports, and consistent and predictable routines and expectations, are vital for their mental well-being.(2) Consequently, abrupt discontinuation of these supports during quarantine and prolonged isolation creates a real risk for behavioral exacerbations in this vulnerable population.(3-6) Possible consequences for family members include physical and mental strain,(7) whereas for the child with an NDD, increased emotional distress and challenging behavior may create safety concerns and the need for hospitalization.(4,6) Children with NDDs may be at increased risk for COVID and COVID-related complications,(8) emphasizing the need for preventive and/or crisis behavioral health care availability outside of emergency and hospital settings

……..

J Abnorm Child Psychol. 2020 Dec;48:1543-53.

REAL-WORLD CHANGES IN ADOLESCENTS' ADHD SYMPTOMS WITHIN THE DAY AND ACROSS SCHOOL AND NON-SCHOOL DAYS.

Pedersen SL, Kennedy TM, Joseph HM, et al.

Research on attention-deficit/hyperactivity disorder (ADHD) points to the possibility that contextual factors (e.g., time of day, school vs. home) may be related to symptoms and impairment. This prior research has relied on laboratory-based or retrospective, global approaches which has limited ecological validity. The present study substantively contributes to the extant literature by examining adolescents' ADHD symptoms in the real world across the day on both school and non-school days to test whether symptoms worsened throughout the day and were higher on school days relative to non-school days. As part of a larger study, 83 adolescents taking stimulant medication for ADHD (Mage = 14.7, 66% identified as boys/men, 78% White) completed a 17-day ecological momentary assessment protocol that included wake-up and bedtime reports and two reports in the afternoon and evening. These assessments asked about ADHD symptoms and stimulant medication usage since the last report. Hypotheses were tested using multilevel modeling. Accounting for demographic covariates and medication usage, ADHD symptoms worsened quadratically, peaking by the afternoon report and subsequently declining, across school days but not non-school days. Mean-level ADHD symptoms were also worse on school days relative to non-school days. Results did not differ across gender. In conclusion, our study is the first to examine important environmental factors (school, time of day) in real time in relation to level of naturalistically occurring ADHD symptoms. Our findings highlight the importance of advancing treatments to support adolescents with ADHD on school days and in the afternoon

……..

J Abnorm Child Psychol. 2020 Dec;48:1529-42.

LONGITUDINAL TRAJECTORIES OF SUSTAINED ATTENTION DEVELOPMENT IN CHILDREN AND ADOLESCENTS WITH ADHD.

Thomson P, Vijayakumar N, Johnson KA, et al.

The present study characterizes changes in sustained attention ability over ages 9–14, and whether longitudinal trajectories of attention development differ between persistent ADHD, remitted ADHD and control groups. The Sustained Attention to Response Task (SART) was administered to 120 children with ADHD

and 123 controls on three occasions between ages 9 and 14. Trajectories of sustained attention development, indicated by changes in SART performance (standard deviation of response time [SDRT], omission errors, and ex-Gaussian parameters sigma and tau), were examined using generalized additive mixed models. For all measures there was a significant main effect of age; response time variability and number of omission errors improved linearly as children aged. However, children with ADHD had significantly greater SDRT, tau and omission errors than controls across waves. There were no significant group differences in sigma, indicating that the greater overall response time variability (SDRT) observed in ADHD was likely driven by more intermittent long responses (larger tau). Trajectories of sustained attention performance did not differ between children with persistent ADHD or ADHD in remission. Longitudinal trajectories of sustained attention development are comparable between ADHD and controls, however children with ADHD (regardless of remission status) display a performance deficit equivalent to typical controls 1–3 years younger. Findings highlight the need for continued clinical support for children in remission from ADHD and provide support for tau as an endophenotype of ADHD

……..

J Affective Disord. 2021 Jan;279:572-77.

ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER SYMPTOMS AND SUICIDAL IDEATION AMONG COLLEGE STUDENTS: A STRUCTURAL EQUATION MODELING APPROACH.

Zhong S, Lu L, Wilson A, et al.

Objective: Suicidal ideation (SI) among college students is frequently reported. However, the mediating roles of depressive and anxiety symptoms between attention-deficit/hyperactivity disorder (ADHD) symptoms and SI has yet to be explored among college students.

Method: A cross-sectional survey of college freshmen in China was conducted between October 2018 and December 2018. Standardized questionnaires were used to collect information on basic sociodemographic characteristics, including SI, ADHD symptoms, and anxiety and depressive symptoms. A structural equation model (SEM) was then constructed.

Results: A total of 904 college freshmen were included in the analysis. The prevalence of ADHD symptoms and lifetime SI were 11.9% (95% CI: 9.9%–14.2%) and 29.2% (95% CI: 26.3%–32.2%), respectively. The SEM revealed that there were no direct paths from inattention, executive dysfunction, and hyperactivity to SI. Under the mediating role of anxiety and depressive symptoms, executive dysfunction (ß = 0.011, $p < 0.05$) and hyperactivity (ß = 0.015, $p < 0.05$) had indirect relationships with the risk of SI, and the role of inattention was not identified. Depressive and anxiety symptoms had direct influences on increasing SI. There also were indirect effects from anxiety symptoms to SI, which were mediated by depressive symptoms (ß = 0.023, $p < 0.001$).

Conclusions: The current study indicated the indirect relationships between ADHD symptoms and SI among college freshmen. The findings could provide useful clues for clinical treatment and school-based prevention that aims to improve college students' mental well-being

……..

J Affective Disord. 2021;281:390-96.

THE ROLE OF NEONATAL VITAMIN D IN THE ASSOCIATION OF PRENATAL DEPRESSION WITH TODDLERS ADHD SYMPTOMS: A BIRTH COHORT STUDY.

Ma SS, Zhu DM, Yin WJ, et al.

Background: Vitamin D has been demonstrated a neuroprotective effect, but it is unclear whether early-life adequate vitamin D protect adverse neurodevelopment. We aimed to examine the role of neonatal vitamin D in the association of maternal depression (MD) symptoms with toddlers ADHD.

Methods: Participants included 1 125 mother-infant pairs from the China-Anhui Birth Cohort study. MD was assessed by the Center for Epidemiological Studies Depression Scale (CES-D) at 30-34 gestational weeks. Toddlers ADHD was reported by the Conners Hyperactivity Index (CHI) at 48-54 months postpartum. Multiple logistic regression models were performed to evaluate the association of maternal depressive score and toddlers ADHD while cord blood 25(OH)D levels were stratified.

Results: Toddlers of mothers with higher depression score were at higher risk of ADHD (20.1% vs 11.1%, P = 0.003; adjusted RR=1.75, 95% CI: 1.10-2.81). Among toddlers with neonatal vitamin D deficiency (VDD), ADHD risk was significantly increased with maternal MD (adjusted RR=3.74, 95% CI: 1.49-9.41), but the association was not found in toddlers with neonatal vitamin D adequacy (VDA). Compared to toddlers without MD, toddlers with both MD and neonatal VDD had higher risk of ADHD (adjusted RR=3.10, 95% CI: 1.44-6.63). But the risk did not significantly increase in toddlers with MD and neonatal VDA (adjusted RR=1.53, 95% CI: 0.86-2.72).
Limitations: Maternal depressive symptoms in early pregnancy and anxious symptoms were needed to include.
Conclusion: This prospective study indicated that the detrimental effect of maternal prenatal depressive symptoms on offspring's ADHD symptoms strengthened in toddlers with neonatal VDD

……..

J Child Psychol Psychiatry. 2020 Dec;61:1380-87.

MODERATE-TO-VIGOROUS PHYSICAL ACTIVITY AND PROCESSING SPEED: PREDICTING ADAPTIVE CHANGE IN ADHD LEVELS AND RELATED IMPAIRMENTS IN PRESCHOOLERS.

Hoza B, Shoulberg EK, Tompkins CL, et al.

Background: Preschool ADHD symptoms have predictive utility for later presence of ADHD diagnoses (Harvey, Youngwirth, Thakar, & Errazuriz, 2009, Journal of Consulting and Clinical Psychology, 77, 349; Lahey et al., 2004, American Journal of Psychiatry, 161(11), 2014), yet some level of inattention, hyperactivity, and impulsivity are present even in typically developing preschoolers. Physical activity (PA) is known to have a broad spectrum of positive effects on the brain in school-age typically developing children (Centers for Disease Control and Prevention, 2010, The association between school based physical activity, including physical education, and academic performance. Atlanta, GA: U.S. Department of Health and Human Services), including functions impaired by ADHD (Halperin, Berwid, & O'Neill, 2014, Child and Adolescent Psychiatric Clinics of North America, 23, 899), yet links between PA and ADHD levels and impairments have rarely been studied in either typically developing or at-risk preschool children. Importantly, impaired processing speed (PS), though not a symptom of ADHD, is a robust neuropsychological correlate (Willcutt & Bidwell, 2011, Treating attention deficit hyperactivity disorder: Assessment and intervention in developmental context. Kingston, NJ: Civic Research Institute) that may indicate additional risk for ADHD. Hence, we examined whether baseline PS moderates the association between preschoolers' PA, specifically moderate-to-vigorous PA (MVPA), and changes in ADHD levels and related behaviors.
Method: Eighty-five preschoolers (49.4% female; Mage = 4.14, SDage = .64) were drawn from a larger study of the effects of the Kiddie Children and Teachers (CATs) on the Move PA program on school readiness. The sample was largely Head Start eligible (68.2%) and ethnically diverse. Hierarchical regressions were utilized to examine links between MVPA, averaged over a school year, and changes in inattention (IA), hyperactivity/impulsivity (HI), oppositional behaviors, moodiness, and peer functioning, and whether these associations varied based on baseline PS.
Results: Results indicated that for IA, HI, and peer functioning, higher amounts of MVPA were associated with greater adaptive change for those with lower (but not higher) levels of PS.
Conclusions: Preschool MVPA may be a viable method of reducing ADHD levels and impairments for those with lower PS

……..

Journal of Diabetes. 2020.

ARE PSYCHIATRIC DISORDERS ASSOCIATED WITH THYROID HORMONE THERAPY IN ADOLESCENTS AND YOUNG ADULTS WITH TYPE 1 DIABETES?

Eckert A, Galler A, Papsch M, et al.

Background: To evaluate the association between thyroid autoimmunity and psychiatric disorders (depression, anxiety, eating disorder, schizophrenia or attention-deficit/hyperactivity disorder) among adolescents and young adults with type 1 diabetes (11-25 years).

Methods: We compared 9368 type 1 diabetes patients with thyroid autoimmunity (3789 of them treated with levothyroxine) with 62 438 type 1 diabetes patients without any thyroid disease from a multicentre diabetes patient follow-up registry (DPV) in terms of psychiatric disorders. Thyroid autoimmunity was defined as documented diagnosis of Hashimoto thyroiditis or positive antibodies against thyroid peroxidase or thyroglobulin. Multivariable logistic regression models were used to calculate odds ratios for the respective psychiatric disorders in type 1 diabetes patients with thyroid autoimmunity (overall and stratified by levothyroxine therapy) compared to type 1 diabetes patients without thyroid diseases (reference).
Results: Of the 9368 patients with thyroid autoimmunity, 62% were female with a median (Q1-Q3) age of 16.3 (14.2-17.6) years. Thyroid autoimmunity (with or without levothyroxine therapy) revealed a slight, but significant higher chance for depression (odds ratio [OR], 1.35, 95% confidence interval [CI], 1.19, 1.52), eating disorder (OR, 1.25, CI, 1.03, 1.51), attention-deficit/hyperactivity disorder (OR, 1.22, CI, 1.07, 1.39) and schizophrenia (OR, 1.63, CI, 1.04, 2.56). In individuals with prescribed levothyroxine therapy because of thyroid dysfunction significantly higher odds for depression (OR, 1.63, CI, 1.34, 1.99), anxiety (OR, 1.60, CI, 1.18, 2.18), and attention-deficit/hyperactivity disorder (OR, 1.71, CI, 1.38, 2.12) were observed compared to reference. Thyroid autoimmunity without required levothyroxine therapy revealed no differences to the reference group.
Conclusions: Patients on levothyroxine had significantly higher odds for psychiatric disorders, but thyroid autoimmunity in terms of high antibody levels only did not show higher odds for any psychiatric disorder

……..

J Neurodevelopmental Disord. 2021;13.

BEHAVIOURAL AND NEURAL MARKERS OF TACTILE SENSORY PROCESSING IN INFANTS AT ELEVATED LIKELIHOOD OF AUTISM SPECTRUM DISORDER AND/OR ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Piccardi ES, Begum Ali J, Jones EJH, et al.

Backgrounds: Atypicalities in tactile processing are reported in autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) but it remains unknown if they precede and associate with the traits of these disorders emerging in childhood. We investigated behavioural and neural markers of tactile sensory processing in infants at elevated likelihood of ASD and/or ADHD compared to infants at typical likelihood of the disorders. Further, we assessed the specificity of associations between infant markers and later ASD or ADHD traits.
Methods: Ninety-one 10-month-old infants participated in the study (n = 44 infants at elevated likelihood of ASD; n = 20 infants at elevated likelihood of ADHD; n = 9 infants at elevated likelihood of ASD and ADHD; n = 18 infants at typical likelihood of the disorders). Behavioural and EEG responses to pairs of tactile stimuli were experimentally recorded and concurrent parental reports of tactile responsiveness were collected. ASD and ADHD traits were measured at 24 months through standardized assessment (ADOS-2) and parental report (ECBQ), respectively.
Results: There was no effect of infantsΓÇÖ likelihood status on behavioural markers of tactile sensory processing. Conversely, increased ASD likelihood associated with reduced neural repetition suppression to tactile input. Reduced neural repetition suppression at 10 months significantly predicted ASD (but not ADHD) traits at 24 months across the entire sample. Elevated tactile sensory seeking at 10 months moderated the relationship between early reduced neural repetition suppression and later ASD traits.
Conclusions: Reduced tactile neural repetition suppression is an early marker of later ASD traits in infants at elevated likelihood of ASD or ADHD, suggesting that a common pathway to later ASD traits exists despite different familial backgrounds. Elevated tactile sensory seeking may act as a protective factor, mitigating the relationship between early tactile neural repetition suppression and later ASD traits

……..

J Neuropsychiatry Clin Neurosci. 2019;31:e7-e8.

MATERNAL PRE-ECLAMPSIA AND OFFSPRING ADHD AT 7 AND 10 YEARS: ALSPAC BIRTH COHORT STUDY.

Dachew BA, Scott JG, Mamun A, et al.

Background: Attention-deficit/hyperactivity disorder (ADHD) is a prevalent heterogeneous neurodevelopmental syndrome associated with various environmental factors.

Objective: This study examined the association between maternal preeclampsia and offspring ADHD at 7- and 10-years.

Methods: The study cohort consisted of more than 7,200 children who participated in Avon Longitudinal Study of Parents and Children (ALSPAC) birth cohort study. We used data from the Avon Longitudinal Study of Parents and Children (ALSPAC). ADHD was diagnosed using parent reported Development and Wellbeing Assessment (DAWBA). Logistic regression and Generalized Estimating Equation (GEE) models were used to examine the association between maternal preeclampsia and ADHD in offspring.

Results: The overall prevalence of ADHD was 2.04% and 1.62% at ages of 7 and 10 years, respectively. GEE analysis showed that pre-eclampsia was associated with increased risk of ADHD in offspring (adjusted odds ratio [OR] = 2.94, 95% confidence interval [CI]: 1.40-6.15). The results of multivariable logistic regression analysis at each time point also showed that preeclampsia almost threefold increase risk of ADHD.

Conclusion: This study suggests that offspring of mothers with pre-eclampsia are at increased risk of ADHD adding to the growing evidence that uterine environment is a critical determinant of neurodevelopmental outcome. If our findings are replicated by others, early screening for ADHD and other developmental delays may be recommended in offspring of women with pre-eclampsia

……

J Neuropsychiatry Clin Neurosci. 2020;32:e6-e7.

TRANSCRANIAL DIRECT CURRENT STIMULATION MODULATES DYSEXECUTIVE DEFICITS AND ITS NEUROPHYSIOLOGICAL SIGNATURES IN ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

Dubreuil-Vall L, Gomez-Bernal F, Villegas AC, et al.

Background: ADHD is a neurodevelopmental disorder associated with significant morbidity and mortality that affects 5% of children, adolescents and adults worldwide. Pharmacological and behavioral therapies exist, but critical symptoms such as dysexecutive deficits remain unaffected.

Objective: To assess the cognitive and physiological effects of transcranial Direct Current Stimulation (tDCS) in adult ADHD patients in order to understand (1) the role of dorsolateral prefrontal cortex (DLPFC) laterality in ADHD dysexecutive deficits, (2) the physiological dynamics sustaining the modulation of executive function by tDCS, and (3) the impact of baseline physiological state on tDCS modulation.

Methods: In a randomized, placebo-controlled, double-blind, cross-over study 40 adult ADHD patients performed three experimental sessions in which they received 30 minutes of 2mA tDCS stimulation targeting the left versus right DLPFC versus sham. Before and after each session, half of the participants completed the Flanker task (EFT) and the other half performed the Stop Signal Task (SST) while we assessed behavioral performance and EEG.

Results: Anodal tDCS to the left DLPFC modulated cognitive (reaction time) and physiological measures (P300) of cognitive control in the EFT in a state-dependent manner, but there were no significant effects in the Stop-SignalReaction-Time of the SST.

Conclusions: We describe procognitive effects in adult ADHD patients associated with the modulation of physiological signatures of cognitive control, linking target engagement with clinical benefit, providing mechanistic support for the state-dependent nature of tDCS, and providing empirical evidence of the value of the ERPs as cross-sectional biomarkers of cognitive performance

……

J Psychiatr Res. 2021;135:86-93.

ASSOCIATION BETWEEN COMT METHYLATION AND RESPONSE TO TREATMENT IN CHILDREN WITH ADHD.

Fageera W, Chaumette B, Fortier M+, et al.

Background: COMT had been considered a promising candidate gene in pharmacogenetic studies in ADHD; yet the findings from these studies have been inconsistent. Part of these inconsistencies could be related to epigenetic mechanisms (including DNA methylation). Here we investigated the role of genetic variants of the COMT gene on the methylation levels of CpG sites in the same gene and explored the effect of methylation on methylphenidate (MPH) and placebo (PBO) response in children with ADHD.

Methods: Two hundred and thirty children with ADHD (6-12 years) participated in a randomized, double-blind, placebo-controlled crossover trial with MPH. Univariate analysis was performed to examine the associations between genotypes in the COMT gene and DNA methylation in the same genetic loci. Association between the DNA methylation of 11 CpG sites and PBO/MPH responses were then assessed using spearman's correlation analysis in 212 children. Multiple linear regression analyses were performed to test the interaction between these factors while accounting for sex.

Results: Associations were observed between specific genetic variants and methylation level of cg20709110. Homozygous genotypes of GG (rs6269), CC (rs4633), GG (rs4818), Val/Val (rs4680) and the haplotype (ACCVal/GCGVal) were significantly associated with higher level of methylation. This CpG showed a significant correlation with placebo response ($r = 0.15$, $P = 0.045$) according to the teachers' evaluation, and a close-to significance correlation with response to MPH according to parents evaluation ($r = 0.134$, $p = 0.051$). Regression analysis showed that in the model including rs4818, sex and DNA methylation of cg20709110 contributed significantly to treatment response.

Conclusions: These preliminary results could provide evidence for the effect of genetic variations on methylation level and the involvement of the epigenetic variation of COMT loci in modulating the response to treatment in ADHD.

Trial registration: clinicaltrials.gov, number NCT00483106

……..

J Psychopathol Behav Assess. 2021.

NEGATIVE HALO EFFECTS IN PARENT RATINGS OF ADHD, ODD, AND CD.

Alacha HF, Lefler EK.

Attention-deficit/hyperactivity disorder (ADHD), Oppositional Defiant Disorder (ODD), and Conduct Disorder (CD) are highly comorbid, with symptoms that share some similarities. The evidence-based diagnostic process for these disorders includes ratings from adults in the childΓÇÖs life to assess behavior across settings, so it is important to understand how these raters think about potentially overlapping symptoms. Researchers have identified negative halo effects in ratings of ADHD and ODD symptoms, but ratings of CD have not been examined in these prior studies. Thus, the current study extended past research to examine negative halo effects in parent ratings of the predominantly hyperactive-impulsive presentation of ADHD (i.e., ADHD/HI), ODD, and CD. Parent participants read one of four vignettes that portrayed an 11-year-old boy displaying symptoms of ADHD/HI, ODD, CD, or typical development, and then completed a disruptive behavior scale. The general trend we found was that the presence of a relatively more severe disorder (i.e., CD) artificially inflated ratings of - or showed a negative halo effect for - the relatively less severe disorder (i.e., ADHD/HI), but with some nuance as discussed in the paper. These findings explain and validate how important it is that clinicians conduct evidence-based psychological assessments to decrease the chance of misdiagnosis

……..

J Psychopathol Behav Assess. 2021.

FACE MEMORY DEFICITS IN CHILDREN AND ADOLESCENTS WITH AUTISM SPECTRUM DISORDER .

Suri K, Lewis M, Minar N, et al.

Face memory is critical for social functioning. Our study examined whether children and adolescents with autism spectrum disorder (ASD) have a face memory deficit relative to those with attention deficit

hyperactivity disorder (ADHD), another commonly occurring neurodevelopmental condition that is associated with socio-emotional and cognitive deficits. Children and adolescents with ASD and ADHD as well as typically developing (TD) peers were randomly allocated to experimental conditions based on face-looking time during the learning phase of an assigned face memory task. Our goal was to determine whether children and adolescents with ASD would demonstrate poorer face memory skills than their ADHD and TD counterparts, and whether increased face-looking time would improve face memory in children and adolescents in these three diagnostic categories. Results revealed that children and adolescents with ASD exhibit a face memory deficit compared to their ADHD and TD peers that does not improve even after increasing the duration of time spent looking at faces

……..

J Psychosom Res. 2021;141.

ATTENTION DEFICIT HYPERACTIVITY DISORDER IN FIRST- AND SECOND-GENERATION IMMIGRANT CHILDREN AND ADOLESCENTS: A NATIONWIDE COHORT STUDY IN SWEDEN.

Osooli M, Ohlsson H, Sundquist J, et al.

Background: Studies on the incidence of Attention Deficit Hyperactivity Disorder (ADHD) among immigrant children and adolescents is limited and results are mixed. The aim of this study was to compare the ADHD risk between first- and second-generation immigrants aged 4-16 years and their native peers in Sweden.

Methods: This was an open nationwide retrospective cohort study. We included 1,902,526 native and 805,450 children and adolescents with an immigrant background, born 1987-2010, and aged 4-16 years at baseline. We identified participants using national population data and participants were observed until they received an ADHD diagnosis in the National Patient Register, turned 18 years, migrated, died, or until the end of the study, whichever came first. ADHD risks were adjusted for birth year and age and maternal income at baseline.

Results: For both males and females, the ADHD risk was lower among most immigrant groups. However, the combination of a Swedish-born mother and foreign-born father was associated with an increased risk of ADHD. The ADHD risk varied substantially between immigrants from different regions of the world. For example, immigrants from other Scandinavian countries, North America, and Latin America and the Caribbean had higher rates of ADHD compared with natives.

Conclusions: Future research should examine the underlying factors behind the differences in ADHD risks between certain immigrant subgroups and natives, such as family structure, cultural and language barriers and potential differences in health care utilization among immigrant families

……..

J Sleep Res. 2020;29.

AMBULATORY EEG-MEASURED SLEEP ASSOCIATED WITH ATTENTION-DEFICIT/ HYPERACTIVITY DISORDER SYMPTOM SEVERITY AMONG ADOLESCENTS.

Lunsford-Avery J, Kollins S, Keller C, et al.

Objectives/Introduction: Sleep disturbances are prevalent in ADHD; however, little is known about sleep and ADHD in adolescence, a period characterized by shifts in sleep behavior and physiology. Additionally, although sleep may be integrally tied to ADHD, sleep is rarely adequately assessed in psychiatric care settings, partly due to cost, inconvenience, and/or inaccessibility associated with objective assessments (e.g., polysomnography). This study is the first to examine associations between sleep and ADHD among adolescents using self-administered, at-home sleep-EEG.

Methods: Ninety adolescents (mean age = 14.34, 49% female, 37% minority race/ethnicity, 24% ADHD) completed 7 nights of sleep-EEG (via Zmachine Insight+) and a self-report of ADHD severity (Youth Self Report; YSR). Parents/guardians reported adolescents' psychiatric diagnosis history. Sleep-EEG was self-administered by adolescents each evening before bed and removed upon waking. Regressions covarying for age, sex, and race/ethnicity examined (1) associations between sleep-EEG (averaged total sleep time (TST), efficiency (SE), wake after sleep onset (WASO), sleep-onset latency (SOL), deep sleep, rapid eye movements (REM), time spent out of bed (TSOB)) and ADHD severity in the full sample and (2) group

differences in sleep-EEG between adolescents with and without ADHD. Results: Lower SE (F(4,85) = 4.26, p = 0.04) and greater SOL (F(4,85) = 7.27, p = 0.01) and TSOB (F(4,85) = 10.58, p = 0.002) were associated with increased ADHD severity. In addition, reduced deep sleep trended toward an association with greater ADHD severity (F(4,85) = 2.99, p = 0.09). TST, WASO, and REM were not associated with ADHD severity (p's> 0.10). Adolescents with ADHD displayed reduced SE (F(4, 85) = 4.49, p = 0.04) and greater SOL (F(4,85) = 4.08, p < 0.05), compared to adolescents without ADHD. No other group differences were observed (p's> .05).
Conclusions: Specific sleep-EEG indices (decreased SE, increased SOL) are associated with ADHD severity and diagnosis among adolescents using self-administered, at-home sleep-EEG. Results suggest that sleep may play a role in adolescent ADHD, or alternatively, ADHD symptoms may contribute to sleep difficulties. Findings also suggest that self-administered sleep-EEG may be a useful tool for assessing ADHD-related sleep difficulties in routine health care settings. Future studies may assess whether interventions targeting SE and SOL (e.g., cognitive-behavioral therapy for insomnia) may improve ADHD outcomes among adolescents

……..

J Sleep Res. 2020;29.

ARE THERE SLEEP RELATED DIFFERENCES IN THE NEUROTRANSMITTERS GLUTAMATE AND GABA BETWEEN TYPICAL DEVELOPING CHILDREN AND CHILDREN WITH ADHD?

Volk C, Jaramillo V, Furrer M, et al.

Objectives/Introduction The balance between the neurotransmitters Glutamate and GABA is important for healthy brain development. The concentrations change across the lifespan. Children with ADHD depict altered levels in both GABA and Glutamate compared to their healthy peers. Sleep has been shown to be significantly involved in the regulation of these neurotransmitters. The goal of this project is to investigate the sleep-related processes that underpin the (im)balances between Glutamate and GABA in healthy children and children with ADHD. More specifically, we investigated if overnight changes in these metabolites are 1) associated with electrophysiological markers of sleep quality (slow wave activity, SWA) and 2) linked to the sleep-related brain clearance system by means of changes in CSF flow within the cerebral aqueduct.
Methods: Subjects comprise 15 children/adolescents with ADHD and 26 healthy controls (age 8-17 years). MRI sequences included magnetic resonance spectroscopy (MRS), T1-weighted scans and a phase contrast sequence. All scans were performed in the evening after a day of wakefulness and in the morning after a night of sleep. The night in-between was recorded with EEG.
Results: Our preliminary analysis focused on GLX. Children with ADHD depict higher levels of GLX in the evening (t = -3.4, p = 0.01) compared to healthy controls. No differences between the groups were present in the morning (p = 0.6). The direction of GLX changes differed between the groups (z = -2.7, p = 0.03, ADHD = -6.6%, healthy controls= +2.8%). Changes in GLX were not associated with SWA in healthy children (p = 0.3) and children with ADHD (p = 0.9).
Conclusions: These results suggest that children with ADHD present different dynamics of GLX across sleep and wake. The complete data set (including CSF flow) might elucidate if these differences are fostered by an alteration in the sleep related clearance system of the brain

……..

J Sleep Res. 2020;29.

SLEEP AND THE ADHD BRAIN IN CHILDREN: DYSREGULATED, VULNERABLE, INATTENTIVE.

Saletin J, Koopman-Verhoeff ME, Dickstein D, et al.

Introduction: Attention-deficit- hyperactivity- disorder (ADHD) is a common disorder of childhood and associated with sleep dysregulation. How sleep patterns are expressed in ADHD, and how ADHD and sleep interact to moderate inattention, impulsivity and associated brain outcomes is unknown.
Objectives: Here, we present preliminary evidence highlighting the neural vulnerability of those with ADHD to sleep-loss.
Aims: This symposium will present data from four distinct sources.

Methods: (1) A published laboratory study of overnight memory consolidation in 21 children (7 with ADHD) investigated how sleep benefits cognition in this disorder; (2) An ALE meta-analysis of 134 fMRI articles investigated whether ADHD and sleep-loss share common neural effects; (3) A pilot study of 12 weeks of actigraphy in 13 children (8F; 12.6 -¦ 0.7 y) investigated how sleep patterns are expressed across ADHD symptoms; and (4) An ongoing study of acute-sleep loss on sleep EEG and functional MRI outcomes of inhibition and resting state connectivity) in children ages 10-13 across a range of ADHD symptom severity.
Results: (1) Children with ADHD had diminished EEG sleep spindle activity (power in Stage 2; 12-13.5 Hz) compared to typically developing controls ($t(19) = -2.48$; $p = 0.023$; $d = -1.15$); the same EEG power was associated with memory improvement ($b = 8.71$; $p < 0.001$) in the ADHD group alone. (2) Our meta-analysis revealed that ADHD and experimental sleep-loss share reductions in activation within inhibitory-control networks: dorsal anterior cingulate (dACC) and middle/inferior frontal (M/IFG) cortices ($p < 0.005$; $k = 20$ mm). (3) Hyperactivity-symptoms were associated with irregular sleep patterns ($b = -0.0025$; $p = 0.032$). (4) Following 5.5 hours of wake extension those with higher hyperactivity experienced greater reductions in inhibition-related activation in the aforementioned dACC ($p < 0.005$; $k = 20$ mm), together with greater reductions in resting default-mode connectivity ($r = -0.69$; $p = 0.008$).
Conclusions: These results support a new appreciation for sleep in ADHD. First, sleep physiology may support healthy cognitive brain function in these children. Second, ADHD and sleep-loss share common reductions in inhibition-related brain activation. Third, ADHD-symptoms index greater dysregulation of sleep across 12-weeks of monitoring. Finally, more severe symptoms were associated with vulnerability to sleep loss. Ultimately, more focus is needed on supporting sleep in children with ADHD to mitigate these effects

……..

J Sleep Res. 2021.
SLEEP, ACADEMIC ACHIEVEMENT, AND COGNITIVE PERFORMANCE IN CHILDREN WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER: A POLYSOMNOGRAPHIC STUDY.
Ruiz-Herrera N, et al.
The objective of this study was to examine the influence of parent-reported and polysomnography (PSG)-measured sleep patterns on the academic and cognitive performance of children with attention-deficit hyperactivity disorder (ADHD). We assessed 91 children (18 girls) diagnosed with ADHD aged 7ΓÇô11-áyears (29 ADHD-Inattentive, 32 ADHD-Hyperactive/Impulsive, and 31 ADHD-Combined). The Paediatric Sleep Questionnaire (PSQ) and Paediatric Daytime Sleepiness Scale (PDSS) were used to assess subjective sleep quality, as perceived by parents, and objective sleep variables were assessed by PSG. Cognitive performance was evaluated using the Wechsler Intelligence Scale for Children (WISC), and the final average grade of the last school year was used as a measure of academic performance. Academic performance was predicted by the following sleep variables: Sleep time, time in bed, night awakenings, and daytime sleepiness. The best predictors of cognitive performance in children with ADHD were rapid eye movement latency, light sleep, periodic limb movements index (PLMs), awakenings, and daytime sleepiness. In conclusion, sleep parameters are closely associated with the academic and cognitive functioning of children with ADHD

……..

J Am Acad Child Adolesc Psychiatry. 2021;60:46-60.
AN UPDATED SYSTEMATIC REVIEW AND META-REGRESSION ANALYSIS: MENTAL DISORDERS AMONG ADOLESCENTS IN JUVENILE DETENTION AND CORRECTIONAL FACILITIES.
Beaudry G, Yu R, L+Ñngstr+Âm N, et al.
Objective: To synthesize evidence on the prevalence of mental disorders in adolescents in juvenile detention and correctional facilities and examine sources of heterogeneity between studies.
Method: Electronic databases and relevant reference lists were searched to identify surveys published from January 1966 to October 2019 that reported on the prevalence of mental disorders in unselected populations of detained adolescents. Data on the prevalence of a range of mental disorders (psychotic illnesses, major depression, attention-deficit/hyperactivity disorder [ADHD], conduct disorder, and posttraumatic stress

disorder [PTSD]) along with predetermined study characteristics were extracted from the eligible studies. Analyses were reported separately for male and female adolescents, and findings were synthesized using random-effects models. Potential sources of heterogeneity were examined by meta-regression and subgroup analyses.
Results: Forty-seven studies from 19 countries comprising 28,033 male and 4,754 female adolescents were identified. The mean age of adolescents assessed was 16 years (range, 10ΓÇô19 years). In male adolescents, 2.7% (95% CI 2.0% 3.4%) had a diagnosis of psychotic illness; 10.1% (95% CI 8.1% 12.2%) major depression; 17.3% (95% CI 13.9% 20.7%) ADHD; 61.7% (95% CI 55.4%67.9%) condu ct disorder; and 8.6% (95% CI 6.4% 10.7%) PTSD. In female adolescents, 2.9% (95% CI 2.4% 3.5%) had a psychotic illness; 25.8% (95% CI 20.3% 31.3%) major depression; 17.5% (95% CI 12.1% 22.9%) ADHD; 59.0% (95% CI 44.9% 73.1%) conduct disorder; and 18.2% (95% CI 13.1% 23.2%) PTSD. Meta-regression found higher prevalences of ADHD and conduct disorder in investigations published after 2006. Female adolescents had higher prevalences of major depression and PTSD than male adolescents.
Conclusion: Consideration should be given to reviewing whether health care services in juvenile detention can address these levels of psychiatric morbidity

……

J Am Acad Child Adolesc Psychiatry. 2021;60:166-75.
CONTEXT-SPECIFIC DYADIC ATTENTION VULNERABILITIES DURING THE FIRST YEAR IN INFANTS LATER DEVELOPING AUTISM SPECTRUM DISORDER.
Macari S, Milgramm A, Reed J, et al.
Objective: Although some eye-tracking studies demonstrate atypical attention to faces by 6 months of age in autism spectrum disorder (ASD), behavioral studies in early infancy return largely negative results. We examined the effects of context and diagnosis on attention to faces during face-to-face live interactions in infants at high familial risk (HR) and low familial risk (LR) for ASD.
Method: Participants were 6-, 9-, and 12-month-old siblings of children with ASD who were later determined to have ASD (n = 21), other developmental challenges (HR-C; n = 74), or typical development (TD) (HR-TD; n = 32), and low-risk, typically developing controls (LR-TD; n = 49). Infants were administered the social orienting probes task, consisting of five conditions: dyadic bid, song, peek-a-boo, tickle, and toy play. Attention to an unfamiliar examiner's face was coded by blinded raters from video recordings.
Results: At all ages, the ASD group spent less time looking at the examiner's face than the HR-C, HR-TD, and LR-TD groups during the Dyadic Bid and Tickle conditions (all p <.05), but not during the Song, Peek-a-Boo, or Toy Play conditions (all p >.23). Lower attention to faces during Dyadic Bid and Tickle conditions was significantly correlated with higher severity of autism symptoms at 18 months.
Conclusion: During the prodromal stages of the disorder, infants with ASD exhibited subtle impairments in attention to faces of interactive partners during interactions involving eye contact and child-directed speech (with and without physical contact), but not in contexts involving singing, familiar anticipatory games, or toy play. Considering the convergence with eye-tracking findings on limited attention to faces in infants later diagnosed with ASD, reduced attention to faces of interactive partners in specific contexts may constitute a promising candidate behavioral marker of ASD in infancy

……

J Am Acad Child Adolesc Psychiatry. 2021;60:142-51.
MATERNAL VITAMIN D LEVELS AND THE RISK OF OFFSPRING ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.
Sucksdorff M, Brown AS, Chudal R, et al.
Objective: Recent evidence has highlighted the importance of vitamin D in the development of the central nervous system. Some studies have shown an association between maternal vitamin D deficiency during pregnancy and offspring attention-deficit/hyperactivity disorder (ADHD) symptoms based on parent or teacher ratings. There are no previous studies on early pregnancy 25-hydroxyvitamin D [25(OH)D] levels and the risk of diagnosed offspring ADHD. Our aim was to examine maternal 25(OH)D levels in early pregnancy and offspring ADHD.

Method: In this nationwide population-based case-control study, 1,067 ADHD cases (born between 1998 and 1999 and diagnosed according to the International Classification of Diseases) and 1,067 matched controls were identified from Finnish registers. Maternal 25(OH)D levels were measured using quantitative immunoassay from maternal sera, collected during the first trimester and archived in the national biobank. Conditional logistic regression was used to examine the association between maternal 25(OH)D and offspring ADHD.
Results: There was a significant association between decreasing log-transformed maternal 25(OH)D levels and offspring ADHD both in the unadjusted analyses (odds ratio 1.65; 95% CI 1.33ΓÇô2.05; p <. 001) and in the analyses adjusting for maternal socioeconomic status and age (odds ratio 1.45; 95% CI 1.15 1.81; p = .002). Analyses by quintiles of maternal 25(OH)D levels in the lowest versus highest quintile revealed an adjusted odds ratio for offspring ADHD of 1.53 (95% CI 1.11ΓÇô2.12; p = .010).
Conclusion: This study demonstrated an association between low maternal 25(OH)D during pregnancy and an elevated risk for offspring ADHD. If replicated in independent samples, this finding may have significant public health implications

……..

Mayo Clin Proc. 2021 Jan;96:66-77.
ASSOCIATION OF INFANT ANTIBIOTIC EXPOSURE WITH CHILDHOOD HEALTH OUTCOMES.
Aversa Z, Atkinson EJ, Schafer MJ, et al.
OBJECTIVE: To investigate the extent to which antibiotic exposure in the first 2 years of life is associated with the risk of immunological, metabolic, and neurobehavioral health conditions with childhood onset.
PATIENTS AND METHODS: In this population-based cohort study, we identified all children born in Olmsted County, Minnesota, between January 1, 2003, and December 31, 2011, through the Rochester Epidemiology Project medical records-linkage system. Demographic characteristics, antibiotic prescriptions, and diagnostic codes through June 30, 2017, were retrieved using the Rochester Epidemiology Project infrastructure. Time-to-event analysis was performed to assess the impact of antibiotic exposure on the risk of several adverse health conditions.
RESULTS: This study included 14,572 children (7026 girls and 7546 boys), of whom 70% (10,220) received at least 1 antibiotic prescription during the first 2 years of life. Early antibiotic exposure was associated with an increased risk of childhood-onset asthma, allergic rhinitis, atopic dermatitis, celiac disease, overweight, obesity, and attention deficit hyperactivity disorder (hazard ratios ranging from 1.20 to 2.89; P<.05 for all). The associations were influenced by the number, type, and timing of antibiotic exposure. Moreover, children exposed to antibiotics had a higher probability of having combinations of conditions, particularly when given multiple prescriptions.
CONCLUSION: The present study finds significant associations between early life antibiotic exposure and several distinct health conditions with childhood onset. Additional research is warranted to establish practical guidelines to optimize the benefit and minimize the risk of antibiotics in children

……..

Mental Health and Physical Activity. 2021;20.
THE EFFECT OF PHYSICAL ACTIVITY INTERVENTIONS ON EXECUTIVE FUNCTIONS IN CHILDREN WITH ADHD: A SYSTEMATIC REVIEW AND META-ANALYSIS.
Welsch L, Alliott O, Kelly P, et al.
Background: Attention-deficit hyperactivity disorder (ADHD) is a commonly diagnosed behavioral disorder in school-aged children. A core symptom of ADHD is difficulties with executive functions (EF). Physical activity (PA) interventions are proposed to be a valuable addition to traditional treatment approaches for ADHD. This systematic review examined the evidence for the effect of chronic PA on EF, specifically, inhibition, shifting, working memory, and attention in children with ADHD compared to no treatment. The moderating impact of PA cognitive demand and methylphenidate (MPH) treatment on the effect of PA interventions on EF was also examined.

Methods: A systematic review and meta-analyses were conducted following the Cochrane Guidelines for Systematic Reviews. A protocol was published with PROSPERO (CRD42018099617); seven databases were searched, and 3690 results screened by two independent researchers. Based on inclusion and exclusion criteria, 12 eligible studies were included, and separate meta-analyses were conducted for each EF domain, each including subgroups of high vs low cognitive demand, and MPH-intake vs. MPH-free.
Results: Results showed beneficial effects of PA for all EF, with 95%-CI compatible with positive effects for shifting (SMD = 1.58; 95%-CI [3.12; 0.04]) and working memory (SMD = 0.99; 95%-CI [01.80; 0.18])only. Cognitive demand of PA differed in its impact depending on the domain of EF. Benefits of PA were lesser in those taking MPH, though subgroup differences were statistically non-significant.
Conclusion: Children with ADHD benefit from PA leading to enhanced executive functioning performance. However, the cognitive demands of the PA need to be considered when contemplating PA as an adjunctive treatment option

……..

Neurocase. 2020 Dec;26:360-63.
CASE REPORT: DIAGNOSIS AND TREATMENT OF ATTENTION DEFICIT HYPERACTIVITY DISORDER AND AUTISM SPECTRUM DISORDER IN PATIENTS DIAGNOSED WITH OCULOCUTANEOUS ALBINISM.
Ünsel Bolat G.
Oculocutaneous albinism (OCA) is a group of autosomal recessive disorders characterized by impairment in the melanin synthesis. We report two siblings with OCA who presented with symptoms of autism spectrum disorder and attention deficit hyperactivity disorder (ADHD). Ocular side effects occured after methylphenidate (MPH) treatment in the patient with ADHD and OCA. The diagnosis of OCA has been associated with difficulties in academic and social fields due to decreased visual activity and differentiation of phenotypic characteristics. Delayed diagnosis of comorbid neuropsychiatric disorders and MPH therapy may increase these difficulties. Patients with OCA require careful evaluation and treatment for neuropsychiatric disorders. (PsycInfo Database Record (c) 2021 APA, all rights reserved)

……..

Neuropediatrics. 2021.
CLINICAL CONUNDRUMS WHEN INTEGRATING THE QBTEST INTO A STANDARD ADHD ASSESSMENT OF CHILDREN AND YOUNG PEOPLE.
Vogt C.
The uptake of the QbTest in clinical practice is increasing and has recently been supported by research evidence proposing its effectiveness in relation to clinical decision-making. However, the exact underlying process leading to this clinical benefit is currently not well established and requires further clarification. For the clinician, certain challenges arise when adding the QbTest as a novel method to standard clinical practice, such as having the skills required to interpret neuropsychological test information and assess for diagnostically relevant neurocognitive domains that are related to attention-deficit hyperactivity disorder (ADHD), or how neurocognitive domains express themselves within the behavioral classifications of ADHD and how the quantitative measurement of activity in a laboratory setting compares with real-life (ecological validity) situations as well as the impact of comorbidity on test results. This article aims to address these clinical conundrums in aid of developing a consistent approach and future guidelines in clinical practice

……..

Neurosci Biobehav Rev. 2021;121:307-45.
COGNITIVE MECHANISMS UNDERLYING DEPRESSIVE DISORDERS IN ADHD: A SYSTEMATIC REVIEW.
Mayer JS, Bernhard A, Fann N, et al.
The risk for major depressive disorder (MDD) is considerably increased in young adults with attention-deficit/hyperactivity disorder (ADHD) but underlying mechanisms are poorly understood. This review explores ADHD-specific neurocognitive impairments as possible underlying mechanisms for ADHD-

depression comorbidity. Two systematic literature searches were conducted in EBSCOhost, PubMED, and Cochrane Reviews databases according to PRISMA guidelines. The first search identified 18 meta-analyses of cross-sectional and longitudinal studies on cognitive dysfunctions in MDD across the lifespan. The second search identified six original studies on reaction time variability in MDD. During acute depression, children and adults showed cognitive deficits that overlapped with some of the ADHD-related impairments. Findings from remitted patients, high-risk individuals, and few prospective studies suggest that a subset of these shared impairments, specifically executive dysfunctions (selective attention, verbal fluency, working memory) and long-term memory problems, are candidate pre-existing risk markers of depression. We discuss if and how these specific neurocognitive mechanisms may mediate developmental pathways from ADHD to depression. If replicated by longitudinal studies, these findings may guide future prevention strategies

……..

Nord J Psychiatry. 2020.

DRUG HOLIDAYS MAY NOT AFFECT PROCESSING SPEED WHILE THEY MAY REDUCE BENEFICIAL EFFECTS ON RESISTANCE TO INTERFERENCE AMONG CHILDREN WITH TREATED WITH METHYLPHENIDATE: A SINGLE-CENTER, PROSPECTIVE STUDY.

Gol Ozcan G, et al.

Objective: This study aimed to investigate the effects of drug holidays during summer vacations among children with attention deficit/hyperactivity disorder (ADHD) who were treated with methylphenidate in terms of ADHD symptoms and executive functions.

Methods: The study was a prospective cohort study that includes pre-treatment, post-treatment and post-drug holiday evaluations. ADHD symptom severity was evaluated with the Clinical Global Impression Scale (CGI), the Conners Parental Rating Scale-Short Form (CPRS) and the Conners Teacher Rating Scale- Short Form (CTRS). The Stroop Color Word Test- TBAG Form (SCWT) was used to evaluate executive functions. Fifty-one patients participated in the study according to the inclusion and exclusion criteria. Methylphenidate (MPH) was started at 0.5 mg/kg/day and titrated weekly to a maximum of 1.2 mg/kg/day. During the follow-up period, 22 (43.0%) of the patients stopped treatment.

Results: Completion times for all SCWT subtests were significantly reduced after treatment ($p < 0.001$, $p = 0.002$, $p < 0.001$, $p = 0.002$, $p < 0.001$; respectively). Mean number of corrections in SCWT-3 and mean number of errors as well as corrections in SCWT-5 significantly reduced after treatment ($p = 0.047$, $p = 0.005$, $p = 0.007$; respectively). Mean number of corrections in SCWT-3 and mean number of errors in SCWT-5 increased significantly after drug holiday compared to post-treatment ($p = 0.032$ and $p = 0.037$; respectively).

Conclusion: Our results suggest that psychomotor speed and resistance to interference improved in children with ADHD receiving methylphenidate treatment. Drug holidays did not affect psychomotor speed while beneficial effects on resistance to interference were reduced with drug holidays

……..

Nord J Psychiatry. 2021.

INCREASED CEREBRAL BLOOD FLOW IN THE RIGHT ANTERIOR CINGULATE CORTEX AND FRONTO-ORBITAL CORTEX DURING GO/NO-GO TASK IN CHILDREN WITH ADHD.

Baytunca MB, de Frederick B, Bolat GU, et al.

Objective: Arterial spin labeling (ASL) is a relatively new imaging modality in the field of the cognitive neuroscience. In the present study, we aimed to compare the dynamic regional cerebral blood flow alterations of children with ADHD and healthy controls during a neurocognitive task by using event-related ASL scanning.

Methods: The study comprised of 17 healthy controls and 20 children with ADHD. The study subjects were scanned on 3 Tesla MRI scanner to obtain ASL imaging data. Subjects performed go/no-go task during the ASL image acquisition. The image analyses were performed by FEAT (fMRI Expert Analysis Tool) Version 6.

Results: The mean age was 10.88 -¦ 1.45 and 11 -¦ 1.91 for the control and ADHD group, respectively ($p = .112$). The go/no-go task was utilized during the ASL scanning. The right anterior cingulate cortex (BA32)

extending into the frontopolar and orbitofrontal cortices (BA10 and 11) displayed greater activation in ADHD children relative to the control counterparts (p <.001). With a lenient significance threshold, greater activation was revealed in the right-sided frontoparietal regions during the go session, and in the left precuneus during the no-go session.
Conclusion: These results indicate that children with ADHD needed to over-activate frontopolar cortex, anterior cingulate as well as the dorsal and ventral attention networks to compensate for the attention demanded in a given cognitive task

……..

Pediatr Ann. 2020;49:e501-e505.
FOCUSING ON ADHD MANAGEMENT.
Liu A.
Attention-deficit/hyperactivity disorder (ADHD) is the most common neurodevel-opmental disorder in children, and it affects academic performance, personal relation-ships, and future well-being. Given the prevalence of ADHD, many pediatricians should feel comfortable with the diagnosis and management of this condition. This article aims to improve understanding of ADHD, treatment options including both medication and behavioral interventions, as well as the laws in place to help these patients

……..

Psychiatr Invest. 2020;17:1236-43.
A PILOT STUDY EVALUATING THE EFFECTIVENESS OF SYSTEM-WIDE POSITIVE BEHAVIOR SUPPORT FOR INSTITUTIONALIZED ORPHANS IN SOUTH KOREA.
Kim Y, Park Y.
Objective In South Korea, the placement of orphans in institutions is still common, despite evidence of its adverse influence on chil-dren's psychological, emotional, physical, and cognitive development. In this preliminary study, we evaluate whether system-wide positive behavior support (SWPBS) is effective for decreasing externalizing problems in institutionalized children.
Methods SWPBS was provided for one month to 36 school-aged boys who had lived in an orphanage for an average of 8.72 years (SD=2.52), along with their 10 caregivers. Direct observation of the frequency of target behaviors in the participating children, caregiv-ers ratings of the severity of children's problematic behaviors, self-reported caregiving stress (i.e., Parenting Stress Scale), and intervention fidelity were dependent variables.
Results After receiving SWPBS, the frequency of problematic behaviors in the participating children showed a mean decrease of 73.6%. The caregivers also reported seeing a decrease in the severity of their children's problematic behaviors after SWPBS compared to before.
Conclusion SWPBS may be a promising intervention to decrease externalizing behaviors in school-aged children who have been liv-ing in institutions for a long time and have shown mental health issues

……..

Psychiatry Res. 2020;294.
THE PREVALENCE OF ADHD SYMPTOMS IN UNIVERSITY STUDENTS: A DESCRIPTIVE, CROSS-SECTIONAL STUDY.
Roshani F, Piri R, Fathabadipour S, et al.

……..

Psychiatry Res. 2021;296.

EARLY RESPONSE TO SPN-812 (VILOXAZINE EXTENDED-RELEASE) CAN PREDICT EFFICACY OUTCOME IN PEDIATRIC SUBJECTS WITH ADHD: A MACHINE LEARNING POST-HOC ANALYSIS OF FOUR RANDOMIZED CLINICAL TRIALS.

Faraone SV, Gomeni R, Hull JT, et al.

Machine learning (ML) was used to determine whether early response can predict efficacy outcome in pediatric subjects with ADHD treated with SPN-812. We used data from four Phase 3 placebo-controlled trials of 100- to 600-mg/day SPN-812 (N=1397; 6ΓÇô17 years of age). The treatment response was defined as having a 50% reduction in change from baseline (CFB) in ADHD Rating Scale-5 (ADHD-RS-5) Total score at Week 6. The variables used were: ADHD-RS-5 Total score, age, body weight, and body mass index at baseline; CFB ADHD-RS-5 Total score at Week 1, cumulative change in ADHD-RS-5 Total score at Week 2, and cumulative change in ADHD-RS-5 Total score at Week 3; Clinical Global Impressions-Improvement (CGI-I) score at Week 1, 2, and 3; and target dose. Using the best selected model, lasso regression, to generate importance scores, we found that change in ADHD-RS-5 Total score and CGI-I score were the best predictors of efficacy outcome. Change in ADHD-RS-5 Total score at Week 2 could predict treatment response at Week 6 (75% positive predictive power, 75% sensitivity, 74% specificity). Therefore, early response after two weeks of treatment with once-daily SPN-812 in pediatric patients with ADHD can predict efficacy outcome at Week 6

……..

Psychiatry Res. 2021;296.

IDENTIFYING THE IMPACT OF THE CONFINEMENT OF COVID-19 ON EMOTIONAL-MOOD AND BEHAVIOURAL DIMENSIONS IN CHILDREN AND ADOLESCENTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD).

Melegari MG, Giallonardo M, Sacco R, et al.

The current study examined the impact of the lockdown due to the Covid-19 disease on mood state and behaviours of children and adolescents with ADHD. Nine hundred ninety-two parents of children and adolescents with ADHD filled out an anonymous online survey through the ADHD family association website. The survey investigated the degree of severity of six emotional and mood states (sadness, boredom, little enjoyment/interest, irritability, temper tantrums, anxiety) and five disrupted behaviours (verbal and physical aggression, argument, opposition, restlessness) based on their frequency/week (absent; low: 1ΓÇô2 days/week; moderate: 3ΓÇô4 days/week; severe: 5ΓÇô7 days/week) before and during the lockdown. Important fluctuations were found in all dimensions during the lockdown independently by the severity degree. Subjects with previous low severity degree of these behaviors significantly worsened in almost all dimensions during the lockdown. On the contrary, ADHD patients with moderate and severe degree showed important improvement during the lockdown. Little enjoyment/interests and boredom resulted the dimensions more strongly affected by the condition of restriction, overall in children. Children vs. adolescents showed substantially similar trend but the former resulted significantly more vulnerable to emotive changes. The results provided both the individuation of domains affected, and the indirect benefits produced by restriction condition

……..

Res Dev Disabil. 2020;107.

BARRIERS AND FACILITATORS TO TREATING INSOMNIA IN CHILDREN WITH AUTISM SPECTRUM DISORDER AND OTHER NEURODEVELOPMENTAL DISORDERS: PARENT AND HEALTH CARE PROFESSIONAL PERSPECTIVES.

Tan-MacNeill KM, Smith IM, Jemcov A, et al.

Background/aims: Insomnia is highly prevalent in children with neurodevelopmental disorders (NDDs), yet little research exists on sleep treatment access, utilization, and provision in this population. This study explores barriers and facilitators to access, use, and provision of treatment for sleep problems as experienced by parents of children with NDDs, including Autism Spectrum Disorder (ASD), Attention-Deficit/Hyperactivity Disorder (ADHD), Cerebral Palsy (CP) and Fetal Alcohol Spectrum Disorder (FASD), and health care professionals who work with children with these conditions.

Method: Transcripts from online focus groups and interviews, conducted separately with parents of children with NDDs (n = 43) and health care professionals (n = 44), were qualitatively analyzed using content analysis for key themes.
Results: Barriers included limited access to/availability of treatment, lack of knowledge/training, NDD-specific factors (e.g., symptoms, medications, and comorbidities), parent factors (e.g., capacity to implement treatment, exhaustion), and the challenging, intensive nature of sleep treatment. Facilitators included positive beliefs and attitudes, education, support, and ability to modify treatments for NDD symptoms. Barriers and facilitators were similar across all four NDDs.
Conclusions: Results highlight a need for more education about sleep in NDDs and to develop accessible interventions, as well as the potential of a transdiagnostic approach to sleep treatment in this population

……..

Res Dev Disabil. 2021;110.

RELATIONS BETWEEN FINE MOTOR SKILLS AND INTELLIGENCE IN TYPICALLY DEVELOPING CHILDREN AND CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

Klupp S, et al.

Background: The embodied cognition hypothesis implies a close connection between motor and cognitive development. Evidence for these associations is accumulating, with some studies indicating stronger relations in clinical than typically developing samples.
Aims: The present study extends previous research and investigates relations between fine motor skills and intelligence in typically developing children (n = 139, 7-13 years) and same-aged children with attention deficit hyperactivity disorder (ADHD, n = 46). In line with previous findings, we hypothesized stronger relations in children with ADHD than in typically developing children.
Methods and procedure: Fine motor skills were assessed using the standardized Movement Assessment Battery for Children. Intelligence was measured with the standardized Wechsler Intelligence Scale for Children.
Outcomes and results: Regression analyses indicated significant relations between fine motor skills and full-scale IQ, perceptual reasoning, working memory, and processing speed. Moderation analyses identified stronger relations between fine motor skills and full-scale IQ, perceptual reasoning, and verbal comprehension in children with ADHD compared to typically developing children.
Conclusions and implications: Results suggest a close relation between fine motor skills and intelligence in children with and without ADHD, with children diagnosed with ADHD showing stronger relations. Findings support combined motor-cognitive interventions in treating children with ADHD

……..

Riv Psichiatr. 2020;55:355-65.

SURVEY ON CENTRES AND PROCEDURES FOR THE DIAGNOSIS AND TREATMENT OF ADULT ADHD IN PUBLIC SERVICES IN ITALY.

Zadra E, Giupponi G, Migliarese G, et al.

Attention deficit/hyperactivity disorder (ADHD) often persists into adulthood. Although its persistence and relative high prevalence, ADHD in adults is often underdiagnosed and undertreated in Italy, leading to poor clinical and functional outcomes, and higher costs of illness. The aims of the study were to identify the Italian mental health services for ADHD in adults, describe the diagnostic and treatment procedures they follow, and compare this offer with the recommendations of the German and English guidelines. The centres, that adopt a clinical and assessment protocol for adult ADHD diagnosis (carried out by specifically trained personnel) and prescribe pharmacological treatment for adult ADHD, were selected from the list of accredited services provided by the Appendix B.2 of the ISTISAN 16/37 Reports of the ISS. An ad-hoc survey including open-ended and close-ended questions was sent to each selected centre in February 2020. The overall picture resulting from the data analysis was compared with the recommendations of the German and English guidelines. The present survey shows that only a few centres are specialised in the diagnosis and treatment of ADHD in adults in Italy. Furthermore, there are no national guidelines for adult ADHD in Italy. The collected

data also suggest that there is no a unified practice shared by the Centres both for the patient's transition from child and adolescent to adult mental health services and for the diagnostic-therapeutic process. It is therefore crucial to create specific protocols and develop national guidelines to better identify and diagnose ADHD in adults and provide targeted and more efficient multimodal treatments

……..

Zhonghua Yu Fang Yi Xue Za Zhi. 2021 Jan;55:96-103.

A SYSTEMATIC REVIEW OF ASSOCIATION BETWEEN FINE PARTICLE EXPOSURE AND CHILDREN'S BEHAVIOR.

Du H, Wang YW, Li TT.

Objective: To systematically analyze the impact of PM(2.5) exposure on children's behavior.

Methods: Use air pollution, fine particulate matter, children, students, child behavior, neurobehavior, attention, autism, autism spectrum disorder, attention deficit hyperactivity disorder, hyperactivity, and bad behavior as Chinese keywords. Use air pollution, fine particulate matter, particulate matter, PM(2.5), children, student, behavior, autism, attention, intention, neurobehavior, attention deficit hyperactivity disorder, ADHD, ASD as English keywords. Journal papers and grey literature were searched from CNKI, Wanfang Data Knowledge Service Platform, PubMed and Web of Science database from their inception to Nov 2019, which are related to PM(2.5) and children behavior problems. The search period is as of November 2019, and the languages are limited to Chinese and English. The inclusion criteria included the exposure factor of the study as PM(2.5); the results of the study included behavioral disorders and related diseases; the languages of the included literature were Chinese and English; original research papers; case-control, cohort or cross-sectional studies. Exclusion criteria include animal experiments; repeated reports; review articles; research exposure factors do not include PM(2.5); children self-harm and illegal behaviors. Finally, 25 articles were included.

Results: Among the 25 included articles, 12 studies discussed the relationship between PM(2.5) exposure and childhood behavioral disorders, 13 discussed the relationship between PM(2.5) exposure and abnormal behaviors in children, and 5 studies based on the Chinese population. According to the research design, it is divided into birth cohort studies (15), cross-sectional studies (5), and case-control studies (5). China mainly uses cross-sectional studies and case-control studies. The results of the study suggest that PM(2.5) exposure will increase the risk of children's behavioral problems, with both short-term and long-term effects. Short-term exposure to PM(2.5) can easily cause mild abnormal behaviors in children, and long-term exposure may increase the risk of children's behavioral disorders. The fetal period and the infant period may be the key exposure window for the occurrence of children's behavior problems.

Conclusion: There may be a certain correlation between PM(2.5) exposure and children's behavioral problems. In future studies, longitudinal cohort studies should be carried out to enhance the causal relationship between fine particulate matter pollution and children's behavioral problems

……..

Psychiatry Research 296 (2021) 113692

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Identifying the impact of the confinement of Covid-19 on emotional-mood and behavioural dimensions in children and adolescents with attention deficit hyperactivity disorder (ADHD)

M.G. Melegari [a], M. Giallonardo [a], R. Sacco [b], L. Marcucci [a], S. Orecchio [a], O. Bruni [a,*]

[a] Department of Developmental and Social Psychology, Sapienza University, Via dei Marsi 78, 00185 Rome, Italy
[b] Service for Neurodevelopmental Disorders, Campus Bio-Medico University, Rome, Italy

ARTICLE INFO

Keywords:
Covid-19
Lockdown
Distress
Attention deficit hyperactivity/impulsivity disorder
Mood state
Behavioral problems

ABSTRACT

The current study examined the impact of the lockdown due to the Covid-19 disease on mood state and behaviours of children and adolescents with ADHD. Nine hundred ninety-two parents of children and adolescents with ADHD filled out an anonymous online survey through the ADHD family association website. The survey investigated the degree of severity of six emotional and mood states (sadness, boredom, little enjoyment/interest, irritability, temper tantrums, anxiety) and five disrupted behaviours (verbal and physical aggression, argument, opposition, restlessness) based on their frequency/week (absent; low: 1–2 days/week; moderate: 3–4 days/week; severe: 5–7 days/week) before and during the lockdown. Important fluctuations were found in all dimensions during the lockdown independently by the severity degree. Subjects with previous low severity degree of these behaviors significantly worsened in almost all dimensions during the lockdown. On the contrary, ADHD patients with moderate and severe degree showed important improvement during the lockdown. Little enjoyment/interests and boredom resulted the dimensions more strongly affected by the condition of restriction, overall in children. Children vs. adolescents showed substantially similar trend but the former resulted significantly more vulnerable to emotive changes. The results provided both the individuation of domains affected, and the indirect benefits produced by restriction condition.

1. Introduction

The confinement due to the Covid-19 disease has represented a great challenge for children and adolescent of the entire world because it required a sudden adaptive change in daily lifestyle caused by imposed restrictions within familiar context. Italy is one of the major COVID-19 hotspots; to prevent disease spread, the lockdown started on March 9, 2020 until May 18 (seventy-one days) forcing people into home confinement and imposed restrictions on the movement of individuals in the entire national territory; but some restriction continued until June 15. The lockdown on the entire Italian territory was total and the population adhered very well to the confinement rules.

The interruption of social relationships, a reduction of physical activities as well as the academic and normal working activities, has caused important disruptions of family routines, with alteration of circadian rhythm (Cellini et al., 2020) and eating habits (Pietrobelli et al., 2020) in all the countries affected by Covid-19. This unfavorable change has negatively affected mental health of the general population, especially of children and adolescents. Recent studies have shown an increase of irritability due to the prolonged boredom times in the general population with rapid swing of mood as well as behavioural problems. (Wang et al., 2020; Cao et al., 2020).

Children and adolescents with attention deficit hyperactivity disorders (ADHD) might be potentially vulnerable to the distress caused by lockdown due to Covid-19 and the European ADHD Guidelines Group alerted for ADHD management during the pandemic period, highlighting this investigation as a field of high priority.

ADHD patients have intolerance for uncertainty, and they face difficulties in following instructions and understanding the complexity of the pandemic situation. Cortese et al., 2020, reported that the enforced condition at home and the unfriendly environment, altering their regular routine, could increase the chances of more severe hyperactivity and impulsive behaviors causing difficulty for the caregivers to engage these children in meaningful activities.

* Corresponding author.
E-mail address: oliviero.bruni@uniroma1.it (O. Bruni).

https://doi.org/10.1016/j.psychres.2020.113692
Received 13 October 2020; Accepted 26 December 2020
Available online 29 December 2020

Some studies confirmed the worsening of ADHD symptoms (Zhang et al., 2020), but, on the other hand, other authors reported improvements in restlessness and in the length of time of study in relation to a decrease of distress created by rhythm imposed of scholastic activities (Bobo et al., 2020). The authors stated that intra familiar environmental enforced condition could lead to a relaxation overall for children and adolescents with ADHD that experienced several external stressors.

Studies performed on general population of children and adolescents showed that the pandemic and lockdown had a great impact on emotion and social relationships (Jiao et al., 2020; Lee, 2020). Nevertheless, the understanding of the effect created by lockdown on behavioural and emotional-mood domains in children and adolescents with ADHD poses great challenges based on the following considerations. First, negative mood and behavioural impairment are often expressed by most patients with ADHD with different degrees of severity, independently by the distress caused by Covid-19; as a consequence, we might expect that the impact of confinement on ADHD patients, will be defined by the changes in severity degree with respect to the previous status. Second, considering that the general functioning of children with ADHD is highly dependent on environmental context (Purper-Ouakil et al., 2004), we could expect that children and adolescents emotional- mood and behavioral variations during Covid-19 could represent a critical indicator of the change with respect to previous lifestyle.

Therefore, the aim of the study is to examine the effect of lockdown on children and adolescents with ADHD based on the changes in severity degree of their emotional-mood state and behaviours with respect to previous condition, and to individuate which ADHD patients will result mostly vulnerable to the restriction condition.

2. Methods

2.1. Subjects

An anonymous online survey to be completed by parents was appointed for the study in order to evaluate the effect of the lockdown on emotional-mood states and behaviours of children and adolescents with ADHD. All parents were informed of the survey through the National ADHD Family Association website, for a limited time window (from June 4 to June 21, 2020), targeting patients with ADHD from 5 to 18 years old. The families were in total and partial lockdown for 88 days at the time of the survey.

Before accessing the survey, parents were asked to read the written consent form and to agree to participate in the study. Informed consent represented an obligate field for advancing to the compilation of the questionnaire.

A total of 992 participants (M = 847 (85.4%); F= 145(14.6%) mean age 11.52, S.D .3.17) completed the survey and none of them were excluded.

All ADHD patients were followed and diagnosed by a child and adolescent psychiatrist of the Child and Adolescent Mental Health Services before the survey and the parents provided this information since they were registered in the National ADHD Family Association with a certified ADHD diagnosis. The Italian child and adolescent psychiatrists follow the ADHD Italian guidelines (that reflect international guidelines of the American Academy of Child and Adolescent Psychiatry) for clinical diagnosis and the obligatory protocol of the Italian Superior Health Institute.

The total sample is to be considered as representative for the entire Italian territory with the participation of all regions, 20 metropolitan cities and 78.3% (72/92) Italian provinces. Data reported in this study were part of a wider research project designed with multiple purposes regarding the psychological impact of home confinement in Italy. There was no monetary or credit compensation for participating in the study. The study was approved by the Ethics Committee of the Department of Developmental and Social Psychology Sapienza University and was conducted in accordance with the Declaration of Helsinki (October 2008).

2.2. Procedures

The questionnaire relative to this study included 11 items indicative of most common negative emotional/mood (sadness, boredom, little enjoyment/interest, irritability, temper tantrums, anxiety) and disruptive behavioral problems (verbal and physical aggression, argument, disobedience/opposition, restlessness). We selected 11 questions and format of the items among emotional and behavioural dimensions of validated Italian version of Child Behavior Checklist (CBCL) 6–18 questionnaire (Achenbach and Rescorla, 2000; Frigerio, 2001). We choose these 11 items as the most appropriate to evaluate the psychological and behavioral effect of confinement condition in children and adolescents.

Parents were requested to choose a single response defining severity degree based on the frequency per week by which their children/adolescents expressed each behavioural and emotional-mood dimension (1–2 time/week (low degree); 3–4 time/week (moderate degree); 5–7 time/week (severe degree), absent) before and during the confinement for Covid-19 (Table 1).

For the transitory period of the confinement (two months in Italy), we have considered that the expression of these problems in terms of frequency/week could be easier for parents in order to evaluate the severity parameter.

3. Statistical analyses

The responses of parents in the single question were modified in categorical variables (1= yes-0 =no) for each of the selected evaluation of severity degree. In order to identify which dimensions increased or decreased in severity under restriction, or which dimensions, not present before the lockdown, were expressed with one of three defined severity degree only during the lockdown (ODL), we have recoded the data of each participant on the base of severity changes with respect to previous condition.

McNemar nonparametric chi square test for dependent samples was performed to compare: 1) each emotional-behavioural dimension with the same severity degree “before-during” lockdown; 2) worsening vs. improvement during the lockdown. Chi square was performed to compare children vs. adolescents on each mood and behavioural dimension.

Statistical significance is set at a nominal two-tail $P<.05$, unless otherwise specified. Statistical analyses were conducted using SPSS software release 17.0 (SPSS INC, Chicago, Illinois).

Table 1
Survey on emotional-mood and behavioral changes.
Which emotional state and behavioral problems shows your son/daughter before and during the lockdown Covid-19? *Sign only one for row*.

Mood-behavioral dimensions	1–2 times/ week	3–4 times/ week	5–7 times/ week	NO
He/she shows restlessness	☐	☐	☐	☐
He/she shows boredom	☐	☐	☐	☐
He/she shows irritability	☐	☐	☐	☐
He/she shows Temper tantrum	☐	☐	☐	☐
He/she argues polemically with parents	☐	☐	☐	☐
He/she is sad	☐	☐	☐	☐
He/she shows little enjoyment/ interest in activities	☐	☐	☐	☐
He/she shows anxiety	☐	☐	☐	☐
He/she shows oppositional behaviors	☐	☐	☐	☐
He/she shows verbally aggression	☐	☐	☐	☐
He/she shows physically aggression	☐	☐	☐	☐

The questions were repeated in two separated items.

3.1. Results

The sample was composed by 528 children [441 M (83.5%); 87 F (16.5%); age range 5–11.11 years; mean age 9.06 y, S.D. 1.63] and 464 adolescents [406 M (87.5%); 58 F (12.5%); age range 12–17.11 years; mean age 14.33 y, S.D.1.92]. No significant gender difference between two age groups was found (χ^2=3.130; p=.077).

Family economic status of the whole sample was high in 3%, middle in 75.2% and low in 21.8%. Mothers were the main compiler of the survey (88.6%).

As for the education level the majority of participants have a graduate (29%) or high school degree (52.6%); middle school was represented in 17.9% and elementary school in 0.5%. Moreover, the family composition was reported as follows: parents with one offspring member: 31.3%; parents with two offspring members: 51.9%; parents with three offspring members: 13.3%; parents with four or more offspring members: 3.5%.

Parents reported that 441 ADHD patients were taking medication, while 551 did not take medication before and during the lockdown.

3.1.1. Changes in frequency of each emotional mood and behavioural domain before and during the lockdown

During the lockdown we observed a significant decreased frequency of mood and behavioural problems expressed with low severity degree in both children and adolescents, with the exception of little enjoyment/interest in children and physical aggression in adolescents (Table 2). In parallel, under restriction, we found an increase in frequency of the boredom, in temper tantrums and little enjoyment/interest domains expressed with moderate severity degree in both ADHD age groups; moreover, children also showed an increase in percentage of sadness and adolescents in physical aggression. No significant differences were found in both age groups in restlessness, opposition, verbal aggression, argument, irritability and anxiety dimensions.

During the lockdown, children and adolescents with ADHD with high severity degree showed a different trend: we found in children an increase in percentage in almost all dimensions with the exception of restlessness and opposition while in adolescents we observed an increased percentage only in boredom, temper tantrums, little enjoyment/interest and argument.

3.1.2. Changes in severity degree of emotional - mood and behaviours dimensions during the lockdown

Children and adolescents with ADHD with previously low severity degree showed the lowest percentage of stability (no change) before-during the lockdown with significant fluctuations toward moderate and severe degree in all the dimensions, mainly in boredom, temper tantrums, little enjoyment/interest, argument, restlessness, irritability and sadness (Fig. 1). During the lockdown, these fluctuations contribute to explain either the decrease or the increase of frequencies in examined domains in ADHD patients with low and with high severity degrees, observed in the comparative analyses in Table 2. Moreover, we found a percentage > 20% of children and/or adolescents with ADHD that started to express little enjoyment/interest and physical aggression, and sadness and boredom with low severity degree during the lockdown (Fig. 1).

Children and adolescents with ADHD with moderate degree showed more stability (no change) before-during the lockdown; nevertheless, we also registered a change toward the lower severity degree in all the dimensions with the exception of boredom among children. Moreover, we continued to find a percentage around 20% of children and/or adolescents that, during the lockdown, started to express boredom, sadness, argument and overall little enjoyment/interest with moderate severity degree (Fig. 2).

Children and adolescents with high severity degree reported the major stability before-during lockdown with rates between 52% and 72% in boredom, temper tantrum, restlessness oppositional and verbal aggression and, in physical and verbal aggression behaviours among children and adolescents respectively. In parallel, in children and adolescents that have a severe degree, only during the lockdown (ODL), we observed a trend toward a lower severity in all dimensions but boredom, little enjoyment/interest and, only among children, sadness (Fig. 3).

When we compared worsening and improvement relative to each domain during the lockdown, children and adolescents with previous low severity degree, showed significant worsening in almost all dimension with exception of anxiety and, only among adolescents, of sadness. In particular, boredom and little enjoyment/interest and temper tantrum and irritability showed a difference in percentage between worsening-improvement > 30% until 50% in both age groups. Moreover, a difference in percentage >30% was found in sadness and restlessness and verbal aggression among children and in argument among adolescents (Table 3). Under restriction, children and adolescents with previous moderate severity expression continued to report high rates of worsening in boredom and little enjoyment/interest, although with significant values only among children. Moreover, adolescents showed significant higher rates of improvement in restlessness and irritability.

Children and adolescents with previous severe degree, during the lockdown, showed a significant improvement in opposition, restlessness irritability and argument; however, they continued to report higher rates of worsening in little enjoyment/ interest and equivalent rates of worsening-improvements in boredom.

Inter-ADHD age groups comparison showed a significant difference in sadness among children with low severity degree while those with moderate degree reported high percentage in boredom and temper tantrum and irritability than adolescents.

4. Discussion

The current study in ADHD patients, aimed to examine the impact of the lockdown on emotional-mood and behavioural domains based on changes in severity degree with respect to previous condition and to individuate ADHD patients who resulted more vulnerable to lockdown experience.

During the lockdown, a first evidence of the study consists in finding different profiles of the emotional-mood states and behavioural dimensions among ADHD patients with distinct severity degree. These differences were found either in the percentage of stability of degree before-during the lockdown than in the changes. During the lockdown, ADHD with low severity degree in the mood-behavioral domains showed the least before-during stability, the largest scale of fluctuation and significant worsening in almost examined domains. The understanding of this general worsening would require further investigations, although emotional lability and mood instability, and adaptive dis-functioning are closely associated and common features reported among ADHD patients (Anastopoulos et al., 2011; Barkley andFischer, 2010; Brotman et al., 2006; Sobansky et al., 2010).

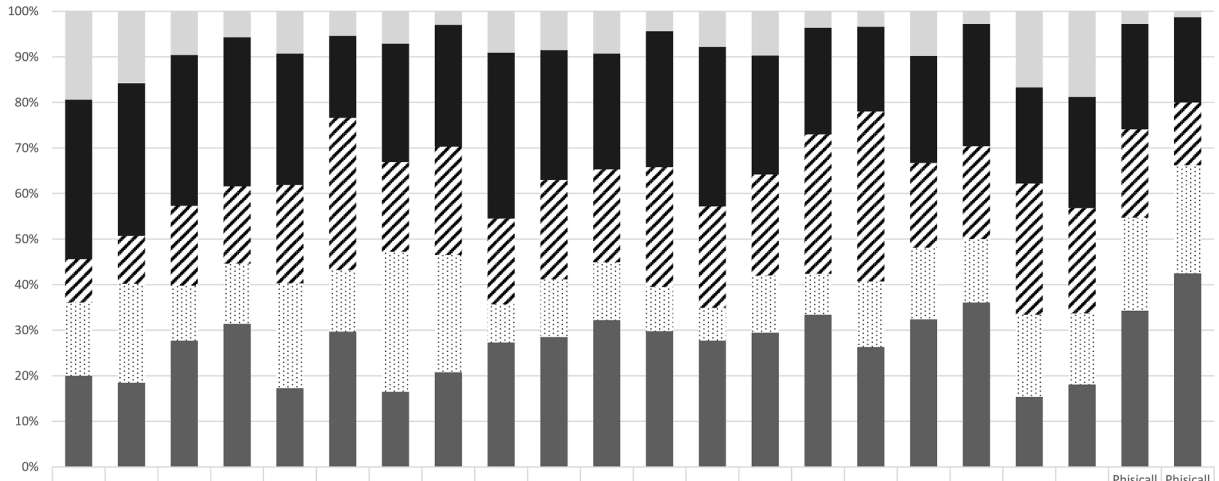
Because similar results were reported in Lee et al. (2020) study on children and adolescents during the lockdown, it is presumable that the sudden interruption of friendly relationships or of the opportunities of pleasant activities, in patients with lower dis-functioning, could have caused a critical adaptation problem with consequent outbreaks of emotional-mood status and of the behaviours. In general, these results support the consideration that excessive and rapid changes, in affective–motivation–arousal, and/or behaviors represent a critical expression of distress to environmental mismatch independently by age and by mental health state.

Conversely, ADHD patients with high and moderate severity degree, although maintained a higher stability of their severity degree before and during the lockdown, showed important rates of improvement in several emotional mood and behavioural dimensions. Due to fact that similar results were found in both age ADHD groups, they suggest that the restriction could have represented, for some children, a protective

Table 2
Comparison of emotional-behavioral dimensions expressed with the same severity degree before and during lockdown in children and adolescents with ADHD.

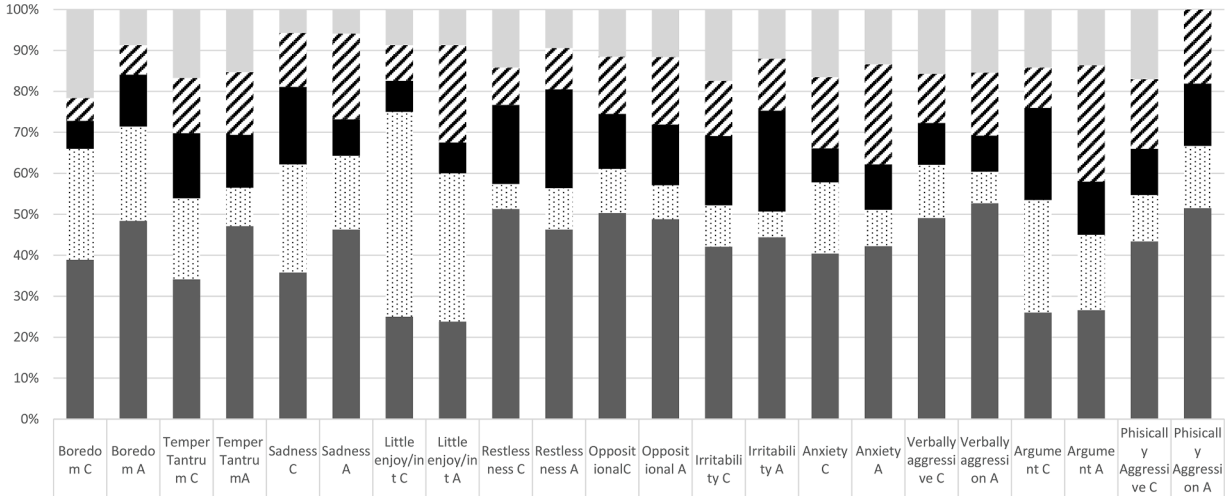
		Low Before NO	Low Before YES	Low During NO	Low During YES	χ^2	*p*	Moderate Before NO	Moderate Before YES	Moderate During NO	Moderate During YES	χ^2	*p*	Severe Before NO	Severe Before YES	Severe During NO	D Severe uring YES	χ^2	*p*
Boredom	C	377 (71.4%)	151 (28.6%)	446 (84.5%)	82 (15.5%)	28.720	.000	410 (77.7%)	118 (22.3%)	349 (66.1%)	179 (33.9	21.053	.000	447 (84.7%)	81 (15.3%)	377 (71.4%)	151 (28.6%)	44.226	.000
	A	345 (74.4%)	119 (25.6%)	384 (82.8%)	80 (17.2%)	10.090	.000	367 (79.1%)	97 (20.9%)	316 (68.1%)	148 (31.9%)	20.325	.000	400 (86.2%)	64/ 13.8%)	366 (78.9%)	98 (21.2%)	16.500	.000
Temper tantrum	C	382 (72.3%)	146 (27.7%)	439 (83.1%)	89 (16.9%)	21.930	.000	427 (80.9%)	101 (19.1%)	397 (75.2%)	131 (24.8%)	5.760	.016	474 (89.8%)	54 (10.2%)	446 (84.5%)	82 (15.5%)	13.500	.000
	A	326 (70.3%)	138 (29.7%)	381 (82.1%)	83 (17.9%)	24.009	.000	387 (83.4%)	77 (16.6%)	357 (76.9%)	107 (23.1%)	8.087	.004	433 (93.3%)	31 (6.7%)	419 (90.3%)	45 (9.7%)	4.447	.035
Sadness	C	421 (79.7%)	107 (20.3%)	462 (87.5%)	66 (12.5%)	12.800	.000	489 (92.6%)	39 (7.4%)	454 (86%)	74 (14%)	15.413	.000	518 (98.1%)	10 (1.9%)	497 (94.1%)	31 (5.9%)	14.205	.000
	A	368 (79.3%)	96 (20.7%)	409 (88.1%)	55 (11.9%)	18.824	.000	409 (88.1%)	55 (11.9%)	397 (85.6%)	67 (14.4%)	2.017	.156	450 (97.0%)	14 (3%)	445 (95.9%)	19 (4.1%)		.359*
Little enjoy/ interest	C	440 (83.3%)	88 (16.7%)	460 (87.1%)	68 (12.9%)	3.167	.075	482 (91.3%)	46 (8.7%)	423 (80.1%)	105 (19.9%)	32.038	.000	509 (96.4%)	19 (3.6%)	472 (89.4%)	56 (10.6%)	24.453	.000
	A	389 (83.8%)	75 (16.2%)	411 (88.6%)	53 (11.4%)	5.128	.024	413 (89.0%)	51 (11.0%)	386 (83.2%)	78 (16.8%)	7.429	.006	443 (95.5%)	21 (4.5	427 (92%)	37 (8%)	6.618	.010
Restlessness	C	387 (73.3%)	141 (26.7%)	431 (81.6%)	97 (18.4%)	12.006	.001	343 (65%)	185 (35%)	339 (64.2%)	189 (35.8%)	.052	.819	413 (78.2%)	115 (21.8%)	398 (75.4%)	130 (24.6%)	2.613	.106
	A	320 (69%)	144 (31%)	350 (75.4%)	114 (24.6%)	5.128	.024	330 (71%)	134 (28.9%)	327 (70.5%)	137 (29.5%)	.030	.862	397 (85.6%)	67 (14.4%)	393 (84.7%)	71 (15.3%)	.155	.694
Opposition	C	425 (80.5%)	103 (19.5%)	451 (85.5%)	77 (14.6%)	6.010	.014	389 (73.7%)	139 (26.3%)	394 (74.6%)	134 (25.4%)	.139	.709	426 (80.7%)	102 (19.3%)	415 (78.6%)	113 (21.4%)	1.887	.170
	A	361 (77.1%)	103 (22.2%)	398 (85.8%)	66 (14.2%)	12.832	.000	353 (76.1%)	111 (23.9%)	347 (74.8%)	117 (25.2%)	.227	.634	395 (85.1%)	69 (14.9%)	389 (83.8%)	75 (16.2%)	.500	.480
Irritability	C	374 (70.8%)	154 (29.2%)	436 (82.6%)	92 (17.4%)	24.162	.000	368 (69.7%)	160 (30.3%)	361 (68.4%)	167 (31.6%)	.203	.652	447 (84.7%)	81 (15.3%)	424 (80.3%)	104 (19.7%)	6.817	.009
	A	310 (66.8%)	154 (33.2%)	354 (76.3%)	110 (23.7%)	11.556	.001	346 (74.6%)	118 (25.4%)	345 (74.8%)	119 (25.6%)	.000	1.00	411 (88.6%)	53 (11.4%)	397 (85.6%)	67 (14.4%)	2.914	.088
Anxiety	C	427 (80.9%)	101 (19.1%)	468 (88.6%)	60 (11.4%)	18.391	.000	438 (83%)	90 (17%)	434 (82.2%)	94 (17.8%)	.094	.759	498 (94.3%)	30 (5.7%)	477 (90.3%)	51 (9.7%)	8.889	.003
	A	363 (78.2%)	101 (20.7%)	403 (86.9%)	61 (13.1%)	15.210	.000	382 (82.3%)	82 (17.2%)	391 (84.3%)	73 (15.7%)	.810	.368	435 (93.8%)	29 (6%)	425 (91.6%)	39 (8.4%)	2.382	.123
Verbal aggression	C	442 (83.7%)	86 (16.3%)	468 (88.6%)	60 (11.4%)	7.813	.005	434 (82.2%)	94 (17.8%)	436 (82.6%)	92 (17.4%)	.013	.911	483 (91.5%)	45 (8.5%)	466 (88.3%)	62 (11.7%)	5.224	.022
	A	371 (80%)	93 (20%)	401 (86.4%)	63 (13.6%)	10.782	.001	380 (81.9%)	84 (18.1%)	374 (80.6%)	90 (19.4%)	.321	.571	428 (92.2%)	36 (7.8%)	417 (89.9%)	47 (10.1%)	3.226	.072
Argument	C	400 (75.8%)	128 (24.2%)	445 (84.3%)	83 (15.7%)	11.877	.000	388 (73.5%)	140 (26.5%)	370 (70.1%)	158 (29.9%)	1.389	.239	452 (85.6%)	76 (14.4%)	418 (79.2%)	110 (20.8%)	7.669	.006
	A	329 (70.9%)	135 (29.1%)	380 (81.9%)	84 (18.1%)	15.528	.000	326 (70.3%)	138 (29.7%)	335 (72.2%)	129 (27.8%)	.362	.548	403 (86.9%)	61 (13.1%)	367 (79.1%)	97 (20.9%)	10.560	.001
Physical aggression	C	442 (83.7%)	86 (16.3%)	462 (87.5%)	66 (12.5%)	4.628	.031	481 (91.1%)	47 (8.9%)	473 (89.6%)	55 (10.4%)	.875	.350	505 (95.6%)	23 (4.4%)	492 (93.2%)	36 (6.8%)		.011*
	A	403 (86.9%)	61 (13.1%)	405 (87.3%)	59 (12.7%)	.019	.890	436 (94%)	28 (6%)	422 (90.9%)	42 (9.1%)	4.694	.030	453 (97.6%)	11 (2.4%)	457 (98.5%)	7 (1.5%)		.388*

* using binomial distribution *C*=children; *A*= adolescents.



	Boredom C	Boredom A	Temper Tantrum C	Temper Tantrum A	Sadness C	Sadness A	Little enjoy/int C	Little enjoy/int A	Restlessness C	Restlessness A	OppositionalC	Oppositional A	Irritability C	Irritability A	Anxiety C	Anxiety A	Verbally aggressive C	Verbally aggressive A	Argument C	Argument A	Phisicall y Aggressive C	Phisicall y Aggressive A
increased in severe degree	19.4	15.8	9.6	5.7	9.3	5.4	7.1	3	9.1	8.5	9.3	4.4	7.8	9.7	3.6	3.4	9.8	2.8	16.7	18.8	2.8	1.3
increased in moderate degree	35	33.5	33.1	32.7	28.8	18	26	26.7	36.4	28.5	25.4	29.8	35	26.1	23.4	18.6	23.5	26.8	21.1	24.4	23.1	18.7
< 1-2/week	9.5	10.5	17.5	17	21.6	33.4	19.7	23.8	18.8	21.8	20.4	26.3	22.3	22.2	30.6	37.3	18.6	20.4	28.8	23.1	19.4	13.8
ODL whitin low degree	16.1	21.7	12.1	13.2	23	13.5	30.7	25.7	8.4	12.7	12.7	9.7	7.2	12.5	9	14.4	15.7	13.9	18	15.6	20.4	23.7
NO change	20	18.5	27.7	31.4	17.3	29.7	16.5	20.8	27.3	28.5	32.2	29.8	27.7	29.5	33.4	26.3	32.4	36.1	15.4	18.1	34.3	42.5

Fig. 1. Changes in Children and Adolescents with Low Severity Degree
% of Children (C) and Adolescents (A) with previous low degree that maintained (no change), increased or lowered their severity degree or started to express emotional-mood behavioural problems with low severity degree (ODL) during lockdown.



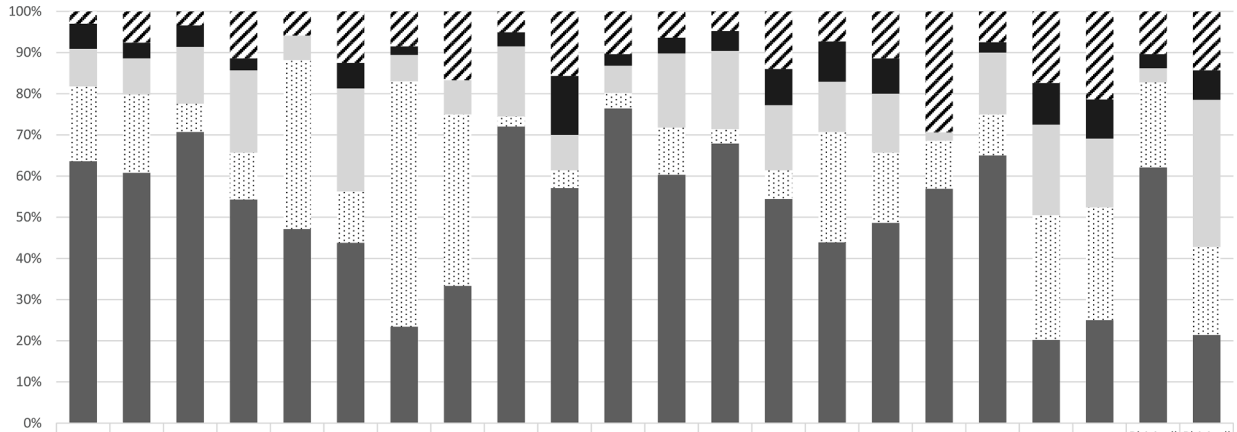
	Boredom C	Boredom A	Temper Tantrum C	Temper TantrumA	Sadness C	Sadness A	Little enjoy/int C	Little enjoy/int A	Restlessness C	Restlessness A	OppositionalC	Oppositional A	Irritability C	Irritability A	Anxiety C	Anxiety A	Verbally aggressive C	Verbally aggression A	Argument C	Argument A	Phisicall y Aggressive C	Phisicall y Aggression A
Increase in severe degree	21.6	8.7	16.7	15.3	5.7	5.9	8.7	8.7	14.2	9.4	11.5	11.6	17.4	12	16.5	13.4	15.7	15.4	14.2	13.6	17	0
<1-2/week	5.6	7.2	13.5	15.3	13.2	20.9	8.7	23.8	9.1	10.1	14	16.5	13.5	12.7	17.4	24.4	12	15.4	9.8	28.4	17	18.1
lowered to low degree	6.8	12.7	15.9	12.9	18.9	8.9	7.6	7.5	19.3	24.1	13.4	14.8	16.9	24.6	8.3	11.1	10.2	8.8	22.5	13	11.3	15.2
ODL within moderate degree	27.1	23	19.8	9.4	26.4	18	50	36.2	6.1	10.1	10.8	8.3	10.1	6.3	17.4	8.9	13	7.7	27.5	18.4	11.3	15.2
NO change	38.9	48.4	34.1	47.1	35.8	46.3	25	23.8	51.3	46.3	50.3	48.8	42.1	44.4	40.4	42.2	49.1	52.7	26	26.6	43.4	51.5

Fig. 2. Changes in children and adolescents with moderate severity degree. % of Children (C) and Adolescents (A) with previous moderate degree that maintained (no change), increased or lowered their severity degree or started to express emotional-behavioural problems with moderate severity degree (ODL) during lockdown.

condition from common social stressors, such as fewer friendships, bullying, victimization, and rejection of peers (Hoza, 2007; Nijmeijer et al., 2008) or school time constraints (Bobo et al., 2020; Chawal et al., 2020). The findings, in confirming the strong relationship between severity degree and stability of behavioural impairment, highlighted that these ADHD patients are improvable when environmental context is more flexible and responsive.

Our results are consistent with those of Zhang et al. (2020), that reported significant relationship between improvements in the online study at home with longer time of study and a decrease of ADHD symptoms.

To a closer exam relative to each domain, the findings highlighted that, the lockdown has overall caused, in both age groups, a worsening of boredom, in particular among ADHD patients with low and moderate severity, and of the enjoyment/interest, independently by severity degree, although with significant results exclusively among children. The first finding was expected because boredom is closely linked to ADHD condition, susceptible to important fluctuations as well as a critical hallmark of distress caused by environmental condition. The results are consistent with previous studies (Zhang et al., 2020), that reported a



	Boredom C	Boredom A	Temper Tantrum C	Temper Tantrum A	Sadness C	Sadness A	Little enjoy/int C	Little enjoy/int A	Restlessness C	Restlessness A	OppositionalC	Oppositional A	Irritability C	Irritability A	Anxiety C	Anxiety A	Verbally aggressive C	Verbally aggression A	Argument C	Argument A	Phisically Aggressive C	Phisically Aggression A
< 1-2 /week	3	7.6	3.4	11.4	5.9	12.5	8.5	16.7	5.1	15.7	10.4	6.4	4.8	14	7.3	11.4	29.4	7.5	17.4	21.4	10.4	14.3
lowered to low degree	6.1	3.8	5.2	2.9	0	6.2	2.1	0	3.4	14.3	2.8	3.8	4.8	8.8	9.8	8.6	0	2.5	10.1	9.5	3.4	7.2
lowered to moderate degree	9.1	8.8	13.8	20	5.9	25	6.4	8.3	17	8.6	6.6	18	19	15.8	12.2	14.3	2	15	22	16.7	3.4	35.7
ODLwith severe degree	18.2	19	6.9	11.4	41.1	12.5	59.6	41.7	2.5	4.3	3.8	11.5	3.5	7	26.8	17.1	11.7	10	30.3	27.4	20.7	21.4
NO change	63.6	60.8	70.7	54.3	47.1	43.8	23.4	33.3	72	57.1	76.4	60.3	67.9	54.4	43.9	48.6	56.9	65	20.2	25	62.1	21.4

Fig. 3. Changes in children and adolescents with high severity degree. % of Children (C) and Adolescents (A) with previous high severity degree that maintained (no change), lowered their severity degree or started to express affective-behavioural problems with severe degree (ODL) during lockdown.

positive association between negative mood states and worsening of ADHD symptoms during the lockdown. Nevertheless, the co-occurrence of boredom and little enjoyment/interest in activities oriented versus a closer relation to lockdown condition. It is reported that the lockdown has caused a significant increased difficulty in keeping track of time (Cellini et al., 2020) providing prolonged boredom times (Cao et al., 2020; Wang et al., 2020).

The psychological perception of the time is usually marked by the duration of the activities, by the variability of information and stimulations, by dynamic environments and contextual changes. In agreement with our findings, it is well documented that the reduction of pace of time promotes an increase of boredom and of the under-motivation state, sometime associated to a general decrease of well-being reflecting on adaptive behaviors. (DanZakai, 2014). The high percentage of ADHD in both age groups that, only during the lockdown, showed boredom and little enjoyment/interest, confirms these domains as the most affected by the restriction. In particular, among children, little enjoyment/interest was the only mood dimension that significantly worsened independently by severity degree. Conversely, despite the risk of Covid-19 infection and according with some studies (Bobo et al., 2020), ADHD patients didn't result particularly affected by anxiety in both age group and, independently by severity degree, showed equivalent rates between worsening and improving. With the exception of ADHD patients with low severity degree, we registered the highest rates in stability degree before-during the lockdown in physical and verbal aggression, oppositional behaviours, and restlessness and an important percentage of patients of both age groups that started to express argument with significant severity parameters, during the lockdown. According with other studies (Bobo et al., 2020), our findings confirmed that the condition of restriction could promote conflict within family environment.

To a general examination, the trend of worsening and improving was substantially similar in both age groups, although children resulted more susceptible to mood fluctuations than adolescents did. It is well documented that ADHD patients showed less flexibility in the use of coping strategies for dealing with stressful situations than control subjects as shown by Babb et al. (2010). The same authors reported a higher coping flexibility in older (10–11 years) vs. younger (7–8 years) typically developing children while this difference was not found in ADHD children with the same age. Since studies show a developmental delay of brain areas implied in the executive functioning among children with ADHD (Shaw et al., 2007) we can assume that the difference in coping flexibility might become evident at later ages. Therefore, the mood patterns differences found between children and adolescents with ADHD in our sample could be linked to the higher flexibility of adolescents in the use of emotional coping strategies.

Considering the representativeness of the sample, these findings represent an important goal of the study, in defining ADHD emotional-mood and behavioural responses to distress caused lockdown.

5. Conclusion

The current approach provided a punctual individuation of domains affected and the indirect benefits produced by restriction condition in children and adolescents with ADHD. In view of reinstatement of regular routine, the major challenge after the pandemic will be to deal with its sequelae, also considering the risk of going back to previous severity condition in patients that improved during the lockdown.

Moreover, it is our opinion that these findings could provide implication for the clinical practice and interventions independently from the specific aim of the study.

The current study has some limitations that must be acknowledged. Although the survey was conducted after few days the end of lockdown and in condition of ongoing yet restriction, we cannot exclude a memory bias of the parents. We have not evaluated the relationship between impairment of the examined domains and ADHD severity, focusing on the problems reported as most concerning for parents. Moreover, we did not examine the relationship with the medication status, since parents did not answer to a specific question about the access to medication during the lockdown. Another limitation is that we did not include the ADHD diagnosis of parents as covariate/confounder in our analyses. Finally, considering the richness of the survey, we decided to select 11 items of the CBCL, as the most appropriate to evaluate the psychological and behavioral effect of confinement condition, in order to ensure the best return rate.

Future extensions of the present study will allow to uncover the relationships with acute stress symptoms, with the comorbidity profiles of the ADHD patients, as well strategies adopted by parents to manage the

Table 3
Comparison of worsening and improving within and between children and adolescents during the lockdown.

		Previous low severity degree				Children vs. adolescents		*Previous moderate severity degree*				Children vs. adolescents		*Previous high severity degree*				Children vs. adolescents	
		Improving N (%)	***WorseningN (%)***	χ^2	*p*	χ^2	*p*	***ImprovingN (%)***	***Worsening N (%)***	χ^2	*p*	χ^2	*p*	***Improving N (%)***	***Worsening N (%)***	χ^2	*p*	χ^2	*p*
Boredom	C	17 (9.5%)	127 (70.5%)	82.507	.000	.112	.946	20 (12.4%)	79 (48.7%)	33.980	.000	10.338	.006	18 (18.2%)	18 (18.2%)	.000	1.000	.025	.988
	A	16 (10.5%)	108 (71%)	66.782	.000			25 (19.9%)	40 (31.7%)	3.015	.082			16 (20.2%)	15 (19%)	.000	1.000		
Temper tantrums	C	29 (17.5%)	91 (54.8%)	31.008	.000	.093	.955	37 (29.4%)	46 (36.5%)	.771	.380	8.789	.012	13 (22.4%)	4 (6.9%)		.049*	.050	.975
	A	27 (17%)	82 (51.6%)	26.752	.000			24 (28.2%)	21 (24.7%)	.089	.766			12 (34.3%)	4 (11.4%)		.077*		
Sadness	C	30 (21.6%)	85 (61.1%)	25.357	.000	12.934	.002	17 (32.1%)	17 (32.1%)	.000	1.000	.873	.646	2 (11.8%)	7 (41.1%)		.180*	5.655	.061
	A	37 (33.4%)	41 (36.9%)	.115	.734			20 (29.8%)	16 (23.9%)	.250	.617			7 (43.8%)	2 (12.5%)		.180*		
Little enjoy/ int	C	25 (19.7%)	81 (63.8%)	28.538	.000	2.254	.324	15 (16.3%)	54 (58.7%)	20.928	.000	5.632	.060	8 (17%)	28 (59.6%)	10.028	.002	2.773	.250
	A	24 (23.8%)	56 (55.4%)	12.013	.001			25 (31.3%)	36 (44.9%)	1.639	.200			9 (25%)	15 (41.7%)	.	.307*		
Restlessness	C	29 (18.8%)	83 (53.9%)	25.080	.000	3.074	.215	56 (28.4%)	40 (20.3%)	2.344	.126	.685	.710	30 (25.5%)	3 (2.5%)	20.485	.000	034	.983
	A	36 (21.8%)	82 (49.7%)	17.161	.000			51 (34.2%)	29 (19.5%)	5.513	.019			16 (38.6%)	3 (4.3%)	17.633	.000		
Opposition	C	24 (20.4%)	56 (47.4%)	12.013	.001	1.808	.405	43 (27.4%)	35 (22.3%)	.628	. 428	939	.625	21 (19.8%)	4 (3.8%)		.001	3.065	.216
	A	30 (26.3%)	50 (43.9%)	4.513	.034			38 (31.3%)	24 (19.9%)	2.726	.099			22 (28.2%)	9 (11.5%)	4.645	.031		
Irritability	C	37 (22.3%)	83 (50%)	16.875	.000	2.138	.303	54 (30.4%)	49 (27.5%)	.155	.693	6.947	.0.31	24 (28.6%)	3 (3.5%)	14.815	.000	.329	.848
	A	39 (22.2%)	85 (48.3%)	16.331	.000			47 (37.3%)	23 (18.3%)	7.557	.006			22 (38.6%)	4 (7%)	11.115	.001		
Anxiety	C	34 (30.6%)	40 (36%)	,338	.561	4.415	.110	28 (25.7%)	37 (33.9%)	.985	.321	4.198	.123	12 (29.3%)	11 (26.8%)		1.000*	1.006	.605
	A	44 (37.3%)	43 (36.4%)	.000	1.000			32 (35.5%)	20 (22.3%)	2.327	.127			12 (34.3%)	6 (17.1%)		.238*		
Verbal aggression	C	19 (18.6%)	50 (49%)	13.043	.000	.984	.612	24 (22.2%)	31 (28.7%)	.655	.418	.811	.667	16 (31.4%)	6 (11.7%)		.052*	.940	.625
	A	22 (20.4%)	47 (43.5%)	8.348	.004			22 (24.2%)	21 (23.1%)	.000	1.000			10 (25%)	4 (10%)		.180*		
Argument	C	45 (28.8%)	87 (55.8%)	12.735	.000	2.377	.305	66 (32.3%)	85 (41.7%)	2.146	.143	4.832	.089	54 (49.5)	33 (30.3%)	4.598	.032	1.649	.438
	A	37 (23.1%)	94 (58.8%)	23.939	.000			70 (41.4%)	54 (32%)	1.815	.178			40 (47.6%)	23 (27.4%)	4.063	.044		
Physical aggression	C	21 (19.4%)	50 (46.3%)	11.042	.001	3.395	.183	15 (28.3%)	15 (28.3%)	.000	1.000	4.146	.126	5 (17.2%)	6 (20.7%)		1.000*	1.793	.408
	A	11 (13.8%)	35 (43.7%)	11.500	0.001			11 (33.3%)	5 (15.2		.210*			8 (57.2%)	3 (21.4%)		0.227*		

* using binomial distribution *C*=children; *A*= adolescents. Worsening includes also ODL.

child-adolescent's problems.

Authorship responsibility

Each author made a substantive intellectual contribution to the study.

- Maria Grazia Melegari: conceptualization and study design; data collection and interpretation; preparation and revision of the manuscript; approved the final manuscript as submitted
- Martina Giallonardo: data collection and interpretation; revision of the manuscript; approved the final manuscript as submitted.
- Roberto Sacco: data analysis and revision of the manuscript; approved the final manuscript as submitted.
- Lavinia Marcucci: data collection, preparation and revision of the manuscript; approved the final manuscript as submitted
- Silvia Orecchio: data collection; preparation and revision of the manuscript; approved the final manuscript as submitted.
- Oliviero Bruni: conceptualization and study design, data collection, interpretation; revision of the manuscript; approved the final manuscript as submitted.

Funding

The authors received no financial support for the research, authorship, and/or publication for this article.

Declaration of Competing Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgments

The authors gratefully acknowledge the Italian President of Family Association of ADHD (AIFA), Patrizia Stacconi, all Regional referents and parents who have participated to this study.

References

Achenbach, T.M., Rescorla, L.A., 2000. Manual for the ASEBA Preschool Forms & Profiles. University of Vermont, Research Center for Children, Youth & Families, Burlington.

Anastopoulos, A.D., Smith, T.F., Garrett, M.E., Morrissey-Kane, E., Schatz, N.K., Sommer, J.L., et al., 2011. Self-regulation of emotion, functional impairment, and comorbidity among children with AD/HD. J. Atten. Disord. 15 (7), 583–592. https://doi.org/10.1177/1087054710370567.

Babb, K.A., Levine, L.J., Arseneault, J.M., 2010. Shifting gears: coping flexibility in children with and without ADHD. Int. J. Behav. Dev. 34 (1), 10–23. https://doi.org/10.1177/0165025409345070.

Barkley, R.A., Fischer, M., 2010. The unique contribution of emotional impulsiveness to impairment in major life activities in hyperactive children as adults. J. Am. Acad. Child Adolesc. Psychiatry 49 (5), 503–513. https://doi.org/10.1097/00004583-201005000-00011.

Bobo, E., Lin, L., Acquaviva, E., Caci, H., Franc, N., Gamon, L., Picot, M.-C., Pupier, F., Speranza, M., Falissard, B., Purper-Ouakil, D., 2020. How do children and adolescents with attention deficit hyperactivity disorder (ADHD) experience during the COVID-19 outbreak? Encephale J. 46 (3S), S85–S92. https://doi.org/10.1016/j.encep.2020.05.011.

Brotman, M.A., Schmajuk, M., Rich, B.A., Dickstein, D.P., Guyer, A.E., Costello, E.J., Egger, H.L., Angold, A., Pine, D.S., Leibenluft, L., 2006. Prevalence, clinical correlates, and longitudinal course of severe mood dysregulation in children. Biol. Psychiatry 60 (9), 991–997. https://doi.org/10.1016/j.biopsych.2006.08.042.

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., Zheng, J., 2020. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Res. 287, 112934 https://doi.org/10.1016/j.psychres.2020.112934.

Cellini, N., Canale, N., Mioni, G., Costa, S., 2020. Changes in sleep pattern, sense of time and digital media use during Covid-19 lockdown in Italy. J. Sleep Res. 22 April.

Chawla, N., Sharma, P., Sagar, R., 2020. Psychological impact of COVID-19 on children and adolescents: is there a silver lining? Indian J. Pediatr. https://doi.org/10.1007/s12098-020-03472-z.

Cortese, S., Asherson, P., Sonuga-Barke, E., Banaschewski, T., Brandeis, D., Buitelaar, J., Coghill, D., Daley, D., Danckaerts, M., Dittmann, R.W., Doepfner, M., Ferrin, M., Hollis, C., Holtmann, M., Konofal, E., Lecendreux, M., Santosh, P., Rothenberger, A., Soutullo, C., Simonoff, E, 2020. ADHD management during the COVID-19 pandemic: guidance from the European ADHD guidelines group. Lancet Child Adolesc. Health 4 (6), 412–414. https://doi.org/10.1016/S2352-4642(20)30110-3. Jun.

DanZakay, 2014. Psychological time as information: the case of boredom. Front. Psychol. https://doi.org/10.3389/fpsyg.2014.0091.

Frigerio, A., 2001. ASEBA (Achenbach System of Empirically Based Assessment) Questionario sul Comportamento Del Bambino [Questionnaire On Child Behaviour]. Istituto Scientifico "E. Medea", Assoc. "La Sacra Famiglia.", Bosisio Parini, Italy.

Hoza, B., 2007. Peer functioning in children with ADHD. J. Pediatric Psychol. Vol 32 (Issue 6), 655–663. https://doi.org/10.1093/jpepsy/ism024.

Jiao, W.Y., Wang, L.N., Liu, J., Fang, S.F., Jiao, F.Y., Pettoello-Mantovani, M., Somekh, E., 2020. Behavioral and emotional disorders in children during the COVID-19 epidemic. J. Pediatr. 221, 264–266. https://doi.org/10.1016/j.jpeds.2020.03.013, 2020 June 1.

Lee, J., 2020. Mental health effects of school closures during COVID-19. 2020. Lancet Child. Adolesc. Health 4 (6), 421. https://doi.org/10.1016/S2352-4642(20)30109-7, 2020 Jun.

Nijmeijer, J.S., Minderaa, R.B., Buitelaar, J.K., Mulligan, A., Hartman, A., Hoekstra, P.J., 2008. Attention-deficit/hyperactivity disorder and social dysfunctioning. Clin. Psychol. Rev. Vol. 28 (Issue 4), 692–708. https://doi.org/10.1016/j.cpr.2007.10.003.

Pietrobelli A., Pecoraro L., Ferruzzi A., Mooseong H., Faith M., Zoller T., Antoniazzi F., Piacentini G., Fearnbach S.N., Heymsfield S.B. (2020) Effect of Covid-19 lockdown on lifestyle. behaviors in children with obesity living in Verona, Italy: a longitudinal study. doi:10.1002/oby.22861 (an article not yet in an issue).

Purper-Ouakil, D., Wohl G., M., Mouren, M.C., Gorwood, P., 2004. Symptom variations in ADHD: importance of context, development and comorbidity. Encephale 30 (6), 533–539. https://doi.org/10.1016/s0013-7006(04)95467-x.

Shaw, P., Eckstrand, K., Sharp, W., Blumenthal, J., Lerch, J.P., Greenstein, D., Clasen, L., Evans, A., Giedd, J., Rapoport, J.L., 2007. Attention-deficit/hyperactivity disorder is characterized by a delay in cortical maturation. Proc. Natl. Acad. Sci. U.S.A. 104 (49), 19649–19654. https://doi.org/10.1073/pnas.0707741104.

Sobanski, E., Banaschewski, T., Asherson, P., Buitelaar, J., Chen, W., Franke, B., Holtman, M., Krumm, B., Sergeant, J., Sonuga-Barke, E., Strigaris, A., Taylor, E., Anney, R., Ebstein, R.P., Gill, M., Miranda, A., Mulas, F., Oades, R.D., Roeyers, H., Rothenberg, A., Steinhausen, H.C., Faraone, S.V., 2010. Emotional lability in children and adolescents with attention deficit/hyperactivity disorder (ADHD): clinical correlates and familial prevalence. J. Child Psychol. Psychiatry 51 (8), 915–923. https://doi.org/10.1111/j.1469-7610.2010.02217.x.

Wang, G., Zhang, Y., Zhao, J., Zhang, J., Jiang, F., The Lancet, 2020. Mitigate the effects of home confinement on children during the COVID-19 outbreak. Lond. Engl. 2020 (395), 945–947. https://doi.org/10.1016/S0140-6736(20)30547-X.

Zhang, J., Shuai, L., Yu, H., Wang, Z., Qiu, M., Lu, L., Cao, X., Xia, W., Wang, Y., Chen, R., 2020. Acute stress, behavioural symptoms and mood states among school-age children with attention-deficit/hyperactive disorder during the COVID-19 outbreak. Asian J. Psychiatry 51, 10207-7.

Survey on centres and procedures for the diagnosis and treatment of adult ADHD in public services in Italy

Studio sui centri e le procedure per la diagnosi e il trattamento dell'ADHD nell'adulto nei servizi pubblici in Italia

ELISA ZADRA[1], GIANCARLO GIUPPONI[1], GIOVANNI MIGLIARESE[2*], FRANCESCO OLIVA[3], PIETRO DE ROSSI[4], FRANCESCO GARDELLIN[5], PAOLO SCOCCO[6], SONIA HOLZER[1], VIVIANA VENTURI[2], ANNALISA SALE[5], ANTONIO MARIA CORATO[5], SILVIA PALETTA[8], ALBERTO PORTIGLIATTI POMERI[9], PAOLO FERRERI[3], PAOLO BUSETTO[6], ALESSANDRO PALUCCHINI[7], FRANCESCO DE DOMINICIS[7], VINCENZO FLORIO[1], JACOPO VITTORIANO BIZZARRI[1], FILIPPO BOSCHELLO[1], ANNA CONTARDI[11], LUCA MARI[4], SILVIA GUBBINI[4], AGOSTINO MANZI[4], GIUSEPPE NICOLÒ[4], GIOVANNI MANFREDI[10], AGNESE RAPONI[1], SERENA BRULETTI[12], LIDIA RAVELLI[12], VERA STEINER[12], ANDREA DANIELI[5], YACOB REIBMAN[2], GIANCARLO CERVERI[8], EMI BONDI[12], MARCO INNAMORATI[11], GIULIO PERUGI[7], MAURIZIO POMPILI[10], CLAUDIO MENCACCI[2], ANDREAS CONCA[1]

*E-mail: giovanni_migliarese@asst-pavia.it

[1]Department of Psychiatry and Child Neuropsychiatry, Bolzano Hospital, Italy
[2]Department of Mental Health and Addiction, ASST Fatebenefratelli-Sacco, Milan, Italy
[3]Department of Clinical and Biological Sciences, University of Turin, SCDU Psichiatry, San Luigi Gonzaga University Hospital, Orbassano (Turin), Italy
[4]Department of Mental Health and Pathological Addictions (DSMDP), ASL Rome 5, Italy
[5]Department of Mental Health, AULSS8 Berica, Vicenza, Italy
[6]Department of Mental Health, AULSS6 Euganea, Padova, Italy
[7]Department of Clinical and Experimental Medicine University of Pisa, UO Psychiatry 2, University Hospital of Pisa, Italy
[8]Department of Mental Health and Addiction, ASST Lodi, Italy
[9]Department of Neuroscience 'Rita Levi Montalcini', University of Turin, Italy
[10]Department of Neurosciences, Mental Health and Sensory Organs, Sant'Andrea Hospital, Sapienza University of Rome, Italy
[11]Department of Human Sciences, European University of Rome, Italy
[12]Department of Mental Health and Addiction, ASST Papa Giovanni XXIII Bergamo, Italy

SUMMARY. Attention deficit/hyperactivity disorder (ADHD) often persists into adulthood. Although its persistence and relative high prevalence, ADHD in adults is often underdiagnosed and undertreated in Italy, leading to poor clinical and functional outcomes, and higher costs of illness. The aims of the study were to identify the Italian mental health services for ADHD in adults, describe the diagnostic and treatment procedures they follow, and compare this offer with the recommendations of the German and English guidelines. The centres, that adopt a clinical and assessment protocol for adult ADHD diagnosis (carried out by specifically trained personnel) and prescribe pharmacological treatment for adult ADHD, were selected from the list of accredited services provided by the Appendix B.2 of the ISTISAN 16/37 Reports of the ISS. An ad-hoc survey including open-ended and close-ended questions was sent to each selected centre in February 2020. The overall picture resulting from the data analysis was compared with the recommendations of the German and English guidelines. The present survey shows that only a few centres are specialised in the diagnosis and treatment of ADHD in adults in Italy. Furthermore, there are no national guidelines for adult ADHD in Italy. The collected data also suggest that there is no a unified practice shared by the Centres both for the patient's transition from child and adolescent to adult mental health services and for the diagnostic-therapeutic process. It is therefore crucial to create specific protocols and develop national guidelines to better identify and diagnose ADHD in adults and provide targeted and more efficient multimodal treatments.

KEY WORDS: ADHD, services in Italy, therapeutic offers, ADHD knowledge.

RIASSUNTO. Il disturbo da deficit di attenzione/iperattività (ADHD) spesso persiste in età adulta. Nonostante la sua persistenza e il tasso di prevalenza relativamente alto, l'ADHD nell'adulto è spesso sottodiagnosticato e sottotrattato in Italia, portando a scarsi esiti clinici e funzionali e a maggiori costi sanitari. Lo scopo dello studio è quello di identificare i servizi per la salute mentale italiani che si occupano di ADHD nell'adulto, descrivere le procedure diagnostiche e di trattamento da essi adottate e confrontare questa offerta con le raccomanda-

zioni delle linee guida tedesche e inglesi. Dalla lista di servizi accreditati fornita dall'Appendice B.2 dei Rapporti ISTISAN 16/37 dell'ISS, sono stati selezionati i centri, che adottano un protocollo clinico e testale per la diagnosi di ADHD nell'adulto (condotta da personale specificatamente formato) e prescrivono un trattamento farmacologico a soggetti adulti con ADHD. Ad ogni centro selezionato, nel febbraio 2020, è stato inviato un questionario *ad hoc* con domande aperte e chiuse. Il quadro complessivo risultante dall'analisi dei dati è stato confrontato con le raccomandazioni dalle linee guida tedesche e inglesi. Il presente studio mostra che in Italia solo pochi centri sono specializzati nella diagnosi e nel trattamento dell'ADHD nell'adulto. Inoltre, non esistono linee guida nazionali per l'ADHD nell'adulto. I dati raccolti suggeriscono che non esiste una pratica condivisa tra i centri né per quanto riguarda la transizione del paziente dai servizi per l'infanzia e l'adolescenza a quelli per l'età adulta né rispetto al processo diagnostico-terapeutico. Si rende pertanto necessaria la stesura di protocolli d'intesa e linee guida nazionali al fine di migliorare l'individuazione e la diagnosi dell'ADHD in età adulta e offrire trattamenti multimodali più mirati ed efficienti.

PAROLE CHIAVE: ADHD, servizi in Italia, offerte terapeutiche, conoscenza ADHD.

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is classified in DSM-5[1] as a neurodevelopmental disorder with onset in childhood, which compromises the individual's global functioning or development. The core symptoms are difficulty paying attention, impulsive behaviors and/or an increased level of motor activity.

ADHD is among the most common psychiatric disorders of childhood that often persists into adulthood and old age, and it is associated with significant psychosocial impairment, a high comorbidity rate and multimorbidity[2]. According to available evidence from longitudinal studies, approximately two-thirds of youths with ADHD maintain impairing symptoms of the disorder into adulthood[3,4].

A recent study estimated the prevalence of ADHD in adults to be around 2.8% across twenty countries, with a range between 1.4-3.6%[5]. ADHD symptoms may change throughout the lifespan. In adults, hyperactivity/impulsivity may decrease and turn into inner restlessness, while inattention may persist[6-8] and result in serious impairment across multiple domains of living.

ADHD in the adult population is frequently associated with emotional dysregulation[9] and comorbid psychiatric diseases that complicate its recognition, diagnosis and management. The most frequent comorbid psychopathologies include mood and anxiety disorders[10], substance use disorders, personality disorders[11,12], and behavioural disorders[5]. Several studies have also shown a high incidence of suicidal ideation in adult ADHD[13,14] and a possible association with an alteration of the circadian rhythm[15,16]. Furthermore, untreated ADHD has negative long-term consequences such as poor academic and work related outcomes, low self-esteem, relational problems, accidents and increased involvement with the criminal justice system[4,17].

Despite the persistence of the disorder and its socio-relational impact, ADHD in adults, in Italy as well as in many other countries, is often underdiagnosed or misdiagnosed[18], undertreated when recognized, or not treated at all[19]. To address this problem, 48 centres for adult ADHD were accredited in six regions of Italy (Emilia-Romagna, Lazio, Lombardy, Piedmont, Sardinia, Veneto) and in the Autonomous Province of Bolzano in 2016.

To date, however, accreditation has not really led, with rare exceptions, to the birth of specific services for managing adult ADHD, so much so that the accredited centres are not generally operational.

The German and English guidelines for the diagnosis and treatment of ADHD in adults

The German guidelines

The Interdisciplinary Evidence- and Consensus-based (S3) Guideline "Attention Deficit/Hyperactivity Disorder (ADHD) in Children, Young People and Adults"[20,21] has been updated in 2018.

With the aim of making valid and replicable diagnoses, these guidelines highlight the need to use, alongside the clinical assessment, self and hetero-administered test instruments and behavioral observations (Table 1).

Furthermore, the German guidelines highlight the importance of cooperation between different specialists and consider the transition from child to adult mental health services to be an important aspect to pay attention to. In order to facilitate the transition process and the sharing of information between professionals, the use of a specific form is suggested.

With regard to treatment, the guidelines recommend to adopt a global and multimodal therapeutic approach. The pillars of this approach are psychoeducation, in which different treatment options must be offered to the patient, with the aim of promoting an informed and participatory decision, and – on the contrary with respect to the care for children and adolescents – pharmacotherapy, considered the primary treatment option in mild, moderate, and severe symptomatic expression. Patient preferences should be always respected and adherence to pharmacological therapy regularly checked.

The multimodal treatment plan can also combine psychosocial interventions (including psychotherapy) with the above mentioned interventions, according to the individual symptoms, the level of functioning, participation, and the preferences of the patient and his social network. If psychotherapy is suggested, the guidelines recommend cogni-

Table 1. Tests recommended by the German guidelines for the diagnosis of adult ADHD.

Clinical assessment	Self-assessment
ADHS-DC (HASE)	ADHS-SB (HASE)
ADHS Interview (IDA)	ADHS-E
CAARS-O	CAARS-S
WIR (HASE)	KATE
	WR-SB

tive behavioral therapy, with the aim of developing strategies and practical techniques that contribute to a reduction in the impact of ADHD symptoms on daily life functioning, for example through the improvement of problem solving skills, techniques for reducing distractibility, and stress management skills. The dysfunctional beliefs, that the patient has developed throughout his life, must also be identified and addressed.

NICE guidelines

The National Institute for Health and Care Excellence (NICE) clinical guidelines for the diagnosis and management of Attention deficit hyperactivity disorder in children, young people and adults[22] have been last updated in 2019.

According to these guidelines, a diagnosis of ADHD should only be made by a specialist psychiatrist, paediatrician or other appropriately qualified healthcare professional with training and expertise in the diagnosis of ADHD, on the basis of a full clinical and psychosocial assessment of the person (this should include discussion about behaviour and symptoms in the different domains and settings of the person's everyday life), a full developmental and psychiatric history, observer reports, and assessment of the person's mental state. A diagnosis of ADHD should therefore not be made solely on the basis of rating scale or observational data. However, rating scales such as standard symptom and adverse effect rating scales are considered valuable adjuncts for clinical assessment and throughout the course of treatment for people with ADHD.

The NICE guidelines suggest that people with ADHD would benefit from improved organisation of care and better integration of child and adolescent mental health services and adult mental health services. A young person with ADHD should be reassessed at school-leaving age to establish the need for continuing treatment into adulthood. If treatment is necessary, arrangements should be made for a smooth transition to adult services and patient information should be shared between professionals. After transition to adult services, adult healthcare professionals should carry out a comprehensive assessment of the person with ADHD that includes personal, educational, occupational and social functioning, and assessment of any coexisting conditions.

Medication is considered the first-line treatment for adult ADHD, although there is still uncertainty over the long-term benefits and the side effects of medication. However, untreated ADHD can have a negative impact on a person's life, with lower educational attainment and higher criminality. That's why the NICE guidelines recommend medication when ADHD symptoms are still causing a significant impairment in at least one domain of everyday life despite environmental modifications.

Furthermore, the use of non-pharmacological treatments is recommended, although their efficacy according to various studies appears lower than that of the medication. Non-pharmacological treatment should include a full cognitive behavioral therapy program and at least a structured psychological support intervention focused on ADHD, with regular follow-ups in person or by phone.

According to these guidelines, mental health services for children, young people and adults should form multidisciplinary specialist ADHD teams and/or clinics for children and young people, and separate teams and/or clinics for adults. These teams and clinics should have expertise in the diagnosis and management of ADHD, and should provide diagnostic, treatment and consultation services for people with ADHD who have complex needs, or where general psychiatric services are in doubt about the diagnosis and/or management of ADHD. They should also put in place systems of communication and protocols for informations sharing among professionals, including arrangements for transition from child to adult services, and they should ensure that clear lines of communication between primary and secondary care are maintained.

The situation in Italy

In Italy, there are no reference guidelines or specific indications on the organization of services for the diagnosis and treatment of ADHD in adults.

With the aim of investigating the national prevalence of ADHD in children and adults and monitoring the use of specific medications for the disorder (i.e. methylphenidate and atomoxetine), the Italian National Institute of Health (ISS) was commissioned to establish a dedicated register (Italian Attention-Deficit/Hyperactivity Disorder Registry, see the Official Gazette of the Italian Republic No. 106 of 24/4/2007). Pharmacovigilance activities on minors were therefore started in April 2007, while the register for adults was created only in February 2016 (see the Official Gazette No. 275 of 26/11/2014). According to the ISS indications, the prescription of pharmacological therapy with methylphenidate or atomoxetine can only be guaranteed to patients diagnosed according to the DSM-5 criteria and registered in the national register.

More recently, in May 2019 (determination of the Italian Medicines Agency (AIFA) in the Official Gazette No. 113 of 16/5/2019), the national ISS register was closed due to a new and more specific one created by AIFA on its online portal, the PT-AIFA register.

Regions have been instructed to identify and accredit authorized centres for the prescription of pharmacological treatments for ADHD in adults. The organization of the centres, their nature of first or second level services and their interface with the territorial psychiatric services have not been defined, as well as no operational methods and/or protocols have been indicated for the diagnosis and/or the treatment of adult ADHD.

It is therefore to be highlighted how in Italy an appropriate treatment for adult patients with ADHD, despite clear evidence and extra-national guidelines, is made difficult to apply due to the fact that, in case of first diagnosis in adulthood, the only medication approved for treatment is a non-stimulant, i.e. atomoxetine (determination AIFA in the Official Gazette No. 275 of 26/11/2014). In addition, methylphenidate is not licensed for use in adults with ADHD, even in the event of need for therapeutic continuity during transition from child to adult care, but it is allowed thanks to special regulatory measures (rectification of the determination AIFA in the Official Gazette No. 168 of 22/07/2015). This happens despite the fact that a substantial efficacy of the medication for the well-being and quality of

life of individuals and the community has long been clearly demonstrated also in adults[23]. ADHD medication use is in fact associated with lowered rates of mood disorders, substance use disorders, criminality, suicidality, traumatic brain injuries, motor vehicle crashes, injuries, and academic outcomes[24].

AIM OF THE STUDY

The aim of the study is to describe the mental health services currently existing in Italy for ADHD in adults and the procedures they follow in the diagnosis and treatment of this disorder, comparing this offer with the recommendations of the German and English guidelines.

METHODS

In order to identify the Italian mental health centres for ADHD in adults, Appendix B.2 of the ISTISAN 16/37 Reports of the ISS[25] was consulted at first. From the list in Appendix B.2, the centres that adopt a clinical and test protocol for adult ADHD diagnosis carried out by specifically trained personnel and that prescribe pharmacological treatment for ADHD in adults have been selected, through telephone investigations and contacts between specialists. An ad-hoc survey with open-ended and close-ended questions was sent to each selected centre in February 2020.

Finally, the overall picture resulting from the analysis of the data collected by the selected centres was compared with the recommendations of the German and English guidelines.

RESULTS

At the end of the selection process, nine centres had the desired characteristics: the Centre of Excellence in ADHD in adults (Bolzano), the DSM of the AULSS 8 Berica (Vicenza), the Centre for the diagnosis and treatment of ADHD in adulthood (Milan), the Adult ADHD Reference Centre (Turin), the ADHD Centre (Rome), the CSM of the ULSS 6 (Padua), the Centre for adult ADHD - ASL Roma 5 (Rome), the Centre for ADHD in adults - AOUP (Pisa), the DSM of ASST Papa Giovanni XXIII (Bergamo).

The main characteristics of these services are shown below both from a diagnostic and clinical intervention point of view.

The Centre of Excellence in ADHD in adults [Ambulatorio d'eccellenza per ADHD nell'adulto] at the Psychiatry Service of the Bolzano Hospital

The Centre started its activity in 2009 and follows around 100 patients per year. It is for adult patients only and adopts a transition protocol agreement with Child Neuropsychiatry to promote therapeutic continuity.

During the first phase of the diagnostic process the patient receives a self-administered test battery via email; in the second phase one or more interviews with the psychologist are held to administer other tests; if ADHD diagnosis is confirmed, a psychiatric consultation is carried out to complete the diagnosis and create an individual treatment plan (Table 2).

Table 2. Battery of tests administered by the Centre of Excellence in ADHD in adults (Bolzano).

1st phase: self-administered tests	2nd phase: tests administered in the clinic
ASRS-V1.1	Mental health history – part 2
BDI-II Becks Depression Inventory	DIVA 2.0
Short mental health history	HASE
HCL-32	SCID-II interview
MDQ	
SCID-II questionnaire	
TEMPS-A	
WURS	

The diagnostic process is completed with an exhaustive series of physical tests. The Centre normally prescribes the following blood tests to patients with ADHD: blood count with formula; liver values (GammaGT, Transaminase); creatinine; electrolytes; CRP; TSH (T3/T4); Vitamin B12 concentration; folate concentration. ECG, EEG and NMR imaging of the brain without contrast are also prescribed (if waiting times are too long, the brain CAT is alternatively prescribed).

The Centre prescribes atomoxetine and/or methylphenidate for the treatment of ADHD in adults. The first stage of methylphenidate administration is carried out following patients' admission to the day hospital with the aim of monitoring patients' response to the drug. For more complex cases, e.g. in the presence of comorbidities such as substance abuse, hospitalization may also be provided for longer periods. If necessary, other medications are prescribed to treat comorbidities.

Furthermore, the following services are offered by the Centre to adult patients with ADHD: psychoeducation, cognitive-behavioral psychotherapy, systemic therapy, group therapy, family therapy, therapy for relatives, mindfulness. The aforementioned interventions are for both inpatients and outpatients with variable average waiting times. In the case of outpatients, waiting times can be longer.

The Mental Health Department (DSM) of the AULSS 8 Berica in Vicenza

It offers diagnosis and treatment of ADHD in adulthood. Its working group on Neurodevelopmental Disorders facilitates the intervision and dissemination of theoretical and practical materials among the clinicians of the CSM (Mental Health Centres) and the SPDC (psychiatric ward). The Department starded its activity in 2016 and accepted about 40 adult patients with ADHD until the end of 2019. The service is for adults only and adopts a transition protocol agreement with the Child Neuropsychiatry.

Steps of the psychodiagnostic process are:

1. Initial psychiatric interview and team discussion of the case;
2. Psychodiagnostic testing (from 2 to 4 meetings with the Psychologist, possible interviews with Social Worker and/or Doctor);
3. Team discussion of the case, diagnostic report writing, therapy/rehabilitation proposal, and feedback to the patient (Table 3).

The prescribed clinical tests are ECG and routine tests (complete blood count, liver values, electrolytes, creatinine).

When drug treatment for ADHD is needed, atomoxetine or methylphenidate are usually prescribed. Mood stabilizers, antide-

Table 3. Battery of tests administered by the DSM of the AULSS 8 Berica (Vicenza).

1st phase	2nd phase: ADHD assessment	3rd phase: outcome evaluation
ASRS-V1.1 WURS MOCA MCMI-III MMPI-RF Rorschach test Mental health history (unstructured or structured interview on the model of Adult Attachment Interview) Sociogram	DIVA 2.0 ACE Plus HASE SCID II	CORE-OM Possible follow-up at 6 months

pressants and antipsychotics may also be prescribed to treat comorbidities, or to optimize the patient's clinical conditions before beginning or during ADHD-specific treatment.

If needed, clinical monitoring and follow-ups are conducted by the patient's referral Mental Health Centre.

As for the non-pharmacological therapeutic offers, the Centre offers: differentiated group psychoeducational pathways (for patients and family members) to provide scientific and clinical information on the nature of the disorder and promote effective strategies to minimize the negative impact of the disorder on daily life; possible social support interventions and career guidance; possible short psychotherapy focused on ADHD-related problems; possible patient's reevaluation.

The Centre accepts also patients from other local health units (AULSS), whose regional centres authorized to prescribe drugs for the treatment of ADHD in adult patients are not active, of the Veneto Region.

The Centre for the diagnosis and treatment of ADHD in adulthood [Ambulatorio per la diagnosi e il trattamento dell'ADHD in età adulta] of ASST Fatebenefratelli-Sacco in Milan

The Centre was born in 2014, follows around 100 patients and accepts around 60 new ones per year. The service is for patients between the ages of 18 and 35. It carries out assessments on adults with clinical suspicion of ADHD and accepts young adults, who have already been diagnosed with ADHD by the Child Neuropsychiatry. It is a suprazonal and supra-departmental centre and is structured as a second level specialist service.

Diagnosis is based on the collection of information from multiple sources, including direct observation and questionnaires completed by the patient and by his family and/or significat others.

After a first phase of screening with self-administered questionnaires that investigate both the core clinical manifestations of the disorder and possible comorbidities of axis I and axis II, a structured anamnestic collection is carried out and symptoms of ADHD in childhood and adulthood are investigated through a structured diagnostic interview and cognitive and affective tests. When possible, a careful analysis of elementary and middle school report cards is carried out to understand the subject's functioning between 7 and 13 years. Attention is paid to the patient's quality of life - both overall and in the areas specifically affected by ADHD symptoms, as well as the ability to regulate emotions and affects. Finally, a clinical and test assessment is undertaken to identify possible comorbid conditions[26] (Table 4).

As for clinical tests, ECG and blood tests are prescribed (blood count with formula; GGT, transaminase, creatinine; electrolytes, TSH reflex, blood sugar, Vitamin B12, folate). Blood pressure and heart rate are also detected before the start of the drug therapy and at each check.

Atomoxetine, methylphenidate and, secondly, bupropion are prescribed to adults with ADHD[27] in combination, if necessary, with other medications for comorbid mental illness. The Centre organizes psychoeducational groups.

The Adult ADHD Reference Centre [Centro di riferimento ADHD per i soggetti in età adulta] of the Psychiatry Unit, San Luigi Gonzaga University Hospital (Orbassano, Turin)

The service was born in 2014 and became Piedmont coordinator centre after the Regional Decree in 2016. The Centre is for adult patients, evaluates about 150 people every year and accepts about 80 new ones. About 10% of patients come from the Child Neuropsychiatry, which has been organized in reference centres in Piedmont for years. For the transition from child to adult mental health services, a protocol was drawn up together with the Piedmont Region.

The diagnostic process is structured as follows:

1. A general psychiatric consultation with a detailed anamnestic collection and psychiatric evaluation;
2. A second consultation to investigate ADHD symptoms and consult elementary and middle school report cards;
3. If necessary, a psychiatric comorbidity assessment;
4. A third appointment to provide diagnostic feedback to the patient and start the drug therapy;
5. One-week follow-up (Table 5).

Table 4. Battery of tests administered by the Centre for the diagnosis and treatment of ADHD in adulthood (Milan).

1st phase: self-administered tests	2nd phase	3rd phase
WURS ASRS-V1.1 MDQ SDS Zung SCID-II questionnaire STAI-Y 1 and 2	DIVA 2.0 SCID-II interview ADD Brown Scales WHOQOL DERS	CGI VGF AA-QoL

Table 5. Battery of tests administered by the Adult ADHD Reference Centre - San Luigi Gonzaga (Turin).

1st phase	2nd phase	3rd phase (possible)
ASRS-V1.1 ADHD-RS	DIVA 2.0 in the presence of a family member MCMI-III	WURS BAARS-IV M.I.N.I. PLUS 5.0.0 MDQ BDI-II HAM-A/HAM-D DES-II

The following clinical tests are prescribed in case of drug administration: blood count with formula, thyroid, kidney and liver function, ECG, and any further tests deemed necessary on a case by case basis. In addition, blood pressure and heart rate are detected before the start of therapy and at each check.

As for the therapeutic offer, a multimodal approach is adopted consisting of psychoeducation, coaching, cognitive psychotherapy, dynamic supportive psychotherapy, mindfulness as well as pharmacological therapy that includes methylphenidate, atomoxetine, and any other drugs to treat comorbidities.

The ADHD Centre [Ambulatorio ADHD] at the Complex Operative Unit (UOC) of Psychiatry of the Sant'Andrea Hospital - Sapienza University of Rome, Faculty of Medicine and Psychology

The Centre started its activity in 2016 and carries out around 30 new medical consultations and 100 follow-ups per year. The Centre is for adult patients only, who independently contacted the Centre or have been sent to the UOC from internal services, external specialists (psychiatrists and psychotherapists), or the Child Neuropsychiatry.

As for the diagnostic evaluation, at the first medical examination, a detailed collection of anamnestic data (medical and psychiatric) is carried out and specific tests are administered. Follow-ups are taken at two months, four months and six months (Table 6).

The drug therapy is constantly monitored with possible drug dosage changes or drug switching. Patients perform instrumental medical tests and blood chemistry tests externally, if needed.

Patients are administered atomoxetine and methylphenidate (immediate and prolonged release), and any other drugs to treat comorbidities, such as mood stabilizers, antidepressants, anxiolytics, and antipsychotics.

The Local Health Unit ULSS 6 Euganea (Padua)

It offers diagnosis and treatment of adult ADHD, although it does not have a formal service specifically dedicated to this disorder. Patients are followed by the Mental Health Centre (CSM). The CSM accepted five patients on first medical consultation in 2015, four in 2016, five in 2017, twenty-two in 2018 and ten in 2019 (data collected until the end of May 2019). Usually patients are sent to this clinic by colleagues when ADHD is suspected. Few patients in transition from the Child Neuropsychiatry of Padua are accepted, as this Centre continues to follow ADHD patients even in adulthood.

The diagnostic process is structured in three medical consultations: the first one includes a psychiatric evaluation following the criteria of the ADHD Semi-structured interview Krause/Krause; the tests listed in Table 7 are administeres in the first and second medical consulation; in the third consultation a re-evaluation of the patient is carried out and a feedback to the patient and his family members is provided.

The medical tests are: blood chemistry routine, ECG and MRI.

Regarding the therapeutic offer, the CSM offers ADHD patients individual interviews and drug therapy: atomoxetine and methylphenidate.

Table 6. Battery of tests administered by the ADHD Centre (Rome).

1st phase	2nd phase: follow-ups
ASRS-V1.1	ASRS-V1.1
DIVA 2.0	BPRS
BPRS	CGI-bp
CGI-bp	WHODAS 2.0
HCL-32	DERS
WHODAS 2.0	RIPoSt
DERS	MEQ-SA
RIPoSt	CAARS - Observer: Screening Version
Barratt Impulsiveness Scale	
FAST	
Brief TEMPS-M (self-report)	
MEQ-SA	
CAARS - Observer: Screening Version	

The Centre for adult ADHD [Ambulatorio per ADHD Adulto] of the Local Health Department "ASL Roma 5"

It is located at the SS Gonfalone Hospital in Monterotondo (RM). At the moment, it represents the only active centre officially approved by the Lazio Region with determination G03276 of 21/3/2019. For this reason, it is the only centre in Lazio formally authorized to prescribe atomoxetine (determination AIFA GU No. 275 of 26/11/2014) and methylphenidate (determination AIFA GU No. 168 of 22/7/2015). Within the ASL Roma 5, a second centre has been approved by the Lazio Region at the Parodi Delfino Hospital in Colleferro (RM), which will soon be open to the public.

The Centre for adult ADHD started its activity in June 2019 and carried out 64 new medical consultations and 97 follow-ups (data collected until 5/3/2020). The estimated total number of first medical consultations during the first year of the centre's activity is 72, while the estimated total number of follow-ups is 120. The service is for adult patients only which usually contact the ASL Roma 5 on suggestion of internal territorial services, other ASL of Rome and Lazio (mainly CSM, SerD and TSMREE), external specialists (psychiatrists and psychotherapists), or request for a consultation on their own initiative.

The clinical activity of the Centre is summarized as follows:

1. During the first phase a medical consultation is conducted to collect a full medical history and perform a psychiatric evaluation; the test listed in Table 8 are administered to the patient; when possible, a diagnostic feedback is immediately given to the patient and the drug therapy is prescribed;
2. Only when it is needed, another medical consultation is conducted to provide a diagnostic feedback to the patient and start the drug therapy, if this had not been done in the previous phase; other tests are administered on a case by case basis.
3. In the third phase, the patient is followed by the Centre togheter with the referring health care provider or physician. One- and two-month follow-ups are taken in case of treatment titration or unstable patients, while follow-up time-points are set at three- and six-month for stabilized patients. Clinical progress is also monitored by interviewing an informant.

Table 7. Battery of tests administered by the CSM of the ULSS 6 Euganea (Padua).

1st phase	2nd phase	3rd phase
ASRS-V1.1	DIVA 2.0	Current Symptoms Questionnaire
WURS	Current Symptoms Questionnaire	
Current Symptoms Questionnaire		

Table 8. Battery of tests administered by the Centre for adult ADHD (Rome).

1st phase	2nd phase (possible)	3rd phase
ASRS-V1.1 DIVA 2.0 Possible integration with ACE plus	MCMI-III WAIS-IV WHODAS 2.0 Specific neuropsychological test battery	Repeated administration of ASRS-V1.1

Patients carry out instrumental clinical tests and blood chemistry analyzes externally, if necessary.

Atomoxetine and methylphenidate drug therapy is proposed to patients who meet the diagnostic criteria, for whom at least moderate severity and functional impairment are ascertained and who do not have ongoing clinical conditions incompatible with ADHD-specific therapy. When necessary, methylphenidate is prescribed off-label with written consent in the case of an adult who has never undergone methylphenidate therapy before the age of 18. In case of methylphenidate administration, patients do not attend day hospital.

The Centre may also prescribe mood stabilizers, antidepressants and antipsychotics to less complex patients, who do not need more intensive care, to treat comorbidities, or to optimize the patient's clinical conditions before beginning or during ADHD-specific treatment. More complex patients, who need frequent follow-ups or intensive care, are sent instead to territorial centres for the necessary stabilization to start the ADHD-specific therapy or integrated parallel follow-ups.

To date, the Centre does not have enough resources to allow structured individual or group non-pharmacological interventions. Despite this, elements of psycho-education are provided to patients and their family members during follow-ups.

The Centre for ADHD in adults [Ambulatorio per l'ADHD dell'Adulto] of the UO Psychiatry 2 - University Hospital of Pisa (AOUP)

It is located at the Santa Chiara Hospital in Pisa. To date, it is the only Centre formally authorized to prescribe atomoxetine (determination AIFA GU No. 275 of 26/11/2014) and methylphenidate (determination AIFA GU No. 168 of 22/7/2015) in Tuscany. The Centre started its activity in collaboration with the Centre for ADHD of the 'Stella Maris' - Institute of Child Neuropsychiatry in February 2018. Since then, the Centre carried out a total of 194 new consultations and more than 400 follow-ups (data collected until 30/3/2020). The service is for adult only. Patients are usually referred to the Centre from other adult psychiatric services of Tuscany and other regions of Italy, from the child psychiatric services of Tuscany at the age of 18 years, from external specialists (psychiatrists and psychotherapists), or they request for a consultation on their own initiative.

During the first medical consultation the patient's personal history is collected and a psychiatric evaluation is performed; the test listed in Table 9 are administered to the patient, a diagnostic feedback is immediately given to the patient and the drug therapy is prescribed. Flexible follow-up schedules are planned in case of treatment titration or unstable patients, while follow-up time-points are set at three- and six-month for stabilized patients. Clinical progress is also monitored by standardized clinical evaluation.

Patients carry out instrumental clinical tests, brain imaging and blood chemistry analyses, if necessary.

Table 9. Battery of tests administered by the Centre for ADHD in adults (Pisa).

ASRS-V1.1
DIVA 2.0
ACE plus
MCMI-III
DERS
WHODAS 2.0
MINI- PLUS 5.0.0
RIPoSt
BPRS
CAARS
Brief TEMPS-M
DOTES
CGI
FAST

If necessary, atomoxetine and methylphenidate are prescribed to the patients. Methylphenidate is prescribed off-label with written consent in the case of an adult who has never undergone methylphenidate therapy before the age of 18.

Psychoeducation is provided for patients and for their families.

The Department of Mental Health and Addiction of ASST Papa Giovanni XXIII in Bergamo

This Department offers diagnosis and treatment of adult ADHD and is organized on three leves:

1. The outpatient Clinic offers clinical evaluation of adult ADHD and, if necessary, it administers the questionnaires listed in the Table 10 to patients to complete the diagnosis. When needed, it provides psychotherapy interventions and follow-ups to ADHD patients. The Clinic provides advice to the patient's referral mental health and addiction services. The patients contact the Clinic on their own initiative or they are referred by the units of Child Neuropsychiatry, the Service of Drug Addiction (SerD), or by other Psychiatric units. There are currently no age or geographic barriers that limit patient access to the Clinic. The team is composed of one psychiatrist and one psychologist. To date, the Clinic follows 109 patients.
2. The Psychosocial Center 1 (CPS1) accepts only patients of territorial competence. It has enough resources to follow more complex patients and to offer multimodal interventions. Patients are referred to the Centre by the local units, the Psychiatric Diagnosis and Treatment Service, the Child Neuropsychiatry, and local agencies such as the Child Protection Services. The Centre follows about 50 patients (all complex patients). It carries out psychodiagnostic and neuropsychological assessment with the aim of structuring an intervention project which may include rehabilitation intervention for more complex patients (carried out by the following structure).
3. Psychosocial Rehabilitation 1 offers specific interventions for ADHD patients: semi-residential care and job placement (including preparatory courses for work carried out by social cooperatives, which are authorized to exercise this function since they won a public sector contract with ASST).

Table 10. Battery of tests administered by the DSM of Bergamo

DIVA 2.0
Possible integration with Rorschach test, ENB-2 and WAIS IV

4. Before treatment, ECG and blood tests are prescribed: blood count, liver function, kidney function, electrolytes, iron metabolism, thyroid function, vitamin B12 dosage, folate.
5. All three levels offer drug therapy with methylphenidate as a first choice in absence of impeding factors (e.g. substance abuse, absence of support in adherence to treatment, unaffordable drug prices for the patient) or atomoxetine (Table 11).

DISCUSSION

From the above results, it is possible to notice that only a few centres in Italy offer diagnosis and treatment of ADHD in adults, especially if compared with the number of existing services for ADHD in childhood and adolescence. For this age group, in fact, diagnostic and treatment services are available and well established throughout most of Europe, as highlighted by the European Network Adult ADHD (ENAA)[2].

Thanks to longitudinal studies, it is now established that approximately two thirds of young people with ADHD maintain impairing symptoms of the disorder into adulthood[4,28]. The lack of services for ADHD in adults determines a significant organizational and clinical issue.

Many young people with ADHD continue to experience significant difficulties into adulthood. ADHD symptoms of-

Table 11. Summary results.

	Centre of Excellence in ADHD in adults (Bolzano)	DSM of the AULSS 8 Berica (Vicenza)	Centre for the diagnosis and treatment of ADHD in adulthood (Milan)	Adult ADHD reference centre (Turin)	ADHD Centre (Rome)	CSM of the ULSS 6 (Padua)	Centre for adult ADHD - ASL Roma 5 (Rome)	Centre for ADHD in adults AOUP (Pisa)	DSM (Bergamo)
Drug therapy:									
Atomoxetine	x	x	x	x	x	x	x	x	x
Methylphenidate	x	x	x	x	x	x	x	x	x
Bupropion			x					x	
Day Hospital for methylphenidate administration	x								
Psychoeducation	x	x	x	x		x	x	x	x
Cognitive behavioral psychotherapy	x								x
Other psychotherapeutic interventions	x	x		x					x
Mindfulness	x			x					
Transition protocol agreement with Child Neuropsychiatry	x	x		x		x		x	x
Multidisciplinary team	x	x	x					x	x
Prescribed medical tests:	Blood tests ECG EEG NMR imaging of the brain without contrast or brain CAT	Blood tests ECG	Blood tests ECG		Blood tests ECG MRI	Blood tests ECG EEG	Blood tests ECG NMR CAT if nesessary		Blood tests ECG
Tests used by multiple Centres	ASRS-V1.1	ASRS-V1.1	ASRS-V1.1	ASRS-V1.1	ASRS-V1.1	ASRS-V1.1	ASRS-V1.1	ASRS-V1.1	
	DIVA 2.0	DIVA 2.0	DIVA 2.0	DIVA 2.0	DIVA 2.0	DIVA 2.0	DIVA 2.0	DIVA 2.0	DIVA 2.0
	WURS	WURS	WURS	WURS		WURS			

(Continued) Table 11

(Continued) Table 11

	Centre of Excellence in ADHD in adults (Bolzano)	DSM of the AULSS 8 Berica (Vicenza)	Centre for the diagnosis and treatment of ADHD in adulthood (Milan)	Adult ADHD reference centre (Turin)	ADHD Centre (Rome)	CSM of the ULSS 6 (Padua)	Centre for adult ADHD - ASL Roma 5 (Rome)	Centre for ADHD in adults AOUP (Pisa)	DSM (Bergamo)
		ACE plus					ACE plus	ACE plus	
	BDI-II			BDI-II					
	HCL-32				HCL-32				
	SCID-II	SCID-II	SCID-II						
	MDQ		MDQ	MDQ					
		MCMI-III		MCMI-III			MCMI-III	MCMI-III	
			DERS		DERS			DERS	
					WHODAS 2.0		WHODAS 2.0	WHODAS 2.0	
	HASE	HASE							
		Rorschach test							Rorschach test
							WAIS-IV		WAIS-IV
				M.I.N.I. PLUS 5.0.0				M.I.N.I. PLUS 5.0.0	
					BPRS			BPRS	
					RIPoSt			RIPoSt	
					CAARS			CAARS	
					FAST			FAST	
					CGI			CGI	
					Brief TEMPS-M			Brief TEMPS-M	

ten persist and are accompanied by comorbidity such as personality disorders, emotional and social difficulties, substance abuse, unemployment, and involvement in criminal activities. Failure to treat adults with ADHD has significant social costs and represents a significant public health issue. Yet, in Italy only a minority of adults with ADHD are correctly diagnosed and treated[27].

Also Aifa Onlus ("Associazione italiana famiglie ADHD"), the "Società italiana di psichiatria" and the "Società italiana patologie da dipendenza" highlighted in 2018 that "it is difficult for adults, or even impossible, to receive the diagnosis of ADHD". AIFA has created the National Register for ADHD in adults at the ISS (Determination No. 1291/2014). Although the ISS has repeatedly requested that the Regions identify the Centres of Reference for ADHD in adults, after 4 years few regions have done so and there is no official list of the established Centres.

To aggravate this situation of absolute lack of specialised services that can correctly diagnose and treat adults with ADHD, there are no official guidelines for ADHD in adult in Italy.

From the comparative evaluation of the nine Centres for adult ADHD that offer structured diagnostic interventions and specific pharmacological and non-pharmacological treatments, it is found that, although some similarity, there is no shared practice between the Centres. The Centres apply diagnostic procedures that are partially different from each other in terms of methods, administered tests and timing. Not

everyone applies a protocol for the patient's transition from child to adult mental health services. In this regard, both the English and German guidelines have highlighted the importance of the transition phase and are trying to systematize this step to encourage better patient care. Research shows that disruption of care during transition adversely affects clinical outcome and can lead to a drop-out from services[2,29,30].

Whit regard to the NICE recommendations about creating multidisciplinary teams of specialists on the disorder, it is to notice that not all the Centres considered by this study resort to teams composed of professionals who are members of different disciplines (e.g. Psychiatrists, Psychologists, Social Workers, etc.).

There is also a significant diversity of the non-pharmacological therapeutic offer among the Centres. Both the English and German guidelines highlight the importance of adopting a global and multimodal therapeutic approach and propose, in cases where non-pharmacological treatment is advisable, the use of psychoeducation interventions and cognitive behavioral therapy. However, not all Italian Centres offer this type of intervention. In addition to the lack of homogeneity between the services, the lack of non-pharmacological treatment offer limits the patient's choice of treatment, the importance of which is indicated by an impressive scientific literature and has been highlighted by both guidelines, and reduces the possibility for the patient to receive adequate and personalized care according to his needs.

Regarding the pharmacological treatment of ADHD, all Centres offer treatment with atomoxetine and methylphenidate (in therapeutic continuity in subjects already treated before 18 years of age according to law 23 December 1996, No. 648 or with off-label modality), in addition to specific drugs to treat any comorbidities.

In conclusion, on the basis of the collected data on the current situation of our country, it is desirable to develop national guidelines for the diagnosis and treatment of ADHD in adults and to define a network of specialised centres that can share practices and modalities of clinical intervention. In order to deal with the disparities that emerged on the national scene, the first Italian network for ADHD, which involves both centres for adults and children, was recently set up under the aegis of the Italian Society of Neuropsychopharmacology (SINPF). Further research will be necessary to better define the clinical characteristics of the disorder in adults and old age, identify its prevalence in Italy and develop universally shared therapeutic programs.

It would also be important to create a shared protocol for the transition of patients from child to adult mental health services. Adult clinics should be able to offer young adults with ADHD in transition services that enable them to obtain the multimodal care and interventions that were available to them as children and adolescents or to establish appropriate interventions for those receiving diagnosis for the first time in adulthood.

CONCLUSIONS

The present survey shows that in Italy only a few centres are specialised in the diagnosis and treatment of ADHD in adults. Given that people with ADHD may experience significant difficulties during adulthood, the data highlight a serious public health issue. Furthermore, the collected data suggest that there is no shared practice neither for the patient's transition from Child and Adolescent Mental Health Services to adult care nor in the diagnostic-therapeutic process.

It is therefore crucial to create specific protocols and develop national guidelines to better identify and diagnose ADHD in adults and provide targeted and more efficient multimodal treatments.

Conflict of interests: the authors have no conflict of interests to declare.

REFERENCES

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders (5th ed.). Washington, DC: American Psychiatric Association, 2013.
2. Kooij JJS, Bijlenga D, Salerno L, et al. Updated European Consensus Statement on diagnosis and treatment of adult ADHD. Eur Psychiatry 2019; 56: 14-34.
3. Faraone SV, Biederman J, Mick E. The age dependent decline of attention-deficit/hyperactivity disorder: a meta-analysis of follow-up studies. Psychol Med 2006; 36: 159-65.
4. Faraone SV, Asherson P, Banaschewski T, et al. Attention-deficit/hyperactivity disorder. Nat Rev Dis Primers 2015; 1: 15020.
5. Fayyad J, Sampson NA, Hwang I, et al. The descriptive epidemiology of DSM-IV Adult ADHD in the World Health Organization World Mental Health Surveys. Atten Defic Hyperact Disord 2017; 9: 47-65.
6. Francx W, Zwiers MP, Mennes M, et al. White matter microstructure and developmental improvement of hyperactive/impulsive symptoms in Attention-Deficit/Hyperactivity Disorder. J Child Psychol Psychiatry 2015; 56(: 1289-97.
7. Turgay A, Goodman DW, Asherson P, et al. ADHD Transition Phase Model Working Group. Lifespan persistence of ADHD: the life transition model and its application. J Clin Psychiatry 2012; 73: 192-201.
8. Biederman J, Mick E, Faraone SV. Age-dependent decline of symptoms of attention deficit hyperactivity disorder: impact of remission definition and symptom type. Am J Psychiatry 2000; 157: 816-8.
9. Perugi G, Pallucchini A, Rizzato S, Pinzone V, De Rossi P. Current and emerging pharmacotherapy for the treatment of adult attention deficit dyperactivity disorder (ADHD). Expert Opin Pharmacother 2019; 20: 1457-70.
10. Oliva F, Carezana C, Nibbio G, Bramante S, Portigliatti Pomeri A, Maina G. Treatment of Comorbid Adult Attention-deficit/Hyperactivity Disorder and Generalized Anxiety Disorder: 2 Case Reports. J Psychiatr Pract 2018; 24: 292-8.
11. Oliva F, Mangiapane C, Nibbio G, Portigliatti Pomeri A, Maina G. MCMI-III Personality Disorders, Traits, and Profiles in Adult ADHD Outpatients. J Atten Disord 2020; 24: 830-9.
12. Katzman MA, Bilkey TS, Chokka PR, Fallu A, Klassen LJ. Adult ADHD and comorbid disorders: clinical implications of a dimensional approach. BMC Psychiatry 2017; 17: 302.
13. Giupponi G, Giordano G, Maniscalco I, et al. Suicide risk in attention-deficit/hyperactivity disorder. Psychiatr Danub 2018; 30: 2-10.
14. Giupponi G, Innamorati M, Rogante E, et al. Characteristic of mood polarity, temperaments and suicide risk in adult ADHD. Int J Environ Res Public Health 2020; 17: 2871.

15. Tonetti L, Conca A, Giupponi G, Filardi M, Natale V. Circadian activity rhythm in adult attention-deficit hypercativity disorder. J Psychiatr Res 2018; 103: 1-4.
16. Tonetti L, Conca A, Giupponi G, Natale V. Circadian pattern of motor activity in adults with attention-deficit/hyperactivity disorder. Chronobiol Int 2017; 34: 802-7.
17. Shaw M, Caci H, Hodgkins P, Kahle J, Callamaras N, Woods A. Review of studies of ADHD: long-term outcomes of ADHD: global and regional study publication trends. Eur Psychiatry 2011; 26 (Suppl. 1): 579.
18. Asherson P, Akehurst R, Kooij JJ, et al. Under diagnosis of adult ADHD: cultural influences and societal burden. J Atten Disord 2012; 16 (5 Suppl): 20S-38S.
19. Targum SD, Adler LA. Our current understanding of adult ADHD. Innov Clin Neurosci 2014; 11: 30-5.
20. Arbeitsgemeinschaft Der Wissenschaftlichen Medizinischen Fachgesellschaften. Langfassung der interdisziplinären evidenz- und konsensbasierten (S3) Leitlinie "Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung (ADHS) im Kindes-Jugend- und Erwachsenenalter". AWMF-Registernummer 028-045. 2018.
21. Banaschewski T, Hohmann S, Millenet DPS, et al. Leitlinienreport der interdisziplinären evidenz- und konsensbasierten (S3) Leitlinie "Aufmerksamkeitsdefizit- / Hyperaktivitätsstörung (ADHS) im Kindes-, Jugend- und Erwachsenenalter". AWMF-Registernummer 028-045. 2018.
22. National Institute for Health and Care Excellence. NICE Guideline [NG87]. Attention deficit hyperactivity disorder: diagnosis and management. 2019.
23. Chappuy M, Boulanger A, Nourredine M, Fourneret P, Rolland B. Disparate regulatory status of methylphenidate for adults with ADHD across Europe. Lancet Psychiatry 2020; 7: e1-e2.
24. Boland H, DiSalvo M, Fried R, et al. A literature review and meta-analysis on the effects of ADHD medications on functional outcomes. J Psychiatr Res 2020; 123: 21-30.
25. Germinario EAP, Arcieri R, Marzi M, Panei P, Vella S. Registro nazionale ADHD (Attention-Deficit/Hyperactivity Disorder): dati dal 2007 al 2016. Roma: Istituto Superiore di Sanità, 2016. (Rapporti ISTISAN 16/37).
26. Migliarese G, Venturi V, Cerveri G, Mencacci C. L'ADHD nell'adulto misdiagnosi e incidenza della patologia nei servizi. Psichiatria oggi 2015; 2: 16-25.
27. Migliarese G, Magni E, Cerveri G, Venturi V, Mencacci C. L'ADHD nell'adulto. Esperienza clinica e linee guida per il trattamento. Psichiatria oggi 2017; 1: 8-22.
28. Franke B, Michelini G, Asherson P, et al. Live fast, die young? A review on the developmental trajectories of ADHD across the lifespan. Eur Neuropsychopharmacol 2018; 28: 1059-88.
29. Singh SP. Transition of care from child to adult mental health services: the great divide. Curr Opin Psychiatry 2009; 22: 386-90.
30. While A, Forbes A, Ullman R, Lewis S, Mathes L, Griffiths P. Good practices that address continuity during transition from child to adult care: synthesis of the evidence. Child Care Health Dev 2004; 30: 439-52.

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

link per potersi cancellare dalla mailing list:
http://adhd.marionegri.it/index.php/newsletter/cancellazione-newsletter

Iniziativa nell'ambito del Progetto di Neuropsichiatria dell'Infanzia e dell'Adolescenza
(Delibera n. 406 - 2014 del 04/06/2014 Progetti NPI)
Il Progetto è realizzato con il contributo, parziale, della Regione Lombardia
(in attuazione della D.G. sanità n. 3798 del 08/05/2014, 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*".

IRCCS ISTITUTO DI RICERCHE FARMACOLOGICHE MARIO NEGRI
DIPARTIMENTO DI SALUTE PUBBLICA
Laboratorio per la Salute Materno Infantile
Via Mario Negri, 2 - 20156 Milano MI - Italia - www.marionegri.it
tel +39 02 39014.511 - mother_child@marionegri.i