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# BIBLIOGRAFIA ADHD MAGGIO 2020

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IDENTIFYING ASSOCIATIONS AMONG CO-OCCURRING MEDICAL CONDITIONS IN CHILDREN WITH AUTISM SPECTRUM DISORDERS.

Neumeyer AM, Anixt J, Chan J, et al.

**OBJECTIVE**: Children with autism spectrum disorder (ASD) have a high prevalence of co-occurring medical conditions, including speech, sleep, and gastrointestinal disorders (constipation and feeding difficulties); developmental delay; attention deficit/hyperactivity disorder; hypotonia; epilepsy; anxiety; disruptive behavior; pica; and eczema. Less is known about whether these commonly coexist in the same children. We sought to determine clinically meaningful, statistically significant associations among co-occurring medical conditions in children with ASD that could lead to better understanding, identification, and treatment of these disorders.

**METHODS**: We studied 2114 children with ASD aged 17 months to 5years and 1221 children aged 6 to 17years at 15 Autism Speaks Autism Treatment Network Registry sites. Clinician-reported diagnoses and problems were grouped into 12 core conditions. We determined the observed prevalence (O) of co-occurring conditions and the estimated expected prevalence (E) across the network, adjusting for sitevariability in the prevalence of individual conditions. Pvalues were calculated using a Cochran-Mantel-Haenszel test stratified by site. We identified pairs of conditions co-occurring more frequently than expected (O/E <1) and less frequently than expected (O/E <1) and highlighted statisticallysignificant differences.

**RESULTS**: Among the 66 condition pairs for each age group, we confirmed previously identified associations, such as sleep disorders and anxiety symptoms, in older children. We found some associations not previously described, including feeding with sleep disorders (younger children only), constipation with sleep disorders, feeding with speech disorders, and constipation with speech disorders.

**CONCLUSIONS**: We have identified new associations among co-occurring medical conditions in children with ASD, offering the potential to examine common pathways

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

Acta Obstet Gynecol Scand. 2019 Oct;98:1227-34.

LONG-TERM COGNITION AND BEHAVIOR IN CHILDREN BORN AT EARLY TERM GESTATION: A SYSTEMATIC REVIEW. Nielsen TM, Pedersen MV, Milidou I, et al.

**INTRODUCTION**: Recent recommendations characterize deliveries at 37(+0) weeks through 38(+6) weeks as early term. We aimed to review the literature systematically on long-term cognition, school performance and behavior in children born early term (37(+0) to 38(+6) weeks) compared with full term (39(+0) to 40(+6) weeks).

**MATERIAL AND METHODS**: The review was performed according to the PRISMA Statement. The final literature search was performed on 31 January 2019. We located studies in PubMed, Embase, CINAHL and Cochrane Library. Eligible studies were randomized controlled trials, cohort studies and case-control studies, with outcome assessment performed at 2-19 years. We collected information using a structured data form and evaluated study quality using the Newcastle-Ottawa Scale (NOS).

**RESULTS**: We included 42 observational studies published between 2006 and 2018. No restriction on year of publication was made. The mean NOS score was 5.8 with a range from 3 to 9. Compared with children born full term, children born early term had a lower intelligence score in early adulthood and up to some 30% increased risk of attention-deficit/hyperactivity disorder. Furthermore, we found some 10%-40% increased risk of cognitive problems, some 25% higher risk of language impairments and another 8%-75% with poorer overall school performance. No meta-analysis was conducted due to heterogeneity in the outcome measures. Only 10 studies presented subgroup analyses in spontaneous deliveries or adjusted for type of labor onset/induction.

**CONCLUSIONS**: Children born early term are at increased risk of cognitive deficits, poorer school performance and behavioral problems compared with children born full term

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Alcohol Alcohol. 2019 Jan;54:545-50.

# MENTAL HEALTH AND AFFECT REGULATION IMPAIRMENT IN FETAL ALCOHOL SPECTRUM DISORDER (FASD): RESULTS FROM THE CANADIAN NATIONAL FASD DATABASE.

# Temple VK, Cook JL, Unsworth K, et al.

**AIMS**: Individuals with fetal alcohol spectrum disorder (FASD) frequently have challenges with regulating emotional arousal, or affect regulation (AR), and experience high rates of mental health disorders. This study examined children and adults with FASD to investigate the relationship between AR impairment and several mental health problems and diagnoses.

**METHODS**: Data from the Canadian national FASD database was used for analysis. Seven mental health diagnoses, including attention-deficit/hyperactivity disorder, post-traumatic stress disorder, conduct disorder, attachment disorder, intellectual disability, and language disorder were examined. A history of suicidality was also examined. The prevalence of these mental health problems in individuals with and without AR impairment was compared.

**RESULTS**: Individuals with FASD and AR impairment were significantly more likely to be diagnosed with conduct disorder (OR 4.8), attachment disorder (OR 6.1), or post-traumatic stress disorder (OR 8.1) when compared to those without AR impairment. They were also more likely to have a history of suicidality (OR 8.6). AR impairment was most commonly found in those with greater overall neurodevelopmental impairment. Having AR impairment was associated with receiving a diagnosis of FASD at a later age, but was not related to gender, intellectual disability, or language disorder.

**CONCLUSION**: AR impairment is strongly related to several mental health diagnoses in those with FASD and presents some promising possibilities for targeted early intervention

Am Fam Physician. 2019 Jun;99:712. ATTENTION DEFICIT/HYPERACTIVITY DISORDER: SCREENING AND EVALUATION. Gaba P, Giordanengo M.

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# Am J Drug Alcohol Abuse. 2019;45:67-76. VIDEO GAME ADDICTION, ADHD SYMPTOMATOLOGY, AND VIDEO GAME REINFORCEMENT. Mathews CL, Morrell HER, Molle JE.

**BACKGROUND**: Up to 23% of people who play video games report symptoms of addiction. Individuals with attention deficit hyperactivity disorder (ADHD) may be at increased risk for video game addiction, especially when playing games with more reinforcing properties.

**OBJECTIVES**: The current study tested whether level of video game reinforcement (type of game) places individuals with greater ADHD symptom severity at higher risk for developing video game addiction.

**METHODS**: Adult video game players (N = 2,801; Mean age = 22.43, SD = 4.70; 93.30% male; 82.80% Caucasian) completed an online survey. Hierarchical multiple linear regression analyses were used to test type of game, ADHD symptom severity, and the interaction between type of game and ADHD symptomatology as predictors of video game addiction severity, after controlling for age, gender, and weekly time spent playing video games.

**RESULTS**: ADHD symptom severity was positively associated with increased addiction severity (b = .73 and .68, ps < 0.001). Type of game played or preferred the most was not associated with addiction severity, ps > .05. The relationship between ADHD symptom severity and addiction severity did not depend on the type of video game played or preferred most, ps > .05.

**CONCLUSION**: Gamers who have greater ADHD symptom severity may be at greater risk for developing symptoms of video game addiction and its negative consequences, regardless of type of video game played or preferred most. Individuals who report ADHD symptomatology and also identify as gamers may benefit from psychoeducation about the potential risk for problematic play

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Am J Emerg Med. 2019 Sep;37:1802-03. METHAMPHETAMINE PSYCHOSIS: LACK OF ASSOCIATION WITH STIMULANT PRESCRIPTION ADHD MEDICATIONS. Mann DM, Marco CA, Detherage JP, III, et al.

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Am J Hum Genet. 2019 Aug;105:351-63.

# COMPARING WITHIN- AND BETWEEN-FAMILY POLYGENIC SCORE PREDICTION.

# Selzam S, Ritchie SJ, Pingault JB, et al.

Polygenic scores are a popular tool for prediction of complex traits. However, prediction estimates in samples of unrelated participants can include effects of population stratification, assortative mating, and environmentally mediated parental genetic effects, a form of genotype-environment correlation (rGE). Comparing genome-wide polygenic score (GPS) predictions in unrelated individuals with predictions between siblings in a within-family design is a powerful approach to identify these different sources of prediction. Here, we compared within- to between-family GPS predictions of eight outcomes (anthropometric, cognitive, personality, and health) for eight corresponding GPSs. The outcomes were assessed in up to 2,366 dizygotic (DZ) twin pairs from the Twins Early Development Study from age 12 to age 21. To account for family clustering, we used mixed-effects modeling, simultaneously estimating within- and between-family effects for target- and cross-trait GPS prediction of the outcomes. There were three main findings: (1) DZ twin GPS differences predicted DZ differences in height, BMI, intelligence, educational achievement, and ADHD symptoms; (2) target and cross-trait analyses indicated that GPS prediction estimates for cognitive traits (intelligence and educational achievement) were on average 60% greater between families than within families, but this was not the case for non-cognitive traits; and (3) much of this within- and between-family

difference for cognitive traits disappeared after controlling for family socio-economic status (SES), suggesting that SES is a major source of between-family prediction through rGE mechanisms. These results provide insights into the patterns by which rGE contributes to GPS prediction, while ruling out confounding due to population stratification and assortative mating

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# Am J Med Genet A. 2019 Feb;179:312-16. SCAPER-ASSOCIATED NONSYNDROMIC AUTOSOMAL RECESSIVE RETINITIS PIGMENTOSA. Jauregui R, Thomas AL, Liechty B, et al.

Mutations in the gene SCAPER (S-phase CyclinA Associated Protein residing in the Endoplasmic Reticulum) have recently been identified as causing syndromic autosomal recessive retinitis pigmentosa with the extraocular manifestations of intellectual disability and attention-deficit/hyperactivity disorder. We present the case of an 11-year-old boy that presented to our clinic with the complaint of decreased night vision. Clinical presentation, family history, and diagnostic imaging were congruent with the diagnosis of autosomal recessive retinitis pigmentosa. Genetic testing of the patient and both parents via whole-exome sequencing revealed the homozygous mutation c.2023-2A>G in SCAPER. Unique to our patient's presentation is the absence of intellectual disability and attention-deficit/hyperactivity disorder, suggesting that SCAPER-associated retinitis pigmentosa can also present without systemic manifestations

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Am J Med Genet B Neuropsychiatr Genet. 2019 Jan;180:25-34.

ITALIAN VALIDATION OF THE FUNCTIONAL DIFFICULTIES QUESTIONNAIRE (FDQ-9) AND ITS CORRELATION WITH MAJOR DETERMINANTS OF QUALITY OF LIFE IN ADULTS WITH HYPERMOBILE EHLERS-DANLOS SYNDROME/HYPERMOBILITY SPECTRUM DISORDER.

# Morlino S, Dordoni C, Sperduti I, et al.

The 2017 nosology defines the new criteria for hypermobile Ehlers-Danlos syndrome (hEDS), which is now considered one end of a continuous spectrum encompassing isolated, nonsyndromic joint hypermobility (JH) and hypermobility spectrum disorders (HSDs). Preliminary data indicate a link between JH and neurodevelopmental disorders and, in particular, developmental coordination disorder (DCD) in children. Assessing DCD in adults is difficult and the recently described functional difficulties questionnaire 9 (FDQ-9) is one of the few available tools. The aims of this study are to (a) validate FDQ-9 written in Italian and present normal values in 230 Italian controls; (b) explore the relationship of FDQ-9 with the brief pain inventory, composite autonomic symptom score 31, multidimensional fatigue inventory, attention deficit/hyperactivity disorder self-report version 1.1, and the SF-36 for quality of life in 105 Italian adults with hEDS/HSD. Validation of the FDQ-9 in Italian was carried out by translation, cross-cultural adaptation and test/retest reliability analysis. A case-control study was performed comparing the FDQ-9 outcome between 105 patients and 105 sex- and age-matched controls. Fifty-nine percent of the patients resulted positive compared to the 3.8% of controls (p value < .00001). In patients, FDQ-9 positive result associated with positive attention deficit/hyperactivity disorder self-report version 1.1 (OR = 4.04). Multivariate regression analysis comparing FDQ-9 with the other questionnaires demonstrated a strong association between positive FDQ-9 and the number of painful joints. Our preliminary data open wider management and therapeutic perspectives for coordination difficulties in hypermobile individuals

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Am J Psychiatry. 2019 Aug;176:635-42.

IDENTIFYING NOVEL TYPES OF IRRITABILITY USING A DEVELOPMENTAL GENETIC APPROACH.

# Riglin L, Eyre O, Thapar AK, et al.

**OBJECTIVE**: Irritability, which is strongly associated with impairment and negative outcomes, is a common reason for referral to mental health services but is a nosological and treatment challenge. A major issue is how irritability should be conceptualized. The authors used a developmental approach to test the hypothesis

that there are several forms of irritability, including a "neurodevelopmental/ADHD-like" type, with onset in childhood, and a "depression/mood" type, with onset in adolescence.

**METHODS**: Data were analyzed from the Avon Longitudinal Study of Parents and Children, a prospective U.K. population-based cohort. Irritability trajectory classes were estimated for 7,924 individuals with data at multiple time points across childhood and adolescence (four possible time points from approximately ages 7 to 15). Psychiatric diagnoses were assessed at approximately ages 7 and 15. Psychiatric genetic risk was indexed by polygenic risk scores (PRSs) for attention deficit hyperactivity disorder (ADHD) and depression, derived using large genome-wide association study results.

**RESULTS**: Five irritability trajectory classes were identified: low (81.2%), decreasing (5.6%), increasing (5.5%), late-childhood limited (5.2%), and high-persistent (2.4%). The early-onset high-persistent trajectory was associated with male preponderance, childhood ADHD (odds ratio=108.64, 95% CI=57.45-204.41), and ADHD PRS (odds ratio=1.31, 95% CI=1.09-1.58). The adolescent-onset increasing trajectory was associated with female preponderance, adolescent depression (odds ratio=5.14, 95% CI=2.47-10.73), and depression PRS (odds ratio=1.20, 95% CI=1.05-1.38). Both the early-onset high-persistent and adolescent-onset increasing trajectory classes were associated with adolescent depression diagnosis and ADHD PRS.

**CONCLUSIONS**: The developmental context of irritability may be important in its conceptualization: earlyonset persistent irritability may be more neurodevelopmental/ADHD-like and later-onset irritability more depression/mood-like. These findings have implications for treatment as well as nosology

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# Am J Psychiatry. 2020 Apr;177:298-307.

DISTINCT POLYGENIC SCORE PROFILES IN SCHIZOPHRENIA SUBGROUPS WITH DIFFERENT TRAJECTORIES OF COGNITIVE DEVELOPMENT.

# Dickinson D, Zaidman SR, Giangrande EJ, et al.

**OBJECTIVE**: Different cognitive development histories in schizophrenia may reflect variation across dimensions of genetic influence. The authors derived and characterized cognitive development trajectory subgroups within a schizophrenia sample and profiled the subgroups across polygenic scores (PGSs) for schizophrenia, cognition, educational attainment, and attention deficit hyperactivity disorder (ADHD).

**METHODS**: Demographic, clinical, and genetic data were collected at the National Institute of Mental Health from 540 schizophrenia patients, 247 unaffected siblings, and 844 control subjects. Cognitive trajectory subgroups were derived through cluster analysis using estimates of premorbid and current IQ. PGSs were generated using standard methods. Associations were tested using general linear models and logistic regression.

**RESULTS**: Cluster analyses identified three cognitive trajectory subgroups in the schizophrenia group: preadolescent cognitive impairment (19%), adolescent disruption of cognitive development (44%), and cognitively stable adolescent development (37%). Together, the four PGSs significantly predicted 7.9% of the variance in subgroup membership. Subgroup characteristics converged with genetic patterns. Cognitively stable individuals had the best adult clinical outcomes and differed from control subjects only in schizophrenia PGSs. Those with adolescent disruption of cognitive development showed the most severe symptoms after diagnosis and were cognitively impaired. This subgroup had the highest schizophrenia PGSs and had disadvantageous cognitive PGSs relative to control subjects and cognitively stable individuals. Individuals showing preadolescent impairment in cognitive and academic performance and poor adult outcome exhibited a generalized PGS disadvantage relative to control subjects and were the only subgroup to differ significantly in education and ADHD PGSs.

**CONCLUSIONS**: Subgroups derived from patterns of premorbid and current IQ showed different premorbid and clinical characteristics, which converged with broad genetic profiles. Simultaneous analysis of multiple PGSs may contribute to useful clinical stratification in schizophrenia

#### Ann Dyslexia. 2019 Oct;69:297-317.

# VALIDATION OF CURRICULUM-BASED READING PASSAGES AND COMPARISON OF COLLEGE STUDENTS WITH AND WITHOUT DYSLEXIA OR ADHD.

# Nelson JM, Lindstrom W, Foels PA, et al.

Although reading is an essential skill for college success, little is known about how college students with and without disabilities read within their actual college curriculum. In the present article, we report on two studies addressing this issue. Within study 1, we developed and validated curriculum-based oral reading fluency measures using a sample of college students without disabilities (N = 125). In study 2, we administered the curriculum-based measures to four groups (each with n = 25): college students without disabilities, college students with dyslexia, college students with ADHD, and a clinical control group. Study 1 results indicated that the curriculum-based measures demonstrated good reliability and criterion validity. Results from study 2 indicated that college students with dyslexia were substantially slower readers than all groups without dyslexia (ds > 1.8). The curriculum-based measures demonstrated high accuracy in classifying participants with dyslexia and with impaired oral reading fluency (area under the curve > .94). Implications for incorporating curriculum-based measures in postsecondary settings are discussed

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#### Arch Clin Neuropsychol. 2019 Nov;34:1418-24.

THE INFLUENCE OF DEMOGRAPHIC AND CHILD CHARACTERISTICS ON REFERRAL FOR NEUROPSYCHOLOGICAL EVALUATION.

#### Pittenger AA, Erklin S, Wodka EL.

**OBJECTIVE**: A number of studies have documented the benefits of neuropsychological evaluation as a tool for understanding brain-behavior relationships in various childhood disorders; however, little is known about the process by which children are referred for neuropsychological evaluation. From a systems perspective, it is important to understand whether there are identifiable referral patterns, and if so, how being aware of such patterns could shape the behavior of providers making those referrals. We aim to examine child characteristics that influence referral for neuropsychological evaluation.

**METHODS**: Retrospective chart review of 773 children who received neuropsychological evaluation and were diagnosed with autism, attention-deficit/hyperactivity disorder, and/or anxiety was completed. Children were divided into groups based on referral source (professional or caregiver) and compared on demographic, behavioral, and medical characteristics.

**RESULTS**: Overall, professionals were more likely than caregivers to refer children for neuropsychological evaluation. Though standardized measures suggested children referred by professionals and caregivers were similar, their clinical presentation appears to be different (i.e., those referred by professionals had more comorbidities and were more likely to be prescribed psychotropic medication than those referred by caregivers). Also, children with public insurance were more likely to be referred by a professional than by their caregiver.

**CONCLUSIONS**: Findings highlight the important role of professionals in identifying "at-risk" children and supporting families through the process of receiving further evaluation when indicated. This information can be used to create a more efficient system for evaluating children and developing treatment plans, providing neuropsychologists with direct information to share with referral sources

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Asian J Psychiatr. 2019 Jun;43:45-49.

HIGH PREVALENCE OF NONSUICIDAL SELF-INJURY, TATTOOS, AND PSYCHIATRIC COMORBIDITY AMONG MALE ADOLESCENT PRISONERS AND THEIR SOCIODEMOGRAPHIC CHARACTERISTICS .

# Ceylan MF, Tural HS, Kasak M, et al.

**BACKGROUND**: This study investigates the frequency of psychiatric disorders and the sociodemographic and clinical features in adolescent prisoners.

**METHOD**: The psychiatric diagnoses and sociodemographic characteristics of treatment of 76 adolescent male prisoners and 76 age-matched patients were compared (age range: 15-17).

**RESULTS**: Conduct disorder (85.5%), attention deficit hyperactivity disorder (61.8%), depression (50%), substance abuse (40.8%), post-traumatic stress disorder (19.7%), and psychotic disorder (3.9%) were more frequent among adolescent prisoners than the control group. The educational levels of parents of adolescent prisoners and their socioeconomic statuses were significantly lower, and the nonsuicidal self-injury (73.7%) and tattooing frequency (65.8%) were significantly higher among adolescent prisoners than the control group. Only 51.3% had both parents living together.

**CONCLUSION**: Psychiatric disorders, low socioeconomic status, family disorganization, nonsuicidal selfinjury, tattoos, and interruption of education were frequent in adolescent prisoners in this study. Our findings emphasize the importance of early psychiatric treatment and family-based interventions to help prevent adolescents from committing crimes. In addition, nonsuicidal self-injury and tattoos may be associated with criminal behavior in adolescents

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#### Assessment. 2019 Apr;26:508-23.

EVALUATING THE HIERARCHICAL STRUCTURE OF ADHD SYMPTOMS AND INVARIANCE ACROSS AGE AND GENDER. *Sturm A, McCracken JT, Cai L.* 

The bifactor model of attention-deficit/hyperactivity disorder (ADHD) has been extensively explored, yet the tendency of the bifactor model to overfit data necessitates investigation of alternative, more parsimonious models, such as a modified bifactor structure. The present study used item response theory to compare unidimensional, correlated factors, bifactor, and modified bifactor models of ADHD symptoms in a clinical sample of youth (N = 1,612) and examined differential item functioning (DIF) by age (<11 and >/=11 years) and gender. Results suggested that two restricted bifactor models showed superior fit compared with alternative models, and support strong general and inattention dimensions, with unreliable hyperactivity and impulsivity dimensions. No DIF was found across gender or age. The present study confirms that the general dimension (i.e., inhibition) and one specific dimension (i.e., sustained attention) represent distinct variability in ADHD symptoms that may improve prediction of symptom persistence, treatment response, or functional outcomes

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### Assessment. 2019 Jan;26:99-110.

# How Consistent Is Sluggish Cognitive Tempo Across Occasions, Sources, and Settings? Evidence From Latent State-Trait Modeling.

#### Preszler J, Burns GL, Litson K, et al.

Research has yet to determine how much of the variance in sluggish cognitive tempo (SCT) symptom ratings is consistent across occasions, sources, and settings versus specific to occasion, source, and setting. Our first objective was to determine the amount of variance in SCT ratings that was consistent (trait consistency) across three occasions of measurement over 12 months versus specific to the occasion (occasion-specificity) with ratings by mothers, fathers, primary teachers, and secondary teachers of 811 Spanish children. Our second objective was then to determine the convergent validity for trait consistency and occasion-specificity variance components within and across settings. SCT ratings reflected mostly trait consistency for mothers, fathers, and primary teachers (less so for secondary teachers) with the convergent validity for trait consistency also being strong for mothers with fathers and for primary teachers with secondary teachers. Across home and school, however, convergent validity for trait consistency was low and even lower for occasion-specificity. SCT appears to be more trait-like rather than state-like, with similar levels of trait consistency across occasions and convergent validity within settings as attention-deficit/hyperactivity disorder (ADHD) symptoms in a prior study. However, SCT symptoms had slightly weaker convergent validity for trait consistency across settings relative to ADHD symptoms

Atten Defic Hyperact Disord. 2019 Dec;11:353-62.

PSYCHOMETRIC PROPERTIES OF A SLUGGISH COGNITIVE TEMPO SCALE IN JAPANESE ADULTS WITH AND WITHOUT ADHD.

# Takeda T, Burns GL, Jiang Y, et al.

This study examined the psychometric properties, convergent validity, and divergent validity of a Japanese translation of Barkley (The Barkley adult ADHD rating scale-IV, Guilford Press, New York, 2011) rating scale for assessing sluggish cognitive tempo (SCT) in adults. In total, 429 Japanese adults participated across three samples: 26 diagnosed with attention-deficit/hyperactivity disorder (ADHD; ages 19-50), 81 adults without ADHD (ages 22-65), and 322 university students (ages 18-27). All participants completed rating scales of SCT, ADHD, anxiety, and depressive symptoms, A subset of participants completed the SCT measure at two time points two weeks apart. The SCT measure (5 items) showed acceptable levels of internal consistency and test-retest reliability. This scale also demonstrated convergent and discriminant validity, as evidenced by factor analyses between SCT and ADHD inattention (ADHD-IN) symptoms as well as adequate fit of a four-factor model involving SCT, ADHD-IN, ADHD-hyperactivity/impulsivity (ADHD-HI), and internalizing symptoms. Additionally, SCT and ADHD-IN dimensions were differentially associated with ADHD-HI and internalizing factors. The ADHD group scored higher on SCT ratings compared to the student and adult non-ADHD groups even after controlling for the severity of ADHD and internalizing symptoms. The 5-item SCT measure appears reliable and demonstrates preliminary evidence of validity in Japanese adults. providing initial support for the transcultural validity of the SCT construct. Additional studies are needed to further evaluate the SCT items that did not meet criteria for convergent and discriminant validity in the current study, and to examine functional outcomes of individuals recruited based on clinically elevated SCT symptoms

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# Atten Defic Hyperact Disord. 2019 Sep;11:299-310.

QUALITY OF LIFE IN SUBSTANCE USE DISORDER PATIENTS WITH AND WITHOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER 12 MONTHS AFTER TREATMENT: A NATURALISTIC FOLLOW-UP STUDY.

# Flores-Garcia L, Lensing MB, Ytterstad E, et al.

There is sparse research on quality of life (QoL) as an outcome measure in patients with substance use disorders (SUD), with or without attention deficit hyperactivity disorder (ADHD). We aimed to investigate whether SUD patients with and without ADHD (SUD + ADHD vs. SUD - ADHD) differed in QoL at baseline and at a 12-month follow-up after SUD treatment. The groups were additionally compared with data from a national population sample (NPS). From a sample of 16 SUD + ADHD and 87 SUD - ADHD patients originally recruited between 2010 and 2012, eight SUD + ADHD (50.0%) and 28 SUD - ADHD (32.2%) patients were reached at follow-up. QoL was measured with the short version of the World Health Organization QoL instrument (WHOQOL-BREF). Cross-sectional data on QoL from NPS was utilized. Compared to NPS, SUD patients reported significantly lower QoL at baseline and follow-up. Furthermore, QoL was similar at baseline in SUD + ADHD and SUD - ADHD patients. At a 12-month follow-up after SUD treatment, SUD + ADHD patients 'QoL had improved, however, not significantly differing from SUD - ADHD patients' QoL remained significantly lower. At follow-up, SUD + ADHD patients' QoL improved nominally compared to SUD - ADHD patients, but not the NPS. The clinical and functional relevance of these findings should be investigated further

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Atten Defic Hyperact Disord. 2019 Sep;11:263-70.

#### ATTENTION AND BEHAVIORAL CONTROL SKILLS IN IRANIAN SCHOOL CHILDREN.

#### Kiani B, Hadianfard H, Mitchell JT.

This study assessed quality of life, emotional and behavioral problems, prosocial behavior, and functional impairment in a sample of Iranian children based on their attention and behavioral control skills. The sample consisted of 280 male and female children aged between 6 and 12 years old who were divided into strong, moderate, and weak groups based on parental ratings of attention and behavioral control skills on the

strengths and weaknesses of ADHD symptom and normal behavior rating scale (SWAN). In addition, parents completed the pediatric quality of life inventory version 4.0 generic core scales (PedsQL 4.0), the strengths and difficulties questionnaire, and the Weiss functional impairment rating scale-parent report (WFIRS-P). The strong group generally showed better quality of life than the weak group. The strong group was better than the moderate group, and the moderate group was better than the weak group on school functioning. The weak group had more conduct problems and hyperactivity/inattention and less prosocial behavior than the moderate group and the strong group. The moderate group had more hyperactivity/inattention than the strong group. The weak group showed more impairment than the moderate group and the strong group on all subscales and the total scale of the WFIRS-P. The quality of life, behavioral problems, prosocial behavior, and functional impairment can be different in children based on their attention and behavioral control skills

Behav Sleep Med. 2019 Sep;17:646-56.

# MODERATING EFFECT OF MOTOR PROFICIENCY ON THE RELATIONSHIP BETWEEN ADHD SYMPTOMS AND SLEEP PROBLEMS IN CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER-COMBINED TYPE.

# Papadopoulos N, Stavropoulos V, McGinley J, et al.

**OBJECTIVES/BACKGROUND**: A high proportion of children with Attention Deficit Hyperactivity Disorder-Combined type (ADHD-CT) experience sleep and motor problems. This study investigated (a) whether motor proficiency moderated the relationship between ADHD symptoms and sleep problems in children with and without ADHD-CT and (b) whether this moderation differed as a function of ADHD diagnosis.

**PARTICIPANTS**: A sample of 70 primary school male children between 8-15 years were recruited; children with ADHD-CT (n = 38; mean age 10 years, 2 months [SD = 1 year, 6 months]) and a typically developing (TD) (n = 32; mean age 9 years, 6 months [SD = 1 year, 5 months]) group.

**METHODS**: Motor proficiency was measured using the Movement Assessment Battery for Children-2nd Edition (MABC-2), ADHD symptoms were measured using the Conners' Parent Rating Scale (CPRS) and parent reported sleep problems were measured using the Children's Sleep Habits Questionnaire (CSHQ).

**RESULTS**: Children who reported higher ADHD symptoms and lower motor proficiency scores reported more sleep problems. The moderation effect only held in children with a diagnosis of ADHD-CT and not in the typically developing group.

**CONCLUSIONS**: These findings indicate that children who experience greater severity of ADHD symptoms who also have lower motor proficiency may be at increased risk of experiencing sleep problems. These findings also illustrate the importance of considering motor proficiency when exploring risk factors for sleep problems in children with ADHD-CT as well as sleep interventions

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#### Benef Microbes. 2019 Dec;10:873-82.

# **EFFECT OF PROBIOTIC SUPPLEMENTATION ON COGNITIVE FUNCTION IN CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW OF RANDOMISED TRIALS.**

#### Rianda D, Agustina R, Setiawan EA, et al.

Available reviews have shown potential effects of probiotics on neurobehavioral outcomes through 'gut-brain axis' mechanism in adults. However, reviews on cognitive function in children and adolescents are lacking. Therefore, we conducted a systematic review of randomised controlled trials (RCTs) of the effect of probiotic supplementation on cognitive function in children and adolescents. A search of four databases (Cochrane Central Register of Controlled Trials, PsycARTICLES, Scopus, PubMed) was conducted to identify RCTs published from January 1990 to December 2018. Seven studies met the inclusion criteria and their cognitive outcomes were analysed. Only one study found a positive result with Lactobacillus rhamnosus GG (LGG) 1x10(10) cfu supplementation with outcomes on attention deficit hyperactivity disorder (ADHD) or Asperger syndrome (AS) manifestations as diagnosed using the International Classification of Diseases-10 criteria. The supplementations were administered to Finnish mothers for 4 weeks before delivery and continuously given for 6 months after delivery if they breastfed, or to the children. ADHD or AS was diagnosed at the age of 13 years in 17.1% children in the placebo and none in the probiotic group (P=0.008). This study found

significant differences in species composition and number of cells belonging to the genus Bifidobacterium between healthy children and children who later developed ADHD or AS at different time points. Six remaining studies with varying strains, durations of intervention, start-time of administration, and outcomes demonstrated no difference in cognition after probiotic supplementation. Metagenomic analyses on gut microbiota composition were not performed in any of these studies. In conclusion, the favourable effect of probiotic supplementation on cognitive function in children and adolescents was observed in one study with LGG supplementation by a risk reduction of developing ADHD or AS (i.e. autism). More long-term and follow-up trials using probiotics identifying the effect on cognition are warranted before routine use

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#### Biol Psychiatry. 2019 Jun;85:966-76.

# AGE-NORMATIVE PATHWAYS OF STRIATAL CONNECTIVITY RELATED TO CLINICAL SYMPTOMS IN THE GENERAL POPULATION.

# Barber AD, Sarpal DK, John M, et al.

**BACKGROUND**: Altered striatal development contributes to core deficits in motor and inhibitory control, impulsivity, and inattention associated with attention-deficit/hyperactivity disorder and may likewise play a role in deficient reward processing and emotion regulation in psychosis and depression. The maturation of striatal connectivity has not been well characterized, particularly as it relates to clinical symptomatology.

**METHODS**: Resting-state functional connectivity with striatal subdivisions was examined for 926 participants (8-22 years of age, 44% male) from the general population who had participated in two large cross-sectional studies. Developing circuits were identified and growth charting of age-related connections was performed to obtain individual scores reflecting relative neurodevelopmental attainment. Associations of clinical symptom scales (attention-deficit/hyperactivity disorder, psychosis, depression, and general psychopathology) with the resulting striatal connectivity age-deviation scores were then tested using elastic net regression.

**RESULTS**: Linear and nonlinear developmental patterns occurred across 231 striatal age-related connections. Both unique and overlapping striatal age-related connections were associated with the four symptom domains. Attention-deficit/hyperactivity disorder severity was related to age-advanced connectivity across several insula subregions, but to age-delayed connectivity with the nearby inferior frontal gyrus. Psychosis was associated with advanced connectivity with the medial prefrontal cortex and superior temporal gyrus, while aberrant limbic connectivity predicted depression. The dorsal posterior insula, a region involved in pain processing, emerged as a strong contributor to general psychopathology as well as to each individual symptom domain.

**CONCLUSIONS**: Developmental striatal pathophysiology in the general population is consistent with dysfunctional circuitry commonly found in clinical populations. Atypical age-normative connectivity may thereby reflect aberrant neurodevelopmental processes that contribute to clinical risk

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BMC Oral Health. 2019 Nov;19:258.

ORAL HEALTH OF CHILDREN AND ADOLESCENTS WITH OR WITHOUT ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) LIVING IN RESIDENTIAL CARE IN RURAL RHINELAND-PALATINATE, GERMANY.

Ehlers V, Callaway A, Wantzen S, et al.

**BACKGROUND**: Attention deficit hyperactivity disorder (ADHD) is defined as childhood neurobehavioural disorder. Due to short attention span, oral hygiene and dental treatment of such individuals can be challenging. Aim of this study was to evaluate the oral health of children and adolescents with and without ADHD living in residential care in rural Rhineland-Palatinate, Germany.

**METHODS**: Included in the study were 79 participants (male/female:58/21, age 9-15 years) living in residential care: 34 participants with ADHD and 45 participants without ADHD (control). Oral examination included the following parameters decayed, missing, filled teeth in the primary dentition (dmft), decayed, missing, filled surfaces/teeth in the secondary dentition (DMFS/DMFT), approximal plaque index (API),

bruxism and orthodontic treatment. Additionally, oral hygiene, last dental visit and treatment performed, and dietary habits were assessed by questionnaire.

**RESULTS**: There were no significant differences in dmft, API, bruxism and oral hygiene habits between groups. However, participants with ADHD tended to have higher DMFS/DMFT values than the control group. Ongoing orthodontic treatment was found more often in the control group. The ADHD group tended to consume acidic/sugary beverages and sweet snacks more often than the controls. Different treatments (control visit/prophylaxis, dental therapy, orthodontic treatment) were performed at the last dental visit in the two groups.

**CONCLUSIONS**: Within the limitations of this study, oral health was similar in children and adolescents with or without ADHD from the same residential care setting. Parents/guardians need instructions for better supervision of oral hygiene and dietary habits to improve the poor oral health of children with or without ADHD

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BMC Pediatr. 2019 Jan;19:10.

PROTOCOL FOR A TRANSDIAGNOSTIC STUDY OF CHILDREN WITH PROBLEMS OF ATTENTION, LEARNING AND MEMORY (CALM).

# Holmes J, Bryant A, Gathercole SE.

**BACKGROUND**: A substantial proportion of the school-age population experience cognitive-related learning difficulties. Not all children who struggle at school receive a diagnosis, yet their problems are sufficient to warrant additional support. Understanding the causes of learning difficulties is the key to developing effective prevention and intervention strategies for struggling learners. The aim of this project is to apply a transdiagnostic approach to children with cognitive developmental difficulties related to learning to discover the underpinning mechanisms of learning problems.

**METHODS**: A cohort of 1000 children aged 5 to 18 years is being recruited. The sample consists of 800 children with problems in attention, learning and / memory, as identified by a health or educational professional, and 200 typically-developing children recruited from the same schools as those with difficulties. All children are completing assessments of cognition, including tests of phonological processing, short-term and working memory, attention, executive function and processing speed. Their parents/ carers are completing questionnaires about the child's family history, communication skills, mental health and behaviour. Children are invited for an optional MRI brain scan and are asked to provide an optional DNA sample (saliva). Hypothesis-free data-driven methods will be used to identify the cognitive, behavioural and neural dimensions of learning difficulties. Machine-learning approaches will be used to map the multi-dimensional space of the cognitive, neural and behavioural measures to identify clusters of children with shared profiles. Finally, group comparisons will be used to test theories of development and disorder.

**DISCUSSION**: Our multi-systems approach to identifying the causes of learning difficulties in a heterogeneous sample of struggling learners provides a novel way to enhance our understanding of the common and complex needs of the majority of children who struggle at school. Our broad recruitment criteria targeting all children with cognitive learning problems, irrespective of diagnoses and comorbidities, are novel and make our sample unique. Our dataset will also provide a valuable resource of genetic, imaging and cognitive developmental data for the scientific community

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BMC Public Health. 2019 Dec;19:1706.

ASSOCIATION OF ADVERSE CHILDHOOD EXPERIENCE AND ATTENTION DEFICIT HYPERACTIVITY DISORDER WITH DEPRESSIVE SYMPTOMS AMONG MEN WHO HAVE SEX WITH MEN IN CHINA: MODERATED MEDIATION EFFECT OF RESILIENCE.

#### Ding C, Wang T, Chen X, et al.

**BACKGROUND**: Adverse childhood experience (ACE), attention deficit hyperactivity disorder (ADHD), and resilience can all contribute to depressive symptoms. However, little is known regarding the complex relationships between these factors and their joint effects on depressive symptoms. This study aimed to

explore the underlying mechanism of ACE, ADHD, and resilience on depressive symptoms among men have sex with men (MSM) in China.

**METHODS**: A total of 714 MSM were recruited from gay/bisexual men-serving venues in Wuhan, Changsha, and Nanchang of China. The data was collected using computer-assisted self-interview. The mediated and moderated mediation models were employed to explore the underlying mechanisms between ACE, ADHD, resilience, and depressive symptoms.

**RESULTS**: Among 714 MSM, 51.4% reported at least one ACE and 13.0% reported three or more. ACE had a direct (beta = 1.01, 95% CI: 0.45-1.57) effect on depressive symptoms. ADHD partially mediated the correlation between ACE and depressive symptoms (indirect effect: 0.55; 95% CI: 0.34-0.79). Additionally, the effect of ACE on depressive symptoms was moderated and buffered by resilience (beta = -0.09, 95% CI: -0.15 - -0.03).

**CONCLUSION**: The findings suggested that, programs and policies that promote resilience and address ADHD might protect Chinese MSM exposed to ACE from depressive symptoms

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BMJ Open. 2019 Feb;9:e026001.

TRENDS IN SELF-POISONING AND PSYCHOTROPIC DRUG USE IN PEOPLE AGED 5-19 YEARS: A POPULATION-BASED RETROSPECTIVE COHORT STUDY IN AUSTRALIA.

# Cairns R, Karanges EA, Wong A, et al.

**OBJECTIVES**: To characterise trends in self-poisoning and psychotropic medicine use in young Australians. **DESIGN**: Population-based retrospective cohort study.

**SETTING**: Calls taken by the New South Wales and Victorian Poisons Information Centres (2006-2016, accounting for 70% of Australian poisoning calls); medicine dispensings in the 10% sample of Australian Pharmaceutical Benefits Scheme data (July 2012 to June 2016).

# PARTICIPANTS: People aged 5-19 years.

**MAIN OUTCOME MEASURES**: Yearly trends in intentional poisoning exposure calls, substances taken in intentional poisonings, a prevalence of psychotropic use (dispensing of antidepressants, antipsychotics, benzodiazepines and medicines for attention deficit hyperactivity disorder (ADHD)).

**RESULTS**: There were 33 501 intentional poisonings in people aged 5-19 years, with an increase of 8.39% per year (95% CI 6.08% to 10.74%, p<0.0001), with a 98% increase overall, 2006-2016. This effect was driven by increased poisonings in those born after 1997, suggesting a birth cohort effect. Females outnumbered males 3:1. Substances most commonly taken in self-poisonings were paracetamol, ibuprofen, fluoxetine, ethanol, quetiapine, paracetamol/opioid combinations, sertraline and escitalopram. Psychotropic dispensing also increased, with selective serotonin reuptake inhibitors (SSRIs) increasing 40% and 35% July 2012 to June 2016 in those aged 5-14 and 15-19, respectively. Fluoxetine was the most dispensed SSRI. Antipsychotics increased by 13% and 10%, while ADHD medication dispensing increased by 16% and 10%, in those aged 5-14 and 15-19, respectively. Conversely, dispensing of benzodiazepines to these age groups decreased by 4% and 5%, respectively.

**CONCLUSIONS**: Our results signal a generation that is increasingly engaging in self-harm and is increasingly prescribed psychotropic medications. These findings indicate growing mental distress in this cohort. Since people who self-harm are at increased risk of suicide later in life, these results may foretell future increases in suicide rates in Australia

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BMJ Open. 2019 Mar;9:e022493.

FIRST INCIDENCE, AGE OF ONSET OUTCOMES AND RISK FACTORS OF ONSET OF **DSM-5** OPPOSITIONAL DEFIANT DISORDER: A COHORT STUDY OF **S**PANISH CHILDREN FROM AGES **3** TO **9**.

# Ezpeleta L, Navarro JB, De La Osa N, et al.

**OBJECTIVE**: To examine the 1-year first incidence and prevalence of oppositional defiant disorder (ODD), the outcomes on psychopathology and functioning by age of onset and the risk factors of onset of ODD from ages 3 to 9 in children from the Spanish general population.

**DESIGN**: Longitudinal with seven follow-ups and double cohort (ODD and non-ODD children). SETTING: General population of preschool and elementary school children in Barcelona (Spain). PARTICIPANTS: On a first phase, the parent-rated Strengths and Difficulties Questionnaire conduct problems scale plus ODD Diagnostic and Statistical Manual of Mental Disorders, fourth version, symptoms were used to screen for behavioural problems. The second phase sample size contained 622 cases at age 3 and, at age 9, 418 remained in the study.

**RESULTS**: The probability of the onset of ODD showed increasing values at ages 4 (R=2.7%) and 5 years (R=4.4%). These values decreased until age 7 (R=1.9%) and increased again until age 9 (R=3.6%). Up to 9 years old, the cumulative risk of new cases of ODD was 21.9%. Early onset was associated with a higher risk of depression comorbidity and later onset with higher functional impairment and symptomatology. Subthreshold ODD, high scores in irritability and headstrong dimensions, attention deficit/hyperactivity disorder and other comorbidity, negative affectivity until age 7, difficulties in inhibit and emotional control, punitive parenting and maternal internalising problems were risk factors of a first episode of ODD during this 7-year period.

**CONCLUSIONS**: The risk of new cases of ODD in the general population at preschool age and during childhood is high. Preschool age is a target period for preventive interventions. Identified risk factors are objectives for targeted and indicated interventions

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# BMJ Open. 2019 Feb;9:e023304.

IMPROVING NEURODEVELOPMENTAL OUTCOMES IN CHILDREN WITH CONGENITAL HEART DISEASE: PROTOCOL FOR A RANDOMISED CONTROLLED TRIAL OF WORKING MEMORY TRAINING.

# Calderon J, Bellinger DC, Hartigan C, et al.

**INTRODUCTION**: Executive function (EF) impairments are among the most prevalent neurodevelopmental morbidities in youth with congenital heart disease (CHD). To date, no studies have investigated the efficacy of cognitive interventions to improve EF outcomes in children with CHD.

METHODS AND ANALYSIS: This is a single-centre, single-blinded, two-arm randomised controlled trial to test the efficacy of Cogmed Working Memory Training (Cogmed) versus standard of care in children with CHD after open-heart surgery in infancy. Participants will consist of 100 children with CHD aged 7-12 years who underwent open-heart surgery before the age of 12 months. Participants are randomly allocated to either an intervention group including training on the home-based Cogmed intervention for a duration of approximately 5 weeks or a control group who receive the standard of care. We will evaluate the efficacy of Cogmed at post-treatment and 3 months after completion of the intervention. Baseline, post-treatment and 3-month follow-up assessments will include specific measures of EF, cognitive and social functioning, and attention deficit hyperactivity disorder (ADHD) symptoms. The primary outcome of this study is the change in standardised mean score on the List Sorting Working Memory test from the National Institutes of Health Toolbox for the Assessment of Neurological and Behavioral Function. Secondary outcomes include measures of social skills, inhibitory control, cognitive flexibility and behavioural EF as well as ADHD symptoms as measured by the Behavior Rating Inventory of Executive Function, Second Edition, and the Conners Third Edition. The efficacy of the intervention will be evaluated by comparing within-subject differences (baseline to post-treatment, baseline to 3-month follow-up) between the two groups using an intention-to-treat analysis.

**ETHICS AND DISSEMINATION**: This study has received Institutional Review Board (IRB) approval from Boston's Children's Hospital IRB (P00022440) and the Human Protection Agency from the US Department of Defense.

TRIAL REGISTRATION NUMBER: NCT03023644; Pre-results

#### BMJ Open. 2019 Jun;9:e024265.

# PUBLIC, HEALTH PROFESSIONAL AND LEGISLATOR PERSPECTIVES ON THE CONCEPT OF PSYCHIATRIC DISEASE: A POPULATION-BASED SURVEY.

#### Tikkinen KAO, Rutanen J, Frances A, et al.

**OBJECTIVE**: To assess which mental health-related states of being are perceived as diseases by psychiatrists, non-psychiatric physicians, nurses, parliament members and laypeople. DESIGN AND SETTING: A population-based, mailed survey in Finland.

**PARTICIPANTS**: Respondents from a random sample of 3000 laypeople, 1500 physicians, 1500 nurses and all 200 members of the parliament (MPs) of Finland.

**PRIMARY OUTCOME MEASURES**: Respondents' perspectives on 20 mental health-related states of being as diseases, measuring the extent of agreement with the claim: '[This state of being] is a disease'. RESULTS: Of the 6200 people approached, we received 3259 eligible responses (53%). Two conditions (schizophrenia and autism) were considered to be diseases by at least 75% and two states (grief and homosexuality) were considered not to be diseases by at least 75% in each group. A majority (at least 50% in each group) considered seven states as diseases (anorexia, attention deficit hyperactivity disorder, bulimia, depression, generalised anxiety disorder, panic disorder and personality disorder) and three not to be diseases (absence of sexual desire, premature ejaculation and transsexualism). In six states, there was a wide divergence of opinion (alcoholism, drug addiction, gambling addiction, insomnia, social anxiety disorder and work exhaustion). Psychiatrists were significantly more inclined to considering states of being as diseases relative to other groups, followed by non-psychiatric physicians, nurses, MPs and laypeople.

**CONCLUSIONS**: Respondents agreed that some conditions, such as schizophrenia and autism, are diseases and other states, such as grief and homosexuality, are not; for others, there was considerable disagreement. Psychiatrists are more inclined to consider mental health-related states of being as diseases compared with other physicians, who, in turn, are more inclined than other constituencies. Understanding notions of disease may underlie important debates in public policy and practice in areas of mental health and behaviour, and have implications for resource allocation and stigma

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# Bone. 2019 Mar;120:20-24. LOWER RISK OF STRESS FRACTURES IN YOUNG ADULTS WITH ADHD UNDER CHRONIC TREATMENT WITH METHYLPHENIDATE.

#### Schermann H, Ankory R, Shlaifer A, et al.

**INTRODUCTION**: Methylphenidate (MP) use is highly prevalent among children and young adults. Previous basic and epidemiological research demonstrated an adverse effect of MP on bone mass. Studies in military recruits have shown that history of MP use before conscription was a risk factor for stress fractures (SF) during the service.

**METHODS**: This study is part of the project in which the association between MP use and incidence of SF was retrospectively investigated in a cohort of healthy conscripts aged 18-25, who served for at least 12months between 2008 and 2017. Baseline information included sex, age, weight, height, geographic origin, socioeconomic status, and education. Subjects were divided into five groups: subjects without ADHD; untreated subjects with ADHD; and subjects with ADHD and prescriptions of 1-90, 91-180, or 181+ tablets during the study period. The primary outcome was at least one diagnosis of stress fracture during the study. **RESULTS**: Among 682,110 subjects (409,175 men [60%]), 29,888 (4.4%) had fractures. MP was used by 1681 (0.4%) men and 2828 (1%) women. In both men and women, SF incidence was significantly higher among subjects with untreated ADHD (7.9% and 5.4%, respectively) and significantly lower in subjects with treated ADHD (1.9-3%; 0.3-4.3%), compared to healthy controls (5.3% and 2.9%). After multivariate adjustment, subjects with untreated ADHD remained at an increased risk of fracture (men OR=1.66, p<0.001 and women OR=1.33, p=0.007), whereas only subjects with highest exposure to MP (180+ tablets) had significantly lower chances for fracture (men OR=0.49, p=0.08 and women OR=0.09, p=0.02), compared to healthy controls.

**DISCUSSION**: The study has demonstrated lower risk of stress fractures with concurrent MP use. The findings in this population challenge our understanding of the MP effect on bone integrity and prompt further basic research

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# Br J Dev Psychol. 2019 Nov;37:519-34. TEACHERS, NOT PARENTS, ARE ABLE TO PREDICT TIME PROCESSING SKILLS IN PRESCHOOLERS. *Tobia V, Bonifacci P, Bernabini L, et al.*

Time processing difficulties are associated with developmental disorders. Questionnaires for assessing children's sense of time are available from primary school, but we lack valid proxy-report tools for younger children, who are not able to complete self-reports. This study aimed to assess the criterion validity of a questionnaire investigating preschoolers' sense of time from the points of view of their parents and teachers. One hundred seventy preschoolers were included in the sample. Their parents and teachers completed the Sense of Time Questionnaire, and the children were administered time reproduction and time discrimination tasks, both concurrently and 7 months later. The assessment of preschoolers' sense of time reported by teachers, but not by parents, predicted the children's time processing skills both concurrently and longitudinally. The teacher version of the Sense of Time Questionnaire constitutes a valid instrument for assessing and predicting preschoolers' time processing skills and can be used for clinical and research purposes STATEMENT OF CONTRIBUTION: What is already known on this subject? Time processing difficulties are associated with developmental disorders such as ADHD and dyscalculia. Early assessment of time processing skills is important for clinical (e.g., screening) and research purposes. We do not have valid questionnaires for assessing sense of time in young children. What the present study adds? The sense of time ability reported by teachers predicts preschoolers' time processing skills. The sense of time ability reported by parents does not predicts preschoolers' time processing skills. The Sense of Time Questionnaire is a valid instrument for investigating time processing skills of 4-6 aged children

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# Brain. 2019 Sep;142:2617-30.

PATHOGENIC WDFY3 VARIANTS CAUSE NEURODEVELOPMENTAL DISORDERS AND OPPOSING EFFECTS ON BRAIN SIZE.

# Le DD, Giulivi C, Hiatt SM, et al.

The underpinnings of mild to moderate neurodevelopmental delay remain elusive, often leading to late diagnosis and interventions. Here, we present data on exome and genome sequencing as well as array analysis of 13 individuals that point to pathogenic, heterozygous, mostly de novo variants in WDFY3 (significant de novo enrichment P = 0.003) as a monogenic cause of mild and non-specific neurodevelopmental delay. Nine variants were protein-truncating and four missense. Overlapping symptoms included neurodevelopmental delay, intellectual disability, macrocephaly, and psychiatric disorders (autism spectrum disorders/attention deficit hyperactivity disorder). One proband presented with an opposing phenotype of microcephaly and the only missense-variant located in the PH-domain of WDFY3. Findings of this case are supported by previously published data, demonstrating that pathogenic PH-domain variants can lead to microcephaly via canonical Wnt-pathway upregulation. In a separate study, we reported that the autophagy scaffolding protein WDFY3 is required for cerebral cortical size regulation in mice, by controlling proper division of neural progenitors. Here, we show that proliferating cortical neural progenitors of human embryonic brains highly express WDFY3, further supporting a role for this molecule in the regulation of prenatal neurogenesis. We present data on Wnt-pathway dysregulation in Wdfy3-haploinsufficient mice, which display macrocephaly and deficits in motor coordination and associative learning, recapitulating the human phenotype. Consequently, we propose that in humans WDFY3 loss-of-function variants lead to macrocephaly via downregulation of the Wnt pathway. In summary, we present WDFY3 as a novel gene linked to mild to moderate neurodevelopmental delay and intellectual disability and conclude that variants putatively causing haploinsufficiency lead to macrocephaly, while an opposing pathomechanism due to variants in the PH-domain of WDFY3 leads to microcephaly

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Brain Inj. 2019;33:480-89.

PREDICTORS OF POST-CONCUSSION SYMPTOM SEVERITY IN A UNIVERSITY-BASED CONCUSSION CLINIC. Houck Z, Asken B, Bauer R, et al.

**OBJECTIVE**: To investigate potential predictors of acute post-concussion symptom severity in a university population.

**METHODS**: Data were obtained from the University of Florida Student Health Care Center Concussion Databank. Symptom severity, measured by the Sport Concussion Assessment Tool - third edition Symptom Evaluation (S3SE), was analyzed at 0-3 (n = 99) and 7-14 days (n = 56) post-concussion. Participants were 99 (56 females; age range: 18-30) students from the University of Florida who had been referred to the center's Concussion Clinic. Independent samples t-test and Mann-Whitney U were used to assess group differences in overall and domain-specific symptom severity, respectively. Hierarchical regressions were used to assess predictors of symptom severity at 0-3 and 7-14 days, as well as residual symptom change between time points.

**RESULTS**: Female sex (beta = .293; p = .002) and history of ADHD (beta = .312; p = .001) predicted greater symptom severity at 0-3 days. History of motion sickness predicted lower symptom severity (beta = -.199; p = .033). ADHD (beta = .284; p = .009) and higher 0-3-day physical symptoms (beta = .552; p < .001) predicted greater symptom severity at 7-14 days. ADHD predicted residual symptom severity change between time points (beta = .433; p = .001).

**CONCLUSION**: ADHD, female sex, and acute physical symptoms (0-3 days) represent risk factors for greater symptom severity in the first two weeks post-concussion among college students

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Braz J Psychiatry. 2020 Apr;42:162-67.

LIFETIME PREVALENCE, SOCIODEMOGRAPHIC PREDICTORS, AND COMORBIDITIES OF OPPOSITIONAL DEFIANT DISORDER: THE NATIONAL EPIDEMIOLOGY OF IRANIAN CHILD AND ADOLESCENT PSYCHIATRIC DISORDERS (IRCAP). Mohammadi MR, Salmanian M, Hooshyari Z, et al.

**OBJECTIVE**: This was the first national epidemiological study on oppositional defiant disorder (ODD) in Iran, which provided new information about the prevalence, comorbidities, and sociodemographic predictors of ODD.

**METHODS**: Data from a face-to-face household survey of 30,532 children and adolescents aged 6-18 years were collected from across all 31 provinces of Iran using a multistage cluster sampling design. The Persian version of the Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children - Present and Lifetime Version (K-SADS-PL) was used in this study.

**RESULTS**: The lifetime prevalence of ODD was found to be 3.9%. ODD was significantly more common in boys than girls and appeared in late adolescence more frequently than in childhood. A lower prevalence of ODD was found among participants who lived in rural areas. ODD is highly likely to co-occur with attention deficit hyperactivity disorder, separation anxiety disorder, generalized anxiety disorder, and depressive disorders.

**CONCLUSIONS**: The findings of this national population-based study confirm and extend previous findings on the prevalence, comorbidities, and sociodemographic predictors of ODD

# CONSIDERING EQUIFINALITY IN TREATMENT PLANNING FOR SOCIAL IMPAIRMENT: DIVERGENT PATHS IN NEURODEVELOPMENTAL DISORDERS.

#### Simmons GL, Hilton DC, Jarrett MA, et al.

Youth with autism spectrum disorder (ASD) present with deficits in both social cognition and executive functioning (EF), which contribute to social impairment. Autistic youth are also frequently diagnosed with comorbid attention-deficit/hyperactivity disorder (ADHD), a disorder that, like ASD, includes impaired EF and social functioning. The comorbidity of ASD and ADHD may result in compounded social impairment, but prior research has not sufficiently evaluated the extent to which this comorbidity profile responds to evidence-based intervention targeting social deficits. It is conceivable that dually targeting EF and social cognition impairment will be more impactful than direct social skills training alone. The authors present an integrative model for intervention programming that examines pathways to social impairment in order to more effectively improve social skills and thereby impact both proximal (e.g., emotion expression, current peer relationships) and more distal outcomes (e.g., depression, self-esteem) in youth with ASD and other neurodevelopmental disorders

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Child Adolesc Psychiatr Clin N Am. 2019 Apr;28:209-20. APPLYING MINDFULNESS-BASED PRACTICES IN CHILD PSYCHIATRY.

# Mathis ET, Dente E, Biel MG.

Mindfulness-based interventions for adults, children, and families have grown considerably, and burgeoning evidence supports use of these approaches for a range of clinical presentations, including anxiety, depression, ADHD, and addiction. Research into the mechanisms of mindfulness suggests improvements in key brain-based functions including attentional control and emotional regulation. Mindfulness may be relevant for improving emotional and behavioral symptoms in children and families presenting for psychiatric care and also may be an important universal strategy to promote brain health. Child psychiatrists should be familiar with mindfulness-based clinical programs and also may seek to develop mindfulness-based strategies to use in clinical practice

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#### Child Psychiatry Hum Dev. 2019 Dec;50:1037-48.

TRAJECTORIES OF VERBAL AND PHYSICAL PEER VICTIMIZATION AMONG CHILDREN WITH COMORBID OPPOSITIONAL DEFIANT PROBLEMS, CONDUCT PROBLEMS AND HYPERACTIVE-ATTENTION PROBLEMS.

# Ter-Stepanian M, Martin-Storey A, Bizier-Lacroix R, et al.

The high levels of comorbidity between oppositional/conduct problems and hyperactivity/attention problems underscore the need for assessing how vulnerability for peer victimization is shaped by overlap among these behavior problems. Children (mean age 8.39, SD = 0.93) participating in a longitudinal study of the development of conduct problems (N = 744; 348 girls) in Quebec, Canada, were evaluated by their teachers regarding experiences of peer verbal and physical victimization every year for 6 years. Parent and teacher ratings of clinically significant oppositional/conduct problems, and hyperactivity/attention problems, as well as cormorbid opposition defiant/conduct problems and hyperactivity/attention problems were regressed onto trajectories of verbal and physical victimization. While behavior problems (both alone and together) were associated with higher levels of verbal and physical victimization, some variation was observed across rater and type of victimization. Ultimately, these findings suggest the importance of adapting programming for reducing victimization to children with oppositional and conduct problems

#### Child Psychiatry Hum Dev. 2019 Jun;50:374-83.

#### CROSS-SECTIONAL AND LONGITUDINAL ASSOCIATIONS OF TEMPERAMENT AND MENTAL DISORDERS IN YOUTH. Hoffmann MS, Pan PM, Manfro GG, et al.

Here we evaluate the cross-sectional and longitudinal associations between temperament and mental disorders in adolescents. Temperament was assessed in a cohort of 1540 youths by the revised self-report Early Adolescence Temperament Questionnaire (EATQ-R) at baseline and confirmatory factor analyses were used to test the best empirical model. Mental disorders were assessed by parental interview using the Development and Well-Being Behavior Assessment at baseline and at 3-year follow-up. Participants were (ADHD) and Disruptive Behavior Disorders (DBD). Logistic regression models tested the effects of temperament on incidence and remission of mental disorders. The bifactor model of EATQ-R presented the best fit. Distress, ADHD and DBD have lower levels of effortful control in baseline. Adjusted longitudinal analysis showed that effortful control predicted lower incidence of Phobias (OR 0.74; p = 0.018), distress (OR 0.74; p = 0.014) and DBD (OR 0.68; p = 0.037). Temperament factors did not predicted remission rates

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Child Psychiatry Hum Dev. 2019 Jun;50:505-19.

CHARACTERISTICS OF CHILD PSYCHIATRIC OUTPATIENTS AT HIGHEST RISK FOR SUICIDAL THOUGHTS AND BEHAVIORS.

# Vuijk PJ, Bush HH, McGuinness PS, et al.

On average, compared to non-referred youth, child psychiatric outpatients show elevated rates of suicidal thoughts and behaviors (STBs), which are predictors of completed suicide. Determining the psychopathology features that associate with highest risk for STBs among youth outpatients may yield opportunities for targeted prevention/intervention. Yet, outpatient studies are limited and have not systematically examined comorbidity and dimensional psychopathology. In 758 youth, aged 6-18, consecutively referred for neuropsychiatric evaluation, we examined the extent to which diagnostic groups, comorbid subgroups and dimensional symptoms associated with STBs. After controlling for comorbidity, mood, anxiety and conduct disorders associated with elevated STB risk. Regarding dimensions, symptoms of depression, aggression and psychosis all contributed to higher STB risk. Although ADHD (as a diagnosis or dimension) did not associate with elevated STB risk independently, ADHD that was comorbid with other conditions did. Suicide prevention/intervention efforts should be investigated in youth outpatients with the highest risk for STBs

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Clin Child Psychol Psychiatry. 2019 Oct;24:791-808.

THE CONNERS 3-SHORT FORMS: EVALUATING THE ADEQUACY OF BRIEF VERSIONS TO ASSESS ADHD SYMPTOMS AND RELATED PROBLEMS.

# Izzo VA, Donati MA, Novello F, et al.

The Conners' Rating Scales are widely used to assess attention deficit/hyperactivity disorder (ADHD) and related difficulties in children and adolescents. A short form of the scales is available, which, along with the several advantages of brief versions, also displays good psychometric properties. Nonetheless, no studies have confirmed them in cultural contexts different from the original one. The present study examined the psychometric properties of the Self-Report, Parent, and Teacher Conners 3-Short Forms in terms of reliability and validity in an Italian sample. Analyses were performed on 591 children and adolescents, 631 parents' ratings, and 325 teachers' ratings. To test for discriminative validity, ADHD clinical samples of 55 youth, 63 parents, and 15 teachers were compared to gender- and age-matched groups. Findings confirmed the original multidimensional structures and supported the Conners 3-Short Form scales as reliable and valid tools to assess ADHD and its main comorbid conditions

# NOVEL IMPACT VALIDITY INDICES IN COLLEGIATE STUDENT-ATHLETES WITH AND WITHOUT HISTORIES OF ADHD OR

# ACADEMIC DIFFICULTIES.

# Manderino LM, Zachman AM, Gunstad J.

Objective: Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) assesses neurocognitive functioning in sports-related concussion. Previous work demonstrates ImPACT's validity indices detect poor effort at disproportionately higher rates in athletes with histories of attention deficit hyperactivity disorder (ADHD) or academic difficulties. The present study examines whether previously suggested 'dormant' validity indices, Word Memory Correct Distractors (WMCD), and Design Memory Correct Distractors (DMCD), reduce disproportionate invalidity in collegiate athletes with such histories.

Method: Six seasons of ImPACT protocols were examined (n = 1727). Athletes were grouped by selfreported histories of ADHD, academic difficulties, or comorbid ADHD and academic difficulties. Chi-square analyses compared invalidity rates using existing validity indices and both standard and conservative cutoffs for WMCD and DMCD.

Results: Using standard cutoffs for dormant indices (WMCD < 22, DMCD < 16) produced significant differences in rates of athletes identified as having an invalid protocol, with the comorbid group exhibiting the highest invalidity rate (63.2%) and the no history group producing the lowest (42.0%), chi(2) (3) = 11.57, p < .01, Cramer's V = 0.08. This difference remained when utilizing conservative cutoffs (WMCD < 18, DMCD < 10), with the comorbid group again producing the highest (26.3%) and the no history group producing the lowest (10.4%), chi(2) (3) = 15.64, p < .005, Cramer's V = 0.10.

Conclusions: Student-athletes with self-reported histories of ADHD and academic difficulties are more likely to produce invalid protocols, even with dormant indices. These findings emphasize the difficulty in assessing validity in special populations of athletes and encourage further work in this area

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# Clin Neuropsychol. 2019 May;33:760-78.

# VISUAL-SPATIAL PROCESSING STYLE IS ASSOCIATED WITH PSYCHOPATHOLOGY IN ADOLESCENTS WITH CRITICAL CONGENITAL HEART DISEASE.

# Cassidy AR, Bernstein JH, Bellinger DC, et al.

**OBJECTIVE**: To determine whether visual-spatial processing style is associated with psychopathology in a large sample of adolescents with critical congenital heart disease (CHD). Local (part-oriented) style was hypothesized to increase risk for internalizing (but not externalizing) forms of psychopathology.

METHOD: Participants included 278 adolescents with critical CHD (dextro-transposition of the great arteries = 134, tetralogy of Fallot = 58, single-ventricle cardiac anatomy requiring the Fontan procedure = 86). Visualspatial processing style was indexed using Copy Style Ratings from the Rey-Osterrieth Complex Figure-Developmental Scoring System. The Schedule for Affective Disorders and Schizophrenia for School-Aged Children-Present & Lifetime Version was used to determine presence/absence of diagnosable DSM-IV psychiatric disorder(s). Processing style and psychopathology were assessed concurrently.

**RESULTS**: Thirty-three percent of the sample had a part-oriented processing style. In multivariable binary logistic regression models, part-orientation was associated with more than twice the odds of having an anxiety disorder (lifetime: OR = 2.2, p = .02, 95% CI = 1.1-4.1; current: OR = 2.7, p = .03, 95% CI = 1.1-6.5) but was not associated with an increased risk for ADHD, disruptive behavior, or mood disorders (ps > .05).

CONCLUSIONS: Adolescents with critical CHD who approach complex visual-spatial materials in a local, part-oriented fashion are more likely to meet criteria for an anxiety disorder than those who approach complexity more holistically. Part-orientation may make it more difficult for individuals to judge the relative importance of isolated details and engage in more adaptive perspective-taking

Clin Pediatr (Phila). 2019 Dec;58:1538-39. ATTENTION DEFICIT HYPERACTIVITY DISORDER MEDICATION MANAGEMENT: WHERE TO BEGIN? Siddiqi SU, Dedlow ER.

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#### Cold Spring Harb Mol Case Stud. 2019 Jun;5.

PARTIAL JACOBSEN SYNDROME PHENOTYPE IN A PATIENT WITH A DE NOVO FRAMESHIFT MUTATION IN THE ETS1 TRANSCRIPTION FACTOR.

# Tootleman E, Malamut B, Akshoomoff N, et al.

Jacobsen syndrome (OMIM #147791) is a rare contiguous gene disorder caused by deletions in distal 11q. The clinical phenotype is variable and can include dysmorphic features, varying degrees of intellectual disability, behavioral problems including autism and attention deficit hyperactivity disorder, congenital heart defects, structural kidney defects, genitourinary problems, immunodeficiency, and a bleeding disorder due to impaired platelet production and function. Previous studies combining both human and animal systems have implicated several disease-causing genes in distal 11q that contribute to the Jacobsen syndrome phenotype. One gene, ETS1, has been implicated in causing congenital heart defects, structural kidney defects, and immunodeficiency. We performed a comprehensive phenotypic analysis on a patient with congenital heart disease previously found to have a de novo frameshift mutation in ETS1, resulting in the loss of the DNA-binding domain of the protein. Our results suggest that loss of Ets1 causes a "partial Jacobsen syndrome phenotype" including congenital heart disease, facial dysmorphism, intellectual disability, and attention deficit hyperactivity disorder

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Cold Spring Harb Mol Case Stud. 2019 Jun;5.

BETA-MANNOSIDOSIS CAUSED BY A NOVEL HOMOZYGOUS INTRAGENIC INVERTED DUPLICATION IN MANBA.

# Blomqvist M, Smeland MF, Lindgren J, et al.

beta-Mannosidosis is a lysosomal storage disorder characterized by accumulation of disaccharides due to deficiency of the lysosomal enzyme beta-mannosidase. The disease is caused by mutations in MANBA and is extremely rare in humans. Although the clinical presentation is heterogeneous, common symptoms include various degrees of developmental delay, behavioral disturbances, hearing loss, and frequent infections. We report a 15-yr-old girl presenting with mild intellectual disability, sensorineural hearing loss, severe behavioral disturbances, dysmorphic traits, and evolving angiokeratomas. Copy-number variation analysis of next-generation sequencing (NGS) data indicated increased coverage in exons 8-11 of MANBA Low beta-mannosidase activity (1 microkatal/kg protein, refv 25-40) established the diagnosis of beta-mannosidosis. Whole-genome sequencing (WGS) and cDNA analysis revealed a novel homozygous intragenic inverted duplication in MANBA, where a 13.1-kb region between introns 7 and 11 was duplicated and inserted in an inverted orientation, creating a 67-base nonduplicated gap at the insertion point. Both junctions showed microhomology regions. The inverted duplication resulted in exon skipping of exons 8-9 or 8-10. Our report highlights the importance of copy-number variation analysis of data from NGS and in particular the power of WGS in the identification and characterization of copy-number variants

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Complement Ther Clin Pract. 2019 Nov;37:39-46.

"EAT, PRAY, LOVE. RITALIN": A QUALITATIVE INVESTIGATION INTO THE PERCEIVED BARRIERS AND ENABLERS TO PARENTS OF CHILDREN WITH ADHD UNDERTAKING A MINDFUL PARENTING INTERVENTION.

# Ruuskanen E, Leitch S, Sciberras E, et al.

**BACKGROUND AND PURPOSE**: There is growing interest in how mindful parenting interventions (MPI) may support families of children with attention deficit hyperactivity disorder (ADHD). The aim of this study was to explore the potential barriers and enablers to parents' participation in a MPI from the perspectives of parents of children with ADHD and healthcare providers.

**MATERIALS AND METHODS**: Thirteen parents of children with ADHD attended focus groups, and seven healthcare providers participated in semi-structured phone interviews. Transcripts of the focus groups and interviews were analysed using inductive thematic analysis.

**RESULTS**: Three overarching themes related to potential barriers and enablers were identified: parent motivation and capacity to engage in a MPI, the need for multimodal and personalised delivery, and considerations for real-world program implementation.

**CONCLUSION**: Parents of children with ADHD appear to require flexible, multimodal MPIs that consider parents' emotional experiences, priorities, and personal struggles

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#### Compr Psychiatry. 2019 Feb;89:33-39.

#### FIVE-YEAR DIAGNOSTIC STABILITY AMONG ADOLESCENTS IN AN INPATIENT PSYCHIATRIC UNIT.

# Blazquez A, Ortiz AE, Castro-Fornieles J, et al.

**INTRODUCTION**: In childhood, diagnoses made at the first admission to a psychiatric unit are frequently unstable and temporary. In this study, we examined the stability of DSM-IV-TR disorders and groups of disorders among adolescents followed-up for 5years after hospitalization.

**METHOD**: All inpatients admitted for the first time between 2007 and 2008 were included and contacted after 5years for re-evaluation. The final sample comprised 72 patients. At admission, diagnoses were based on the DSM-IV-TR criteria, Fourth Edition. At five years, diagnoses were made using structured clinical interviews for DSM-IV axis I Disorders and for axis II (SCID-I and SCID-II) as well as the Personality Diagnostic Questionnaire, Fourth Edition (PDQ-4). We also evaluated and collected information on the global assessment of functioning using the World Health Organization Quality of Life-BREF (WHOQOL-BREF) instrument. Depending on the distribution of variables, we used the chi-squared and Fisher exact tests or the Student t and McNemar tests for statistical analyses.

**RESULTS**: The most stable diagnoses were schizophrenia spectrum disorders, bipolar disorder, generalized anxiety disorder, obsessive-compulsive disorder, attention deficit hyperactivity disorder, Tourette syndrome, and pervasive developmental disorder. The most unstable diagnoses were disruptive disorders. Participants were satisfied with their quality of life and the global outcomes of the sample were positive.

**CONCLUSION**: Major psychiatric disorders, including mood and schizophrenia spectrum disorders, were significantly more stable than other diagnoses and tended to continue into adulthood. In the case of study participants, suffering a mental disorder during adolescence did not appear to affect global functioning outcomes

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Curr Neuropharmacol. 2019;17:916-25.

USING CELL CULTURES FOR THE INVESTIGATION OF TREATMENTS FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER: A SYSTEMATIC REVIEW.

# Chierrito D, Villas-Boas CB, Tonin FS, et al.

**BACKGROUND**: Advances in basic and molecular biology have promoted the use of cell cultures in a wide range of areas, including the evaluation of drug efficacy, safety and toxicity.

**OBJECTIVE**: This article aims to provide a general overview of the methodological parameters of cell cultures used to investigate therapeutic options for Attention Deficit Hyperactivity Disorder.

**METHOD**: A systematic search was performed in the electronic databases PubMed, Scopus, and DOAJ. In vitro experimental studies using cell cultures were included.

**RESULTS**: A total of 328 studies were initially identified, with 16 included for qualitative synthesis. Seven studies used neuronal cells (SH-SY5Y neuroblastoma and PC12 cell line) and nine used nonneuronal cells. All the studies described the culture conditions, but most studies were inconsistent with regard to reporting results and raw data. Only one-third of the studies performed cell viability assays, while a further 30% conducted gene expression analysis. Other additional tests included electrophysiological evaluation and transporter activity. More than 50% of the studies evaluated the effects of drugs such as methylphenidate and atomoxetine, while plant extracts were assessed in four studies and polyunsaturated fatty acids in one.

**CONCLUSION**: We suggested a flowchart to guide the planning and execution of studies, and a checklist to be completed by authors to allow the standardized reporting of results. This may guide the elaboration of laboratory protocols and further in vitro studies

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# Curr Opin Pediatr. 2019 Apr;31:267-73.

NEUROTOXICITY OF GENERAL ANESTHETICS IN CHILDREN: EVIDENCE AND UNCERTAINTIES. Bellinger DC, Calderon J.

**PURPOSE OF REVIEW**: Compelling evidence in animal models that, under some conditions, general anesthetics and sedatives produce changes in the brain and persistent impairments in learning, memory, and behavior. The present review summarizes recent clinical studies investigating whether the use of these agents in children causes similar neurotoxicities.

**RECENT FINDINGS**: Although the results of retrospective studies are somewhat mixed, multiple exposures to general anesthesia were generally found to confer greater risk than single exposures with regard to learning disability, attention deficit hyperactivity disorder, school readiness, and academic achievement. Recent clinical studies, including a large randomized controlled trial, are consistent in confirming that a single exposure in infancy to general anesthesia lasting less than 1 h is not associated with neurodevelopmental impairments in later childhood. These studies do not, however, clarify the potential impacts of longer exposures or multiple exposures.

**SUMMARY**: Given that approximately half of the anesthetic exposures in young US children are 1 h or less in duration, the results of the recent clinical studies are reassuring. Because of the clinical necessity of administering general anesthetics and sedatives for longer periods for many surgical, procedural, or diagnostic purposes, the identification of adjuvants that prevent or reduce the potential neurotoxicity of these agents is an area of active research

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Curr Opin Pediatr. 2019 Aug;31:435-41.

# A PRIMARY CARE PEDIATRICIAN'S GUIDE TO ASSESSING PROBLEMATIC INTERACTIVE MEDIA USE.

# Nereim C, Bickham D, Rich M.

**PURPOSE OF REVIEW**: To review the literature and provide a guide to assessing patients with problematic interactive media use (PIMU).

**RECENT FINDINGS**: 0.3-1.0% of the world population meets criteria for internet gaming disorder (IGD). 26.8-83.3% of adolescents meeting criteria for internet addiction have comorbid attention-deficit/hyperactivity disorder. IGD is associated with increased anxiety and social anxiety/phobias. Group counseling, cognitive behavioral therapy, and sports intervention are associated with significant reductions in internet addiction.

**SUMMARY**: With the Diagnostic and Statistical Manual of Mental Disorders-5 inclusion of IGD under 'Conditions for Further Study' and the addition of gaming disorder to International Classification of Diseases (ICD)-11, the idea that PIMU is a mental health disorder gained traction. Although certain populations may be at increased risk, all children and adolescents should be screened for PIMU given now-normal heavy media usage rates. Effective treatment of PIMU starts with identification and management of comorbid mental and behavioral health problems. Depending on their degree of functional impairment, patients may benefit from various forms of psychotherapy with coordinated outpatient management or may warrant higher level of care in one of several established residential treatment programs. Few studies have evaluated pharmacologic approaches to treating PIMU, but some medications targeting comorbid mental and behavioral health conditions improve PIMU-related behaviors

# Curr Opin Pediatr. 2019 Aug;31:469-75.

# MINDFULNESS-BASED INTERVENTIONS FOR ADOLESCENT HEALTH.

# Lin J, Chadi N, Shrier L.

**PURPOSE OF REVIEW**: Mindfulness, the practice of paying attention to the present moment, purposefully and nonjudgmentally, has been gaining popularity as adjunct treatment for adolescents with a range of physical and mental health problems. Research conducted in adults and emerging research conducted in adolescents has shown that mindfulness-based interventions can improve outcomes in several areas. The purpose of this review is to discuss recent research on the effects of mindfulness and suggest exercises that primary care clinicians can offer to their adolescent patients.

**RECENT FINDINGS**: Research has shown positive effects of mindfulness across several health conditions commonly encountered during adolescence. Mindfulness-based Interventions can reduce symptoms of anxiety and depression. The application of mindfulness can help with the prevention and treatment of binge eating, over-eating, and restrictive eating disorders. In the treatment of substance use disorders, mindfulness can improve emotion regulation and reduce symptoms of withdrawal and craving. Mindfulness can also lead to improvement in overall quality of life for patients suffering from chronic pain. Lastly, mindfulness can be useful for adolescents with ADHD, sleep problems, chronic illness, and stress related to performance sports. **SUMMARY**: Although research in adolescents remains limited, mindfulness holds promise in the treatment of a range of health conditions in adolescents

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# Dev Med Child Neurol. 2019 Dec;61:1377-85.

NEUROPSYCHIATRIC PROFILE OF PAEDIATRIC HYPOTHALAMIC HAMARTOMA: SYSTEMATIC REVIEW AND CASE SERIES. Corbet BG, Liang H, Lancaster R, et al.

**AIM**: To evaluate neuropsychiatric comorbidities in children and adolescents with hypothalamic hamartoma. **METHOD**: We retrospectively analysed case notes for all individuals with hypothalamic hamartoma referred to Great Ormond Street Hospital, London, between 2000 and 2016. In addition, a systematic review aiming to identify all previous paediatric case series was performed. Psychiatric symptoms, demographics, physical comorbidities, and cognitive functioning were recorded for all cases where possible. Analyses were performed to determine which factors were associated with psychopathology and potential mechanisms investigated.

**RESULTS**: Forty-six cases were included in the case series (28 males, 18 females; mean age at assessment 11y 8mo [1y 11mo-16y 11mo, SD 4y 0mo]). Twenty-nine papers representing data from 264 cases met inclusion criteria for the systematic review. Overall, at least 50% of cases presented with psychopathology. Epilepsy, intellectual disability, and male sex were associated with externalizing disorders (attention-deficit/hyperactivity disorder, conduct and oppositional defiance disorders, and rage attacks). Intellectual disability mediated the effects of epilepsy on externalizing psychopathology. No factors were associated with internalizing disorders (anxiety and depressive disorders), although these were not well reported.

**INTERPRETATION**: Psychiatric comorbidities are highly prevalent in the presentation of paediatric hypothalamic hamartoma. The aetiology of psychopathology comprises a range of interacting biological and psychosocial factors with particular influence from epilepsy. Further research is required to achieve an evidence base for treatment.

WHAT THIS PAPER ADDS: Over half of children with hypothalamic hamartoma present with psychiatric comorbidity. Externalizing and internalizing disorders are present in approximately 60% and 30% of children with hypothalamic hamartomas respectively. Epilepsy and male sex are associated with externalizing psychopathology. Intellectual disability mediates the association between epilepsy and externalizing symptoms. No clear associations are evident for internalizing disorders or precocious puberty

We examined genetic and environmental contributions to the development of symptoms of attentiondeficit/hyperactivity disorder (ADHD) in preschool children. ADHD symptoms in siblings at 1.5, 3, and 5 years of age were investigated in a population-based sample from the prospective Norwegian Mother and Child Cohort Study. The longitudinal contributions of additive genetic, shared, twin-specific, and unique environmental influences were estimated using biometric structural equation models. Heritability of ADHD symptoms ranged from 54% to 70%. There was evidence of partially new genetic influences at successive ages, with genetic correlations ranging from .58 to .89. Contributions from shared environmental factors and twin-specific factors were minor. The importance of unique environmental effects appeared to increase across ages, and was mostly specific to a given age. There was no evidence suggesting that this pattern differs across males and females. Symptoms of ADHD are highly heritability in young children from as early as 1.5 years of age. Longitudinal stability of ADHD symptoms is mainly attributable to genetic influences, but there is also some evidence for age-specific genetic influences. These findings contribute to our understanding of development of ADHD early in life, and can guide future molecular genetics studies

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#### Dev Sci. 2020 Jan;23:e12844.

BRAIN STRUCTURE MEDIATES THE ASSOCIATION BETWEEN SOCIOECONOMIC STATUS AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

#### Machlin L, McLaughlin KA, Sheridan MA.

Low socioeconomic status (SES) is associated with greater risk for symptoms of attention-deficit/hyperactivity disorder (ADHD). One mechanism through which SES may confer risk for ADHD is by influencing brain structure. Alterations to cortical thickness, surface area and subcortical volume have been associated with low SES and with the presence of ADHD across multiple studies. The current study examined whether cortical thickness, surface area or subcortical volume mediate the associations between SES and ADHD in vouth 3-21 years old (N = 874) from the Pediatric Imaging. Neurocognition and Genetics Study. Freesurfer was used to estimate cortical thickness, surface area and subcortical volume from structural magnetic resonance imaging. Parents reported on demographics, family SES, ADHD diagnoses and the presence of child attention problems. Statistical mediation was assessed using a bootstrap resampling procedure. Controlling for parental ADHD, child age, gender, birth weight and scanner, children in low SES families were more likely to be in the ADHD group. Consistent with previous reports in this sample, low SES was associated with reduced surface area across the frontal lobe and reduced subcortical volume in the amygdala, cerebellum, hippocampus and basal ganglia. Of these regions, a significant indirect effect of SES on ADHD status through subcortical volume was observed for the left cerebellum (95% confidence interval: 0.004, 0.022), the right cerebellum (95% confidence interval: 0.006, 0.025), and the right caudate (95% confidence interval: 0.002, 0.022). Environmentally mediated changes in the cerebellum and the caudate may be neurodevelopmental mechanisms explaining elevated risk of ADHD in children in low SES families

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# Early Interv Psychiatry. 2020 May 26.

COGNITIVE BEHAVIOURAL THERAPY FOR HELP-SEEKING ADOLESCENTS AND YOUNG ADULTS WITH AT-RISK-MENTAL STATE: EFFECTS ON SUBCLINICAL POSITIVE SYMPTOMS

# Pozza A, Domenichetti S, Dèttore D.

**Aim**: Cognitive behavioural therapy (CBT) is effective for at-risk-mental state (ARMS) in reducing/delaying transition to psychosis. However, previous systematic reviews pointed out the small number of trials as a limitation and suggested that additional outcomes should be evaluated, not only prevention of first psychosis episode. No study assessed the CBT effects on subclinical psychotic symptoms. The present study investigated the effects of CBT on the transition risk (primary outcome), and on overall remission from ARMS

and severity of subclinical symptoms, that is, unusual content of thought, non-bizarre ideas, perceptual abnormalities, disorganized speech (secondary outcome).

**Methods**: CBT consisted of 30 individual weekly sessions over 7 months. Fifty-eight participants with ARMS detected by the Comprehensive Assessment of At-Risk-Mental States were randomized to CBT or control condition.

**Results**: Respectively in the CBT and control groups, 1 (3.40%) and 5 (26.31%) participants at post-treatment and 3 (10.30%) and 8 (42.10%) at follow-up made transition with a difference between the two groups, despite at borderline significance. At post-treatment and follow-up, respectively, the number of participants recovered from ARMS was significantly higher in CBT (76.92% and 61.53%) than in control (10.52% and 15.80%). Participants in the control group reported lower reductions on all the subclinical symptoms over time as compared with those in CBT.

**Conclusions**: This is the first study assessing CBT on subclinical positive symptoms in ARMS. CBT seems to be a tailored approach able to produce short- and long-term benefits on this outcome.

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# Early Interv Psychiatry. 2019 Oct;13:1165-72.

#### CREATIVITY IN PERSONS AT-RISK FOR BIPOLAR DISORDER-A PILOT STUDY.

# Burkhardt E, Pfennig A, Breitling G, et al.

**AIM**: The association between bipolar disorder and creativity may be related to symptoms of the disorder itself or personality traits present before the onset. To further explore the relationship between creativity and clinical risk for bipolar disorder, creativity among individuals with a history of depressive disorder and varying risk for future (hypo-)manic episodes was assessed and compared.

**METHODS**: Thirty-eight participants completed the diagnostic process, including Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) Diagnosis, Hamilton Depression Scale and Young Mania Rating Scale. The early detection tools Bipolar Prodrome Symptom Interview and Scale-Prospective (BPSS-P), Early Phase Inventory for Bipolar Disorders (EPIbipolar) and bipolar-at-risk-(BAR) criteria were used to assign participants into different at-risk groups. Assessment of creativity included Barron-Welsh Art Scale (BWAS) and Creative Achievement Questionnaire (CAQ). Scores were compared between low- and high-risk groups for the development of bipolar disorder.

**RESULTS**: Participants meeting BAR criteria scored significantly higher on the BWAS than the non-BAR group (P = 0.03). EPIbipolar groups did not differ significantly in creativity scores. Participants with mood swings, especially when associated with increased activity and euphoric features, had significantly higher BWAS scores compared to individuals without mood swings (P = 0.04). Sleep disturbances, substance abuse, anxiety, ADHD and behavioural disturbances in childhood or adolescence had no effect on creativity level or achievement scores. Generalisability was reduced by small sample size and inclusion of depressive participants only considered at-risk for bipolar disorder.

**CONCLUSIONS**: There is evidence of increased creativity, but not of higher creative achievements, in persons at-risk of bipolar disorder. Mood swings are strongly associated with creativity

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Epidemiol Psychiatr Sci. 2019 Jan;29:e15.

PREVALENCE OF DSM-5 MENTAL DISORDERS IN A NATIONALLY REPRESENTATIVE SAMPLE OF CHILDREN IN TAIWAN: METHODOLOGY AND MAIN FINDINGS.

# Chen YL, Chen WJ, Lin KC, et al.

**AIMS**: There has been a lack of prevalence estimates of DSM-5 mental disorders in child populations at the national level worldwide. This study estimated the lifetime and 6-month prevalence of mental disorders according to the DSM-5 diagnostic criteria in Taiwanese children.

**METHODS**: Taiwan's National Epidemiological Study of Child Mental Disorders used the stratified cluster sampling to select 69 schools in Taiwan resulting in a nationally representative sample of 4816 children in grades 3 (n = 1352), 5 (n = 1297) and 7 (n = 2167). All the participants underwent face-to-face psychiatric interviews using the Kiddie-Schedule for Affective Disorders and Schizophrenia-Epidemiological version,

modified for the DSM-5, and they and their parents completed questionnaires. The inverse probability censoring weighting (IPCW)-adjusted prevalence was reported to minimise non-response bias.

**RESULTS**: The IPCW-adjusted prevalence rates of mental disorders decreased by 0.1-0.5% than raw weighted prevalence. The IPCW-adjusted weighted lifetime and 6-month prevalence rates for overall mental disorders were 31.6 and 25.0%, respectively. The most prevalent mental disorders (lifetime, 6-month) were anxiety disorders (15.2, 12.0%) and attention-deficit hyperactivity disorder (10.1, 8.7%), followed by sleep disorders, tic disorders, oppositional defiant disorder and autism spectrum disorder. The prevalence rates of new DSM-5 mental disorders, avoidant/restrictive food intake disorder and disruptive mood dysregulation disorder were low (<1%).

**CONCLUSIONS**: Our findings, similar to the DSM-IV prevalence rates reported in Western countries, indicate that DSM-5 mental disorders are common in the Taiwanese child population and suggest the need for public awareness, early detection and prevention

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# Epidemiol Psychiatr Sci. 2019 Feb;29:e17.

EXPOSURE TO MATERNAL DEPRESSIVE SYMPTOMS IN CHILDHOOD AND ADOLESCENT SUICIDE-RELATED THOUGHTS AND ATTEMPTS: MEDIATION BY CHILD PSYCHIATRIC SYMPTOMS.

# Goodday SM, Bondy S, Brown HK, et al.

**AIMS**: The nature of the association between child psychiatric symptoms and adolescent suicide-related thoughts (SRT) and attempts (SA) remains unclear. Our objective was to assess whether child psychiatric symptoms from 6 to 10 years of age mediate the association between exposure to maternal depressive symptoms in childhood and offspring SRT and SA in adolescence.

**METHODS**: A population-based cohort study was constructed by linking all eight cycles from the National Longitudinal Survey of Children and Youth (NLSCY), a nationally representative Canadian panel survey conducted from 1994 to 2009. Self-reported maternal depressive symptoms were measured when offspring were between 0 and 5 years. Maternal-reported child psychiatric symptoms and psychiatric comorbid symptoms were measured from 6 to 10 years, and offspring self-reported SRT and SA were measured between 11 and 19 years. Indirect effects, the effect proportion mediated and their corresponding bootstrapped 95% confidence intervals (CI) were estimated.

**RESULTS**: Hyperactivity and inattention significantly mediated the association between maternal depressive symptoms in childhood and risk of both SRT and SA from 11 to 19 years, where approximately 60% (SRT 95% CI 23-94%; SA 95% CI 27-95%) of this association was explained by hyperactivity and inattention. Psychiatric comorbid symptoms also significantly mediated this relationship and accounted for 50% (95% CI 18-81%) of this association with SA.

**CONCLUSIONS**: Targeting hyperactivity and inattention, and co-occurring psychiatric symptoms in offspring of depressed mothers could reduce risk of SRT, eventual SA and halt progression towards suicide. However, further understanding of comorbid psychiatric symptoms in childhood that most strongly predict adolescent SA is needed

Epidemiol Psychiatr Sci. 2020 May;29:e131.

RISK OF EATING DISORDERS IN INTERNATIONAL ADOPTEES: A COHORT STUDY USING SWEDISH NATIONAL POPULATION REGISTERS.

# Strand M, Zhang R, Thornton LM, et al.

**AIMS**: Compared to the general population, adoptees are more often referred to specialist psychiatric treatment, exhibit increased risk of suicide and display more symptoms of attention-deficit/hyperactivity-disorder. However, little is known about the impact of being an adoptee on the risk of developing an eating disorder. The aim of the present study was to assess whether international adoptees have a higher risk for eating disorders than native Swedes.

**METHODS**: In the present retrospective cohort study, data from the Swedish total population registers on individuals born between 1979 and 2005 were used to assess whether international adoptees residing in

Sweden (n = 25 287) have a higher risk for anorexia nervosa (AN) and other eating disorders (OED) than non-adoptees with Swedish-born parents from the general population (n = 2 046 835). The patterns of these results were compared to those for major depressive disorder (MDD), obsessive-compulsive disorder (OCD), and anxiety disorders to determine whether any observed effects were unique to eating disorders or reflected a more general impact on mental health outcomes.

**RESULTS**: A survival analysis adjusting for relevant demographic covariates revealed an elevated risk of all examined psychiatric disorders in international adoptees: hazard ratios (95% confidence intervals) are 1.21 (1.04-1.41) for AN, 1.60 (1.44-1.79) for OED, 1.90 (1.81-2.00) for MDD, 1.25 (1.09-1.44) for OCD, and 1.69 (1.60-1.78) for anxiety disorders.

**CONCLUSIONS**: Elevated risk of eating disorders as well as of MDD, OCD, and anxiety disorders was found in international adoptees. A parallel pattern between AN and OCD was observed, which both display less elevated rates than the other diagnoses. A considerable number of biological, environmental, and societal factors have been suggested to explain the observed differences in mental health between adoptees and non-adoptees, but they remain primarily theoretical

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## Eur Arch Psychiatry Clin Neurosci. 2019 Sep;269:741-52.

# INTERPLAY BETWEEN GENOME-WIDE IMPLICATED GENETIC VARIANTS AND ENVIRONMENTAL FACTORS RELATED TO CHILDHOOD ANTISOCIAL BEHAVIOR IN THE **UK ALSPAC** COHORT.

#### Ruisch IH, Dietrich A, Glennon JC, et al.

We investigated gene-environment (G x E) interactions related to childhood antisocial behavior between polymorphisms implicated by recent genome-wide association studies (GWASs) and two key environmental adversities (maltreatment and smoking during pregnancy) in a large population cohort (ALSPAC). We also studied the MAOA candidate gene and addressed comorbid attention-deficit/hyperactivity disorder (ADHD). ALSPAC is a large, prospective, ethnically homogeneous British cohort. Our outcome consisted of motherrated conduct disorder symptom scores at age 7;9 years. G x E interactions were tested in a sex-stratified way (alpha = 0.0031) for four GWAS-implicated variants (for males, rs4714329 and rs9471290; for females, rs2764450 and rs11215217), and a length polymorphism near the MAOA-promoter region. We found that males with rs4714329-GG (P = 0.0015) and rs9471290-AA (P = 0.0001) genotypes were significantly more susceptible to effects of smoking during pregnancy in relation to childhood antisocial behavior. Females with the rs11215217-TC genotype (P = 0.0018) were significantly less susceptible to effects of maltreatment, whereas females with the MAOA-HL genotype (P = 0.0002) were more susceptible to maltreatment effects related to antisocial behavior. After adjustment for comorbid ADHD symptomatology, aforementioned G x E's remained significant, except for rs11215217 x maltreatment, which retained only nominal significance. Genetic variants implicated by recent GWASs of antisocial behavior moderated associations of smoking during pregnancy and maltreatment with childhood antisocial behavior in the general population. While we also found a G x E interaction between the candidate gene MAOA and maltreatment, we were mostly unable to replicate the previous results regarding MAOA-G x E's. Future studies should, in addition to genome-wide implicated variants, consider polygenic and/or multimarker analyses and take into account potential sex stratification

Eur Arch Psychiatry Clin Neurosci. 2019 Sep;269:689-99.

**STX1A** GENE VARIATIONS CONTRIBUTE TO THE SUSCEPTIBILITY OF CHILDREN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A CASE-CONTROL ASSOCIATION STUDY.

#### Wang M, Gu X, Huang X, et al.

It was presumed syntaxin-1A (STX1A) might relate to the pathophysiology of attention-deficit/hyperactivity disorder (ADHD), but the results were inconsistent. The present study aims to confirm whether the STX1A gene is involved in the susceptibility of children ADHD. We genotyped three single nucleotide polymorphisms (SNPs) of STX1A gene using Sequenom MassARRAY technology. A case-control study was performed among Chinese Han population including 754 cases and 772 controls from two different provinces. The

Conners Parent Symptom Questionnaire and Integrated Visual and Auditory Continuous Performance Test were used to assess ADHD clinical symptoms. We found for the first time that rs3793243 GG genotype carriers had a lower risk of ADHD compared with AA genotype (OR 0.564, 95% confidence interval (CI) 0.406-0.692, P = 0.001), and rs875342 was also associated with children ADHD (OR 1.806, 95% CI 1.349-2.591, P = 0.001). In addition, the two positive SNPs were also significantly associated with the clinical characteristics of ADHD. Expression quantitative trait loci analysis indicated that rs3793243 might mediate STX1A gene expression. Using a case-control study to explore the association between STX1A gene and children ADHD in Chinese Han population, our results suggest STX1A genetic variants might contribute to the susceptibility of children ADHD

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Eur Arch Psychiatry Clin Neurosci. 2019 Sep;269:667-79.

ADULT ATTENTION-DEFICIT/HYPERACTIVITY DISORDER, RISKY SUBSTANCE USE AND SUBSTANCE USE DISORDERS: A FOLLOW-UP STUDY AMONG YOUNG MEN.

# Estevez-Lamorte N, Foster S, Eich-Hochli D, et al .

We investigated whether adult attention-deficit/hyperactivity disorder (ADHD) predicts risky substance use and substance use disorders (SUDs), and its impact on the course of these problematic substance use patterns. Our sample included 4975 Swiss men (mean age 20 +/- 1.2 years) who participated in the baseline and 15-month follow-up assessments of the Cohort Study on Substance Use Risk Factors. We examined: (1) the contribution of ADHD, as assessed at baseline, on the risky use of alcohol, nicotine and cannabis, and their corresponding use disorders (AUD, NUD, CUD) at follow-up; and (2) the association between ADHD and the course of outcomes (i.e., absence, initiation, maturing out, persistence) over 15 months. All analyses were adjusted for socio-demographics and co-morbidity. Men with ADHD were more likely to exhibit persistent risky alcohol and nicotine use, and to mature out of risky cannabis use. ADHD at baseline was positively linked to AUD and negatively to CUD at follow-up, but not to NUD. For all SUDs, ADHD had a positive association with use persistence and maturing out. Comparing these two trajectories revealed that early age of alcohol use initiation distinguished between persistence and maturing out of AUD, while the course of NUD and CUD was related to ADHD symptoms and SUD severity at baseline. Already in their early twenties, men with ADHD are especially likely to exhibit persistent problematic substance use patterns. Substance-specific prevention strategies, particularly implemented before early adulthood, may be crucial to reducing the development and persistence of pathological patterns in such individuals

Eur Child Adolesc Psychiatry. 2019 Oct;28:1411-13. REPLY TO CRITICAL COMMENTS ON THE ARTICLE 'INCREASED RISK OF DEVELOPING PSYCHIATRIC DISORDERS IN CHILDREN WITH ATTENTION DEFICIT AND HYPERACTIVITY DISORDER (ADHD) RECEIVING SENSORY INTEGRATION THERAPY: A POPULATION-BASED COHORT STUDY'. *Tzang RF, Kao KL, Muo CH, et al.* 

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#### Eur J Trauma Emerg Surg. 2019 Dec;45:989-94.

THE ROLE OF PSYCHIATRIC STATUS ON PEDIATRIC EXTREMITY FRACTURES: A PROSPECTIVE ANALYSIS.

Duramaz A, Yilmaz S, Ziroglu N, et al.

**PURPOSE**: The aim of the study was to investigate the relationship between attention deficit and hyperactivity disorder (ADHD), anxiety, and depression with pediatric extremity fractures.

**METHODS**: Between November 2014 and November 2016, consecutive 138 patients with pediatric extremity fractures were prospectively investigated in terms of the tendency to anxiety, depression, or ADHD in the study group. Consecutive 168 non-trauma patients who were admitted to general pediatrics outpatient clinic were included the control group. Patients were performed with Turgay DSM-IV-Based Child and Adolescent

Behavior Disorders Screening and Rating Scale-Parents Form (T-DSM-IV S), The Screen for Child Anxiety-Related Emotional Disorders (SCARED), and The Children's Depression Inventory (CDI).

**RESULTS**: There were not any significant differences between study and control groups regarding the age, gender distribution, economical level, or previous psychiatric admission rates (p > 0.05). In the study group, the previous ADHD history and previous fracture history were significantly higher than the control group (p < 0.05). In the study group, the severity of depressive signs and anxiety were significantly higher than the control group (p = 0.000 and p = 0.019; respectively). Regarding the previous fracture history, conduct disorder and tendency to depression were significantly higher in the study group (p = 0.001 and p = 0.011; respectively).

**CONCLUSIONS**: The signs of ADHD, anxiety, and depression were determined to be higher in children with extremity fractures compared with the non-traumatic population. In patients with especially behavioral problems and depressive signs, directing to the child and adolescent psychiatrists will be protective to prevent re-fractures and high-energy traumas

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Eur Psychiatry. 2019 Oct;62:58-59. ATYPICAL ANTIPSYCHOTICS FOR ATTENTION-DEFICIT/HYPERACTIVITY DISORDER- SCIENCE, ART, OR FAD? Naguy A, Hashem MS, AIKhadhar S.

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#### F1000Res. 2020;9:257.

# GILLES DE LA TOURETTE SYNDROME: ADVICE IN THE TIMES OF COVID-19.

Robertson MM, Eapen V, Rizzo R, et al.

The novel coronavirus disease (COVID-19) was identified as the cause of an outbreak of respiratory disease in China at the end of 2019. It then spread with enormous rapidity and by mid-March 2020 was declared a world pandemic. Gilles de la Tourette Syndrome (GTS) is a childhood-onset neurodevelopmental disorder with a worldwide prevalence of about 1% of the population. The clinical symptoms include multiple motor and one or more phonic (vocal) tics. Germane to this communication is that 85% of patients with GTS have associated psychiatric co-morbidities, many of which are being exacerbated in the current global health crisis. In addition, several symptoms of GTS may mimic COVID-19, such as a dry cough and sniffing (phonic tics), while other symptoms such as spitting, inappropriate touching of others and "non-obscene socially inappropriate symptoms" can potentially get patients with GTS into trouble with the law. We suggest that a clear explanation of the COVID-19 illness and GTS is important to enable colleagues of various specialities who tend to patients with GTS. It is important to acknowledge at the outset that the information available on the COVID-19 pandemic changes daily, including cases infected, deaths reported, and how various national health systems are planning and or coping or not. It is fair to say that having read the current medical and lay press we conclude that it is not easy to reassure our patients with absolute certainty. However, notwithstanding that, we hope our documentation is of some assistance

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Games Health J. 2019 Aug;8:265-74.

A PILOT STUDY OF THE EFFICACY OF A COGNITIVE TRAINING BASED ON BOARD GAMES IN CHILDREN WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A RANDOMIZED CONTROLLED TRIAL.

# Estrada-Plana V, Esquerda M, Mangues R, et al.

**Objective**: The main aim of this study was to prove the efficacy of an intervention based on board games on executive functions (EFs) and clinical symptoms in children with attention-deficit/hyperactivity disorder (ADHD).

**Materials and Methods**: A nonblinded randomized controlled trial was conducted with a sample of children with a diagnosis of ADHD (diagnosed by psychiatrists and clinical psychologists in a mental health center). Children were randomly allocated by matching age and sex, into two groups: experimental EF training group

(n = 13; mean [M]age = 9.46, standard deviation [SD] = 1.20; boys = 53.8%) or a wait-list control group (n = 14; Mage = 9.50, SD = 1.09; boys = 71.4%). Measures assessed individually at pretest, posttest, and follow-up intervention included EFs and clinical symptoms.

**Results**: Analysis of covariance repeated measures analysis showed that linguistic short-term memory, F(1,28) = 7.45, p = 0.02, and conduct problems, F(1,28) = 12.51, p = 0.00, significantly improved with larger effects in the board games training group after intervention when compared to the wait-list group. Although nonsignificant effects were reported at the follow-up, large effect sizes were actually found.

**Conclusion**: Although future studies are needed, the results of this study highlight the importance of board games and its efficacy as a possible therapeutic and/or preventive intervention on ADHD

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# Harv Rev Psychiatry. 2019 Nov;27:342-53.

# IMPLEMENTATION OF OFF-SITE INTEGRATED CARE FOR CHILDREN: A SCOPING REVIEW.

# Spencer AE, Platt RE, Bettencourt AF, et al.

**BACKGROUND**: As an alternative to co-located integrated care, off-site integration (partnerships between primary care and non-embedded specialty mental health providers) can address the growing need for pediatric mental health services. Our goal is to review the existing literature on implementing off-site pediatric integrated care.

**METHODS**: We systematically searched the literature for peer-reviewed publications on off-site pediatric integrated care interventions. We included studies that involved systematic data collection and analysis, both qualitative and quantitative, of implementation outcomes (acceptability, adoption, appropriateness, feasibility, fidelity, implementation cost, penetration, and sustainability).

**RESULTS**: We found 39 original articles from 24 off-site programs with a variety of study designs, most with secondary implementation outcomes. Models of off-site integration varied primarily along two dimensions: direct vs. indirect, and in-person vs. remote. Overall, off-site models were acceptable to providers, particularly when the following were present: strong interdisciplinary communication, timely availability and reliability of services, additional support beyond one-time consultation, and standardized care algorithms. Adoption and penetration were facilitated by enhanced program visibility, including on-site champions. Certain clinical populations (e.g., school-age, less complicated ADHD) seemed more amenable to off-site integrated models than others (e.g., preschool-age, conduct disorders). Lack of funding and inadequate reimbursement limited sustainability in all models.

**CONCLUSIONS**: Off-site interventions are feasible, acceptable, and often adopted widely with adequate planning, administrative support, and interprofessional communication. Studies that focus primarily on implementation and that consider the perspectives of specialty providers and patients are needed

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# IET Syst Biol. 2019 Oct;13:260-66.

#### DIAGNOSIS OF ATTENTION DEFICIT HYPERACTIVITY DISORDER USING NON-LINEAR ANALYSIS OF THE EEG SIGNAL. Boroujeni YK, Rastegari AA, Khodadadi H.

Attention deficit hyperactivity disorder (ADHD) is a common behavioural disorder that may be found in 5%-8% of the children. Early diagnosis of ADHD is crucial for treating the disease and reducing its harmful effects on education, employment, relationships, and life quality. On the other hand, non-linear analysis methods are widely applied in processing the electroencephalogram (EEG) signals. It has been proved that the brain neuronal activity and its related EEG signals have chaotic behaviour. Hence, chaotic indices can be employed to classify the EEG signals. In this study, a new approach is proposed based on the combination of some non-linear features to distinguish ADHD from normal children. Lyapunov exponent, fractal dimension, correlation dimension and sample, fuzzy and approximate entropies are the non-linear extracted features. For computing, the chaotic time series of obtained EEG in the brain frontal lobe (FP1, FP2, F3, F4, and Fz) need to be analysed. Experiments on a set of EEG signal obtained from 50 ADHD and 26 normal cases yielded a sensitivity, specificity, and accuracy of 98, 92.31, and 96.05%, respectively. The obtained accuracy provides a significant improvement in comparison to the other similar studies in identifying and classifying children with ADHD

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Int J Adolesc Med Health. 2019 Sep;31.

ADVERSE EFFECTS OF STIMULANT MEDICATIONS IN CHILDREN AND ADOLESCENTS: FOCUS ON DRUG ABUSE. *Greydanus DE, Cates KW, Sadigh N*.

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Int J Cardiol. 2019 Sep;291:52-56.

ALLEVIATION OF ARRHYTHMIA BURDEN IN CHILDREN WITH FREQUENT IDIOPATHIC PREMATURE VENTRICULAR CONTRACTIONS BY OMEGA-3-FATTY ACID SUPPLEMENTATION.

# Buchhorn R, Baumann C, Willaschek C.

**BACKGROUND**: Patients at our pediatric outpatient clinic were offered 24-h Holter electrocardiogram (ECG) before and after 3-month period of dietary supplementation with omega-3 fatty acids to monitor the effect on heart rate variability (HRV) and arrhythmias.

**METHODS**: The study included 17 children (mean age: 11.6+/-4.9years) with >1% premature ventricular contractions (PVC) at baseline. 24-h Holter ECG monitoring was performed before and after omega-3 fatty acid supplementation (mean duration: 143days).

**RESULTS**: Compared with 86 age-matched healthy control children, baseline HRV was significantly reduced and mean heart rate was significantly increased in children with frequent PVC. After omega-3-fatty acid supplementation, the mean heart rate decreased from 92.6+/-3.4bpm to 83.9+/-9.9bpm (p=0.001), while global HRV showed a significant increase [standard deviation of all NN intervals (SDNN): 148.1+/-34.4ms vs. 126.5+/-39.3ms, p=0.022)]. Enhanced vagal activity was indicated by significantly higher square root of the mean of the sum of the squares of differences between adjacent NN intervals (rMSSD) (42.3+/-12.6 vs. 33.2+/-14.8; p=0.0003). PVC percentage significantly decreased by 45% (6.9+/-7.0% vs. 12.1+/-8.2%; p=0.014).

**CONCLUSIONS**: Omega-3-fatty acid supplementation caused a 45% reduction in frequent PVC in children with structurally healthy hearts. This antiarrhythmic effect was likely attributable to improved autonomic function, which is consistent with previous findings in children with obesity, attention deficit disorder, and short stature

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Int J Drug Policy. 2019 Mar;65:86-96.

LIGHT AND HEAVY DRINKING IN JURISDICTIONS WITH DIFFERENT ALCOHOL POLICY ENVIRONMENTS.

### Foster S, Gmel G, Mohler-Kuo M.

**BACKGROUND**: A basic, yet untested tenet underlying alcohol control policies is that they should affect both light and heavy drinking, thereby shifting the entire population in a favourable direction. The aim of this study was to test this assumption in young Swiss men.

**METHODS**: Cross-sectional self-reported data - from 5755 young Swiss men participating in the Cohort Study on Substance Use Risk Factors (C-SURF), a large cohort study on young men living within 21 jurisdictions across Switzerland - were analysed via nested logistic regression. With this approach, a set of increasingly-heavy drinking patterns was broken down into a set of nested regression models, each one estimating the probability of heavier drinking, conditional on the lighter drinking pattern. Drinking patterns relating to heavy episodic drinking (HED), heavy volume drinking (HVD) on weekends, and workweek drinking, as well as alcohol use disorder (AUD) were examined. The explanatory variable was a previously-used alcohol policy environment index (APEI) reflecting the number of alcohol control policies implemented in each jurisdiction. Conventional and multilevel logistic regression models were tested, adjusted for age, education, linguistic region, urban/rural status, attention-deficit/hyperactivity disorder, depression, sensation seeking, antisocial personality disorder, and unobserved heterogeneity between jurisdictions.

**RESULTS**: For HED, weekend HVD, and AUD, negative relationships with the APEI were found, such that with a higher APEI the probability of lighter drinking patterns was increased while the probability of heavier patterns was reduced, including a reduced probability of the heaviest patterns. These relationships were nonlinear, however, and tapered off towards the heavy end of the drinking spectrum. No relationship was identified between the APEI and workweek drinking patterns.

**CONCLUSION**: Among young Swiss men, stricter alcohol policy environments were associated with a global shift towards lighter drinking, consistent with the basic tenet behind the universal prevention approach

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Int J Environ Res Public Health. 2019 Oct;16.

# EXECUTIVE FUNCTION AND ATTENTION PERFORMANCE IN CHILDREN WITH ADHD: EFFECTS OF MEDICATION AND COMPARISON WITH TYPICALLY DEVELOPING CHILDREN.

# Miklos M, Futo J, Komaromy D, et al.

The emerging literature reports that children with Attention-Deficit/Hyperactivity Disorder (ADHD) show deficits in executive functioning. To date, the combination of drug therapy with certain evidence-based nonmedication interventions has been proven to be the most effective treatment for ADHD. There is a gap in the literature regarding comparing the executive functions (EF) of treatment naive and medicated children with ADHD with both each other and typically developing children. Altogether, 50 treatment naive and 50 medicated children with ADHD and 50 typically developing children between the ages of six and 12 were enrolled. The Mini International Neuropsychiatric Interview for Children and Adolescents (Mini Kid) and the Test of Attentional Performance for Children (KiTAP) measures were employed. Treatment naive children with ADHD showed weaker performance on most executive function measures (12 out of 15) than either the medicated ADHD group or the controls. There were no significant differences between the medicated ADHD children and typically developing children, which draws attention to the importance of treating ADHD. Future studies should focus on the specific effects of stimulant medication on executive functions

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Int J Law Psychiatry. 2019 Sep;66:101474.

PERCEPTIONS OF WAIVED JUVENILE DEFENDANTS ACROSS MENTAL HEALTH DIAGNOSES AND DEMOGRAPHIC CHARACTERISTICS.

# Taylor M, Kaplan T, Mulvey P, et al.

Justice involved youth who present with diagnosable mental health issues are commonly prosecuted in criminal courts. Limited research has examined how jurors perceive and respond to transferred juveniles with mental health issues. For the current study, 252 mock jurors were randomly assigned to read one of six profiles (i.e., White male, White female, Black male, Black female, Latino, and Latina) and report culpability, deserved punishment, behavior regulation, and dangerousness for juveniles diagnosed with conduct disorder, major depressive disorder, attention deficit hyperactivity disorder, schizophrenia, and described with antisocial traits/behaviors. A schizophrenia diagnosis was associated with less blame, punishment, and capacity for behavior regulation. A description of antisocial traits/behaviors was associated with more blame, punishment, capacity for behavior regulation, and dangerousness. White juveniles described with antisocial traits were considered more blameworthy and deserving of punishment than Latinos. Considering the temporary nature of adolescent antisocial personality characteristics, jurors should have greater awareness of the maturation process

#### Int J Law Psychiatry. 2019 May;64:106-16.

# SOCIAL SUPPORT, ATTACHMENT AND EXTERNALIZING BEHAVIOR IN FORENSIC PATIENTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

#### Houtepen JABM, Sijtsema JJ, Van der Lem R, et al.

This study was designed to provide more insight into the relationship between social support and externalizing behavior in forensic patients with ADHD. Because ADHD is highly associated with psychosocial impairment, we expected poor social support and attachment insecurity (i.e., preoccupied, fearful, and dismissive attachment) to be associated with higher levels of externalizing behaviors in forensic patients with ADHD. Self-reports of 32 forensic male outpatients with ADHD (M age=35.34) were compared with self-reports of healthy (n=32; M age=33.84), and 'at risk' control males with (a history of) psychological problems (n=30; M age=36.47) from the general population. In addition, associations between social support, attachment and externalizing behaviors (i.e., aggression, antisociality, anger and hostility) were examined within the sample as a whole. Analyses of variance showed that forensic patients with ADHD had higher levels of externalizing behaviors and insecure attachment, and lower levels of secure attachment compared to both healthy and at risk controls. Multivariate regression analyses showed that social support was not associated with any of the externalizing behaviors, after accounting for attachment. In contrast, insecure attachment best explained antisociality and hostility, suggesting that attachment is more important than other psychopathological risk factors that distinguish the different groups

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#### Int J Methods Psychiatr Res. 2019 Dec;28:e1795.

# PRACTICAL CONSEQUENCES OF MODEL MISFIT WHEN USING RATING SCALES TO ASSESS THE SEVERITY OF ATTENTION PROBLEMS IN CHILDREN.

# Crisan DR, Tendeiro JN, Wanders RBK, et al.

**OBJECTIVES**: In this study, we examined the consequences of ignoring violations of assumptions underlying the use of sum scores in assessing attention problems (AP) and if psychometrically more refined models improve predictions of relevant outcomes in adulthood.

**METHODS**: Tracking Adolescents' Individual Lives data were used. AP symptom properties were examined using the AP scale of the Child Behavior Checklist at age 11. Consequences of model violations were evaluated in relation to psychopathology, educational attainment, financial status, and ability to form relationships in adulthood.

**RESULTS**: Results showed that symptoms differed with respect to information and difficulty. Moreover, evidence of multidimensionality was found, with two groups of items measuring sluggish cognitive tempo and attention deficit hyperactivity disorder symptoms. Item response theory analyses indicated that a bifactor model fitted these data better than other competing models. In terms of accuracy of predicting functional outcomes, sum scores were robust against violations of assumptions in some situations. Nevertheless, AP scores derived from the bifactor model showed some superiority over sum scores.

**CONCLUSION**: These findings show that more accurate predictions of later-life difficulties can be made if one uses a more suitable psychometric model to assess AP severity in children. This has important implications for research and clinical practice

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Int J Methods Psychiatr Res. 2019 Dec;28:e1794.

IS THE ENDORSEMENT OF THE ATTENTION DEFICIT HYPERACTIVITY DISORDER SYMPTOM CRITERIA RATINGS INFLUENCED BY INFORMANT ASSESSMENT, GENDER, AGE, AND CO-OCCURRING DISORDERS? A MEASUREMENT INVARIANCE STUDY.

#### Vitoratou S, Garcia-Rosales A, Banaschewski T, et al.

**OBJECTIVES**: This study aims to ascertain whether the differences of prevalence and severity of attention deficit hyperactivity disorder (ADHD) are true or whether children are perceived and rated differently by

parent and teacher informant assessments (INFAs) according to gender, age, and co-occurring disorders, even at equal levels of latent ADHD traits.

**METHODS**: Use of latent trait models (for binary responses) to evaluate measurement invariance in children with ADHD and their siblings from the International Multicenter ADHD Gene data.

**RESULTS**: Substantial measurement noninvariance between parent and teacher INFAs was detected for seven out of nine inattention (IA) and six out of nine hyperactivity/impulsivity (HI) items; the correlations between parent and teacher INFAs for six IA and four HI items were not significantly different from zero, which suggests that parent and teacher INFAs are essentially rating different kinds of behaviours expressed in different settings, instead of measurement bias. However, age and gender did not affect substantially the endorsement probability of either IA or HI symptom criteria, regardless of INFA. For co-occurring disorders, teacher INFA ratings were largely unaffected by co-morbidity; conversely, parental endorsement of HI symptoms is substantially influenced by co-occurring oppositional defiant disorder.

**CONCLUSIONS**: Our findings suggest general robustness of Diagnostic and Statistical Manual of Mental Disorders ADHD diagnostic items in relation to age and gender. Further research on classroom presentations is needed

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# Int J Pharm Pract. 2019 Dec;27:545-54.

A POPULATION-BASED STUDY OF PRESCRIBING TRENDS IN A POTENTIALLY VULNERABLE PAEDIATRIC POPULATION FROM 1999 TO 2012.

#### Sears K, Elms S, Whitehead M, et al.

**OBJECTIVES**: There is a limited understanding of paediatric medication prescribing trends and patterns, thus poorly positioning decision-makers to identify quality and safety concerns related to medication use. The objective of this study was to determine overall medication prescribing trends and patterns among children receiving Ontario Drug Benefits over a thirteen-year period in the province of Ontario, Canada.

**METHODS**: Administrative health databases housed within the Institute for Clinical Evaluative Sciences (ICES), Ontario, Canada, were used to identify outpatient prescriptions dispensed from 1999 to 2012 through a publicly funded programme to children </=18 years of age. Medications were classified according to the American Hospital Formulary Service Pharmacologic-Therapeutic Classification system. Descriptive statistics were used to summarize prescribing patterns.

**KEY FINDINGS**: This study identified 457 037 children who were dispensed a new prescription between 1999 and 2012. About 56% received their first prescription before 6.5 years of age, and 85% of the children in this study were from families who received social assistance. The most commonly prescribed drugs were antiinfectives (56.1%). Prescriptions for several central nervous system agents, including antipsychotics and agents for attention-deficit/hyperactivity disorder, increased across the study period. Changes in prescribing patterns within opioids, hormones and autonomic agents were noted. The results suggest that historically, prescribing trends have shifted with public policy, pharmaceutical marketing and diagnostic patterns, thus identifying them as a possible tool to measure the impact of policydriven practice changes. Anti-infective prescribing increased markedly with the global H1N1 pandemic. Pharmaceutical marketing, formulary decisions and diagnostic trends may affect the prescribing of ADHD medications globally. The prescribing of codeine-containing products and medroxyprogesterone appeared to fluctuate in response to important publications in the medical literature, and the use of epinephrine syringes increased after public policy changes in the province of Ontario. The steady rise in the use of medications whose long-term effects in children are unknown, such as antipsychotics and proton pump inhibitors, identifies areas in need of future research.

**CONCLUSIONS**: This study presents the first overview of Canadian prescribing trends for children, the majority of which are of low socioeconomic status and represent a potentially vulnerable population. Our analysis suggests that future research is required to determine whether prescribing trends could be used as indicators of policy effectiveness, pharmacovigilance and diagnostic trends

Int J Qual Health Care. 2019 Aug;31:563-67.

AUTOMATED EXTRACTION OF QUALITY INDICATORS FOR TREATMENT OF CHILDREN WITH COMPLEX DEVELOPMENTAL DISORDERS: A FEASIBILITY STUDY USING THE EXAMPLE OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER. Borusiak P, Hameister KA, Jozwiak D, et al.

**QUALITY ISSUE**: Quality assessment is challenging in children with developmental disorders. Previously, a set of quality indicators (QIs) was developed and analyzed in terms of feasibility of use with patients with attention-deficit/hyperactivity disorder (ADHD). QI assessment turned out to be possible but highly complex. Thus, we compared different technologies for automated extraction of data for assessment of QIs.

**CHOICE OF SOLUTION**: Four automated extraction technologies (regular expressions, Apache Solr, Apache Mahout, Apache OpenNLP) were compared with respect to their properties regarding the complexity of implementing the QI, the complexity of implementing a check module, the reliability and quality of results, the complexity of preparation of interdisciplinary medical reports, and the complexity of deployment and installation.

**IMPLEMENTATION**: Twenty medical reports from different institutions were reviewed for compliance with three QIs by these technologies and compared with expert opinions.

**EVALUATION**: Among the four technologies, Apache Solr had the best overall performance. For manual extraction of the three QIs, at least 77 s were necessary per medical report, whereas the prototype evaluated and extracted the QIs automatically in 8 s on average. Unexpectedly, different assessments of the degree of compliance by the experts turned out to be one of the stumbling blocks. An in-depth evaluation compared results on a semantic level.

**LESSONS LEARNED**: It is possible to extract QIs by post-processing automated technologies. This approach can also be applied to other developmental disorders. However, a more uniform documentation throughout institutions involved will be necessary in order to implement this method in daily practice

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# Int J Qual Stud Health Well -being. 2019 Dec;14:1690091.

# EXPERIENCE OF STRESS IN PARENTS OF CHILDREN WITH ADHD: A QUALITATIVE STUDY.

#### Leitch S, Sciberras E, Post B, et al.

**Purpose**: Qualitative research aimed at understanding the stress of parents of children with ADHD is limited and few interventions have been designed to directly target their stress. The study aim was to explore the stress of parents of children with ADHD using qualitative methodology.

**Methods**: Thirteen parents of children with ADHD participated in two focus groups. Open-ended questions explored parents' experiences of stress. Focus groups were recorded, transcribed, and coded using thematic analysis. Parents also completed the Parenting Stress Index-Short Form.

**Results**: Four primary themes were identified: The child's behaviour feels like a "wrecking ball"; Coping with the "war at home"; A divided family: "relationships don't survive"; and Craving support: "it's goddamn hard work". Five of eleven participants who completed the PSI-SF scored in the clinically significant range indicating levels of stress that require professional support.

**Conclusions**: Parents attribute their high stress to their children's behaviour, unmet needs for support, and social stigma. Parents request support to enable them to cope and appear to represent a clinical population who require mental health care and support themselves. Future interventions directly targeting the stress of parents of children with ADHD may provide wide-ranging benefits for their children and families

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Iran J Allergy Asthma Immunol. 2019 Jun;18:340-45.

# ASSOCIATIONS OF BEHAVIORAL DISORDERS WITH ASTHMA IN IRANIAN CHILDREN.

#### Tajdini M, Effatpanah M, Zaki-Dizaji M, et al.

Asthma is a common respiratory disease with huge economic burden leading to activity limitations, morbidity, and mortality. In this study, we aim to investigate the prevalence of Oppositional Defiant Disorder (ODD), Attention Deficit Hyperactivity Disorder (ADHD) and Conduct Disorder (CD) among children with asthma. This case-control study was performed in a pediatric referral health care center(Children's Medical
CenterinTehran University of Medical Sciences) in 2017. With random selection, the 80 children with asthma and 92 controls with age range of 5 to 11 years were enrolled in this study. In addition to the demographic information and family history of allergy, asthma symptoms, and control quality evaluated with a validated Childhood Asthma Control Test (C-ACT). The mode of measurement for ADHD, ODD and CD was based on Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) psychiatric scales from clinical interviews conducted by child psychiatrists. Totally, 42.5% and 25% in the case and control groups had ADHD respectively withsignificant difference (p=0.01). Also, 25% and 5.4% in thecase and control groups had ODD respectively with significant difference (p=0.001). But conduct disorder was 10% and 10.9% in case and control groups respectively without significant difference (p=0.8). Children with asthma were associated with exhibiting ADHD and ODD but not CD. Therefore, appropriate evaluation and treatment are needed for asthmatic children with attention-deficit and ODD symptoms. Besides, further research is needed to determine the etiological approach towards ADHD, ODD and asthma

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#### J Abnorm Child Psychol. 2019 Jan;47:177-94.

#### MATERNAL AND FAMILY PROCESSES IN DIFFERENT SUBGROUPS OF YOUTH WITH AUTISM SPECTRUM DISORDER. Chang JP, Lai MC, Chou MC, et al.

We compared the maternal reports on mothering and family processes between 160 youth with autism spectrum disorder (ASD) and 160 age and gender-matched typically developing (TD) youth stratified by personal characteristics from Taiwan. The ASD groups consisted of 51 'typical autism' (TA), 52 'high-functioning autism' (HFA), and 57 'Asperger syndrome (AS).' Maternal reports showed that youth with ASD obtained less affection and more protection from the mother, and had less active mother-child interactions and more behavioral problems at home. Their mothers perceived less family support when compared to mothers of TD youth. Moreover, both TA and AS groups had more maternal protection and less maternal perceived family support, whereas HFA and co-occurring ADHD were only associated with more behavioral problems at home. The maternal and family process may vary across different ASD subgroups

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#### J Abnorm Child Psychol. 2019 Jan;47:35-46.

## ADVANCING THE MULTI-INFORMANT ASSESSMENT OF SLUGGISH COGNITIVE TEMPO: CHILD SELF-REPORT IN RELATION TO PARENT AND TEACHER RATINGS OF SCT AND IMPAIRMENT.

#### Saez B, Servera M, Burns GL, et al.

Despite increasing interest in sluggish cognitive tempo (SCT) in children and advancements in its measurement, little research has examined child self-reported SCT. Child self-report of SCT is important for the multi-informant assessment of SCT. The current study used a large, school-based sample of children and a multi-informant design to examine child self-reported SCT using the Child Concentration Inventory -Version 2 (CCI-2) which was recently revised based on meta-analytic findings and parallels the item content of validated parent and teacher rating scales. The study involved 2142 unique children (ages 8-13 years, 50.51% males). Children (n = 1980) completed measures of SCT, loneliness, and preference for solitude. Mothers (n = 1648), fathers (n = 1358), and teachers (n = 1773) completed measures of SCT, attentiondeficit/hyperactivity disorder-IN (ADHD-IN), academic impairment, social impairment, and conflicted shyness. Children's self-reported SCT demonstrated good reliability with the 15 SCT symptoms showing moderate to strong loadings on the SCT factor. The child self-report SCT factor also showed moderate convergent validity with mother, father, and teacher ratings of children's SCT. In addition, higher childreported SCT predicted greater mother, father, and teacher ratings of children's academic impairment even after controlling for mother, father, and teacher ratings of children's SCT and ADHD-IN. Higher child-rated SCT also predicted greater mother ratings of children's social impairment after controlling for mother ratings of children's SCT and ADHD-IN. The present study provides initial empirical support for the reliability and validity of child-reported SCT as part of the multi-informant assessment of SCT. A key direction for future research includes evaluating the unique contributions of different informants and their utility within specific contexts to guide evidence-based recommendations for assessing SCT

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#### J Abnorm Child Psychol. 2019 Jan;47:21-34. INVARIANCE OF ADHD SYMPTOMS ACROSS SEX AND AGE: A LATENT ANALYSIS OF ADHD AND IMPAIRMENT RATINGS FROM EARLY CHILDHOOD INTO ADDLESCENCE.

#### Leopold DR, Christopher ME, Olson RK, et al.

A population-based longitudinal sample of 489 twin pairs was assessed at six time points over ten years to examine the measurement invariance and stability of attention-deficit/hyperactivity disorder (ADHD) symptoms, as well as the developmental relations between inattention (IN), hyperactivity-impulsivity (HI), and multiple aspects of functional impairment. Parent ratings of ADHD symptoms and functional impairment were obtained in preschool and after the completion of kindergarten, first, second, fourth, and ninth grades. Results of the temporal and sex invariance models indicated that parent ratings of the 18 ADHD symptoms function in the same manner for females and males from early childhood into adolescence. In addition to establishing this prerequisite condition for the interpretation of longitudinal and between-sex differences in the IN and HI symptom dimensions, cross-lagged models indicated that both IN and HI were associated with increased risk for both concurrent and future overall, social, and recreational impairment, whereas only IN was uniquely associated with later academic impairment. Taken together, the current results demonstrate that IN and HI are highly stable from preschool through ninth grade, invariant between females and males, and indicative of risk for impairment in multiple areas, thereby providing strong support for the validity of the symptom dimensions among both sexes

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#### J Abnorm Child Psychol. 2019 Jan;47:47-58.

### CONSISTENCY OF LIMITED PROSOCIAL EMOTIONS ACROSS OCCASIONS, SOURCES, AND SETTINGS: TRAIT- OR STATE-LIKE CONSTRUCT IN A YOUNG COMMUNITY SAMPLE?

#### Seijas R, Servera M, Garcia-Banda G, et al.

Limited prosocial emotions (LPE, also referred to as callous-unemotional [CU] traits) are considered to reflect a more trait- than state-like construct. Our first objective was to determine the amount true score variance in CU/LPE that was consistent (trait consistency) over two occasions (12-month interval) of measurement versus specific (occasion-specificity) to each occasion. Our second objective was to determine the convergent validity of the consistent (trait) and occasion-specific (state) variance in CU/LPE symptom ratings within and across settings. Mothers, fathers, primary teachers, and ancillary teachers rated the CU/LPE symptoms in sample of 811 Spanish children (55% boys) on two occasions (i.e., end of first and second grades). CU/LPE symptom ratings showed more trait consistency than occasion-specificity for mothers and fathers, slightly more occasion-specificity than trait consistency for primary teachers, and much more occasion-specificity than trait consistency for ancillary teachers. Convergent validity for trait consistency was strong for fathers with mothers but weaker for primary with ancillary teachers. There was essentially no convergent validity for either trait consistency or occasion-specificity across home and school settings. CU/LPE symptom ratings within this age range represented a more trait-like construct for mothers and fathers and more state-like construct for primary teachers and ancillary teachers. In contrast, earlier studies showed ADHD and ODD ratings to be trait-like within and across home and school. The study of CU/LPE in young children should therefore include multiple sources in multiple settings across occasions to better understand the consistent and occasion-specific nature of the CU/LPE construct

#### J Acquir Immune Defic Syndr. 2019 Aug;81:e109-e116.

#### MENTAL HEALTH AND FUNCTIONAL COMPETENCE IN THE CAPE TOWN ADOLESCENT ANTIRETROVIRAL COHORT. Hoare J, Phillips N, Brittain K, et al.

**BACKGROUND**: The impact of HIV and antiretrovirals (ART) on long-term mental health in perinatally infected children has not been well studied in sub-Saharan Africa where HIV is most prevalent. **SETTING**: Cape Town, South Africa.

**METHODS**: We investigated mental health measures, including depression, anxiety, attention-deficit hyperactivity disorder, motivation, disruptive behavior, and functioning in perinatally infected adolescents (PHIV+) stable on ART within the Cape Town Adolescent Antiretroviral Cohort. Two hundred four adolescents living with HIV (median age 10 years; mean CD4 953) and a sample of 44 uninfected adolescents were enrolled. The Beck Youth Inventories, Children's Motivation Scale, Conner's Parent's Rating Scale, and Child Behavior Checklist were administered. Among PHIV+, we explored independent associations between HIV-related stigma, recent life stressors, sociodemographic, clinical, and caregiver-related variables, and mental health measures.

**RESULTS**: PHIV+ had poorer functional competence, self-concept and motivation, higher levels of disruptive behavior, depression and attention-deficit hyperactivity disorder symptoms and clinically significant anger and disruptive behavior. Within the PHIV+ group, the loss of both biological parents was associated with higher levels of disruptive behavior. Within the PHIV+, factors associated with mental health symptoms and poorer functioning were mostly sociodemographic factors, HIV-related stigma, and life stressors. Age of initiation of ART was associated with self-concept, and failing first-line ART with internalizing and externalizing behavior problems.

**CONCLUSIONS**: PHIV+ are likely to face future physical and psychological health consequences related to the functional competence challenges they face if mental health care is not made a priority in the fight against HIV

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#### J Affect Disord. 2019 Jun;252:60-67.

ALLERGIC RHINITIS INCREASES THE RISK OF INCIDENT PANIC DISORDER AMONG YOUNG INDIVIDUALS: A NATIONWIDE POPULATION-BASED COHORT STUDY IN TAIWAN.

#### Hsieh MT, Liang SH, Yang YH, et al.

**BACKGROUND**: Studies have reported an association between allergy and panic disorder. However, few studies have explored the relationship between allergic rhinitis and panic disorder. Previous studies were limited by cross-sectional study designs, self-reported symptoms, absence of matched controls, and lack of consideration of the influence of steroid and comorbidities. This study aimed to explore the longitudinal association between allergic rhinitis and panic disorder in a large population-based cohort of young people.

**METHODS**: In this study, 79,917 new cases of allergic rhinitis between 1998 and 2012 in individuals younger than 20 years were identified from Taiwan's National Health Insurance Research Database. One control (nonallergic rhinitis) per case (allergic rhinitis) was randomly selected from the remaining sample, matching for age, sex, residence, and insurance premium. Both groups were followed until the end of 2013 for incidence of panic disorder. Cox regression analysis was performed, adjusting for sex, age, residence, insurance premium, systemic steroids, asthma, atopic dermatitis, allergic conjunctivitis, attention deficit hyperactivity disorder, depression, and Charlson index.

**RESULTS**: Allergic rhinitis was associated with a 2-fold increase in risk for panic disorder after adjustment for other variables. Additional independent risk factor of panic disorders were female sex, older age group, and depression.

**LIMITATIONS**: Lifestyle, substance use, smoking by the patient or family members, and psychosocial stressors were not evaluated.

**CONCLUSIONS**: Allergic rhinitis was associated with increased risk of panic disorder. Assessment and intervention of allergy rhinitis among young people with panic disorder are critical

#### J Am Acad Child Adolesc Psychiatry. 2019 Jul;58:668-69.

EDITORIAL: BETTER TREATMENTS AND THE IMPORTANCE OF PUBLISHING NEGATIVE CLINICAL TRIALS. *Novins DK, McCauley E.* 

We need better treatments for children with mental health problems, particularly those struggling with depression and suicidality. Every reader of this editorial already knows this. Although our best treatments help many children and adolescents, some experience only modest improvements such that they are still burdened with much of the weight of mental illness. And some experience no benefit at all. These conclusions are supported by two recent meta analytic studies. In a comprehensive meta-analysis of the efficacy of treatments for anxiety, attention-deficit/hyperactivity disorder, conduct problems, and depression, outcomes for depression were the "most disappointing," with effect sizes of only 0.29 at posttreatment assessments.(1) Likewise, Ourgin and colleagues'(2) meta-analysis of efficacy of interventions (pharmaceutical, social, or psychological) in reducing both suicidal and nonsuicidal self-harm in adolescents found promising effects for self-harm but no significant reductions in suicide attempts

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#### J Asthma. 2019 May;56:512-21.

### OBESE- AND ALLERGIC-RELATED ASTHMA PHENOTYPES AMONG CHILDREN ACROSS THE UNITED STATES. Ross MK, Romero T, Sim MS, et al.

**OBJECTIVES**: Pediatric asthma is heterogeneous with phenotypes that reflect differing underlying inflammation and pathophysiology. Little is known about the national prevalence of certain obesity- and allergy-related asthma phenotypes or associated characteristics. We therefore assessed the national prevalence, risk factors, and caregiver-reported severity of four asthma phenotypes: not-allergic-not-obese, allergic-not-obese, obese-not-allergic, and allergic-and-obese.

**METHODS**: We analyzed data from the 2007-2008 National Survey of Children's Health (NSCH) of 10-17 year-olds with caregiver-reported asthma. We described sociodemographic and health risk factors of each phenotype and then applied logistic and ordinal regression models to identify associated risk factors and level of severity of the phenotypes.

**RESULTS**: Among 4427 children with asthma in this NSCH cohort, the association between race and phenotype was statistically significant (p < 0.0001); white children with asthma were most likely to have allergic-not-obese asthma while black and Hispanic children with asthma were most likely to have the obesenonallergic phenotype (p < 0.001). Attention-deficit disorder/attention-deficit hyperactivity disorder was more likely to be present in allergic-not-obese children (odds ratio (OR) 1.50, confidence interval (CI) 1.14-1.98, p = 0.004). The phenotype with the highest risk for more severe compared to mild asthma was the obese-and-allergic asthma phenotype (OR 3.34, CI 2.23-5.01, p < 0.001).

**CONCLUSIONS**: Allergic-not-obese asthma comprised half of our studied asthma phenotypes, while obesity-related asthma (with or without allergic components) comprised one-fifth of asthma phenotypes in this cohort representative of the US population. Children with both obese and allergic asthma are most likely to have severe asthma. Future management of childhood asthma might consider more tailoring of treatment and management plans based upon different childhood asthma phenotypes

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J Atten Disord. 2019 Jan;23:12-21.

DO PERSONALITY TRAITS PREDICT FUNCTIONAL IMPAIRMENT AND QUALITY OF LIFE IN ADULT ADHD? A CONTROLLED STUDY.

#### He JA, Antshel KM, Biederman J, et al.

**OBJECTIVE**: To examine the association of personality traits and characteristics on quality of life and functioning in adults with ADHD.

**METHOD**: Participants were adults with (n = 206) and without ADHD (n = 123) who completed the Temperament and Character Inventory (TCI), the Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q), and the Social Adjustment Scale-Self-Report (SAS-SR). Participants also provided information on academic, motor vehicle operation, legal, social, familial, and occupational functioning. Outcomes were

examined using stepwise linear regression, logistic regression (for binary outcomes), and negative binomial regression (for count outcomes) controlling for ADHD symptoms, psychiatric comorbidity, and executive dysfunction.

**RESULTS**: Adults with ADHD significantly differed from controls across nearly all TCI personality domains. On average, adults with ADHD endorsed more novelty seeking, harm avoidance, and self-transcendence, and less reward dependence, persistence, self-directedness, and cooperativeness. Personality traits and characteristics, especially self-directedness, significantly predicted functional impairments even after controlling for ADHD symptoms, executive function deficits, and current psychiatric comorbidities.

**CONCLUSION**: In adults with ADHD, personality traits exert unique associations on quality of life and functional impairment across major life domains, beyond the relations expected of and associated with ADHD symptoms and other associated psychiatric conditions and cognitive vulnerabilities. Addressing personality traits in adults with ADHD may lead to improvements in quality of life and reductions in functional impairment

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#### J Atten Disord. 2019 Jun;23:838-48.

BORDERLINE PERSONALITY FEATURES MEDIATE THE ASSOCIATION BETWEEN ADHD, ODD, AND RELATIONAL AND PHYSICAL AGGRESSION IN GIRLS.

#### Babinski DE, McQuade JD.

**OBJECTIVE**: This study investigates borderline personality features (BPF) as a mediator of the association between ADHD and ODD symptoms and aggression in girls.

**METHOD**: Parents of 118 girls (Mage = 11.40 years old) with and without ADHD completed ratings of ADHD and ODD severity, and parents and youth provided ratings of physical and relational aggression.

**RESULTS**: ADHD, ODD, and their subfactors were significantly correlated with BPF, and these variables were associated with aggression measures. BPF fully mediated the association between total ODD symptom severity and relational and physical aggression by parent and youth report. At the subfactor level, BPF fully mediated the association between hyperactivity/impulsivity and oppositional behavior and physical and relational aggression.

**CONCLUSION**: These findings add to a growing literature showing the relevance of BPF as a risk factor for poor social functioning in youth and point to the importance of continued work examining BPF among girls with ADHD and ODD

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#### J Atten Disord. 2019 Feb;23:333-40.

DOES INCREASED CONSOLIDATED NIGHTTIME SLEEP FACILITATE ATTENTIONAL CONTROL? A PILOT STUDY OF NAP RESTRICTION IN PRESCHOOLERS.

#### Lam JC, Koriakin TA, Scharf SM, et al.

**OBJECTIVE**: The aim of this study is to understand the impact of a 5-day period of nap restriction on sleep patterns and cognitive function in typically developing preschoolers, aged 3 to 4 years.

**METHOD**: Following 1 week of baseline assessment, 28 children were randomly assigned to either a "napping as usual" group (n = 15) or a 5-day period of nap restriction (n = 13). Sleep was assessed with sleep logs and actigraphy; cognition was assessed at baseline and at the end of the intervention week.

**RESULTS**: No group differences in sleep or cognitive function were observed at baseline. For the no-nap group, the 5-day period of daytime nap restriction resulted in increased nighttime sleep. Children in the no-nap group also showed a significant improvement in attentional control compared with baseline, whereas no such changes were observed among children in the napping-as-usual group.

**CONCLUSION**: In preschool children who typically take naps, short-term nap restriction is associated with increased nighttime sleep and may contribute to improved attentional function

#### J Atten Disord. 2019 Feb;23:384-97.

### EFFECTS OF PHYSICAL EXERCISE INTERVENTION ON MOTOR SKILLS AND EXECUTIVE FUNCTIONS IN CHILDREN WITH ADHD: A PILOT STUDY.

#### Pan CY, Tsai CL, Chu CH, et al.

**OBJECTIVE**: This study examined the effect of a 12-week table tennis exercise on motor skills and executive functions in children with ADHD.

**METHOD**: Fifteen children with ADHD received the intervention, whereas 15 children with ADHD and 30 typically developing children did not. The Test of Gross Motor Development-2, Stroop, and Wisconsin Card Sorting Test (WCST) were conducted before and after the intervention.

**RESULTS**: After the intervention, the ADHD training group scored significantly higher in the locomotor as well as object-control skills, Stroop Color-Word condition, and WCST total correct performance compared with the ADHD non-training group, and we noted improvements in the locomotor as well as object-control skills, Stroop Color-Word condition, and three aspects of the WCST performances of the ADHD training group over time.

**CONCLUSION**: A 12-week table tennis exercise may have clinical relevance in motor skills and executive functions of children with ADHD

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#### J Atten Disord. 2019 Oct;23:1486-96.

### CHILDHOOD SOCIAL FUNCTIONING AND YOUNG ADULT INTIMATE PARTNER VIOLENCE IN GIRLS WITH AND WITHOUT ADHD: RESPONSE INHIBITION AS A MODERATOR.

#### Youn C, Meza JI, Hinshaw SP.

**Objective**: Examine the moderating effects of response inhibition on the longitudinal association between social preference/relational aggression measured in childhood, and intimate partner violence (IPV) measured in young adulthood, among women with (n = 140) and without (n = 88) histories of childhood ADHD.

**Method**: During childhood, social preference was measured through confidential peer sociometric nominations, yielding negative and positive peer regard; relational aggression was assessed via staff behavioral observations; and response inhibition was assessed using commission errors from the continuous performance task. During young adulthood, IPV was ascertained via a clinician-administered, semistructured interview.

**Results**: Social preference and relational aggression independently predicted IPV; this prospective link was moderated by response inhibition.

**Conclusion**: In combination with low social preference or high relational aggression in childhood, poor response inhibition predicted the highest levels of young-adult IPV. Given the developmental significance of peer relationships, additional research on the causes of and treatments for poor social functioning in ADHD is warranted

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J Atten Disord. 2019 Apr;23:599-614.

### CLINICAL VALIDATION OF EYE VERGENCE AS AN OBJECTIVE MARKER FOR DIAGNOSIS OF ADHD IN CHILDREN. Varela CP, Lorena EF, Morata M, I, et al.

**OBJECTIVE**: ADHD youth show poor oculomotor control. Recent research shows that attention-related eye vergence is weak in ADHD children.

**METHOD**: To validate vergence as a marker to classify ADHD, we assessed the modulation in the angle of vergence of children (n = 43) previously diagnosed with ADHD while performing an attention task and compared the results with age-matched clinical controls (n = 19) and healthy peers (n = 30).

**RESULTS**: We observed strong vergence responses in healthy participants and weak vergence in the clinical controls. ADHD children showed no significant vergence responses. Machine-learning models classified ADHD patients (n = 21) from healthy controls (n = 21) with an accuracy of 96.3% (false positive [FP]: 5.12%; false negative [FN]: 0%; area under the curve [AUC]: 0.99) and ADHD children (n = 11) from clinical controls (n = 14) with an accuracy of 85.7% (FP: 4.5%; FN: 19.2%, AUC: 0.90).

**CONCLUSION**: In combination with an attention task, vergence responses can be used as an objective marker to detect ADHD in children

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#### J Atten Disord. 2019 Jan;23:57-64.

FAMILY FUNCTIONING AND PARENTAL BONDING DURING CHILDHOOD IN ADULTS DIAGNOSED WITH ADHD. *Montejo JE, Duran M, Del Mar MM, et al*.

**OBJECTIVE**: This work assesses family functioning, parental bonding, and the relationship between the two in adults diagnosed with ADHD.

**METHOD**: The study used a retrospective, ex post facto design and consisted of 100 adult participants, who were distributed into two groups: with and without diagnosis of ADHD. Two family assessment instruments were applied: the Family Adaptability and Cohesion Evaluation Scale short spanish version (FACES-20esp)) and the Parental Bonding Instrument (PBI). The diagnosis of ADHD was done by using a semistructured interview for Diagnostic and Statistical Manual of Mental Disorders (4th ed.; DSM-IV) criteria (Conners' Adult ADHD Diagnostic Interview for DSM-IV [CAADID]).

**RESULTS**: The results showed that higher rigidity and lower emotional connection were significantly associated with ADHD family functioning. Regarding parental bonding, the results showed significant differences only in the care dimension, with the ADHD group reporting lower care than the control group. **CONCLUSION**: The results suggest that ADHD families present dysfunctional family functioning with a rigid,

separated typology, and parental bonding based on control without affection

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J Atten Disord. 2019 Apr;23:641-50.

Assessing ADHD Through the Multi-Informant Approach: The Contribution of the Conners' 3 Scales.

#### Izzo VA, Donati MA, Primi C.

**OBJECTIVE**: Symptoms of ADHD need to be present in at least two different settings to suggest a diagnosis, so multi-informant assessment approaches are usually adopted. The Conners' Rating Scales offer three versions, completed by parents (Conners 3-P), teachers (Conners 3-T), and youth (Conners 3-SR). Nonetheless, there is a lack of studies examining the psychometric properties of the Parent and Teacher versions and the relation between each version of the Conners 3 scales.

**METHOD**: The present work examined the psychometric properties of the Parent and Teacher scales in terms of the structural validity and reliability of their Content scales in an Italian sample. Moreover, to support the need to administer all Conners 3 scales together and to exclude their potential redundancy, cross-informant agreement between parents, teachers, and children was assessed.

**RESULTS**: Results supported the Conners 3 scales as reliable and valid tools to assess ADHD and provided evidence for their non-redundancy.

**CONCLUSION**: The non-redundancy of the Conners 3 may promote clinicians to adopt a multi-informant perspective

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J Atten Disord. 2019 Jun;23:869-86.

EXAMINING THE RATE OF SELF-REPORTED ADHD-RELATED TRAITS AND ENDORSEMENT OF DEPRESSION, ANXIETY, STRESS, AND AUTISTIC-LIKE TRAITS IN AUSTRALIAN UNIVERSITY STUDENTS.

#### Nankoo MMA, Palermo R, Bell JA, et al.

**OBJECTIVE**: To investigate the rate of ADHD-related traits among young adults in an Australian university, and to examine whether higher endorsement of ADHD-related symptoms is associated with self-reported symptoms of depression, anxiety, distress, and autistic-like traits.

**METHOD**: In total, 1,002 students aged 17 to 25 years completed the Conners' Adult ADHD Rating Scale (CAARS), the Depression, Anxiety, and Stress Scale (DASS), and the Autism Quotient (AQ).

**RESULTS**: About 17.3% of students reported "at-risk" levels of ADHD-related symptoms. Regression analyses revealed that CAARS scores explained unique variance in self-reported levels of depression, anxiety, stress, and autism-related traits.

**CONCLUSION**: The rate of self-reported ADHD symptoms is higher in Australian undergraduate students than that reported in previous studies using the CAARS to investigate rates of diagnosed students. Problems with self-concept accounted for the most unique variance in DASS subscale scores. Hyperactivity/restlessness and inattention/memory problems accounted for the most unique variance in AQ-Social and AQ-Attention-to-Detail scores, respectively

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#### J Atten Disord. 2019 Feb;23:409-17.

ACADEMIC SKILLS GROUPS FOR MIDDLE SCHOOL CHILDREN WITH ADHD IN THE OUTPATIENT MENTAL HEALTH SETTING: AN OPEN TRIAL.

#### Ciesielski HA, Tamm L, Vaughn AJ, et al.

**OBJECTIVE**: To conduct an open trial assessing the initial efficacy of an intervention focusing on increasing skills related to academic performance (planning, organization, studying, and homework behaviors) for middle school children diagnosed with ADHD. The intervention is modeled on evidence-based interventions but designed for administration in the outpatient setting.

**METHOD**: Parents and their children diagnosed with ADHD attended seven weekly group sessions targeting academic, organizational, and homework skills. Parents completed the Homework Problem Checklist and Impairment Rating Scale pre- and post-treatment.

**RESULTS**: Following intervention, significant improvements in homework completion and management, as well as reductions in academic impairment and improvements in parent confidence and family relations, were reported.

**CONCLUSION**: Despite limitations including small sample size and lack of a control group, our results demonstrate initial efficacy of an academic skills intervention designed for use in the outpatient setting with middle school children diagnosed with ADHD on clinically relevant outcome measures

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#### J Atten Disord. 2019 Jan;23:40-50.

GENDER-ROLE ATTITUDES MEDIATE THE EFFECTS OF ADULT ADHD ON MARRIAGE AND RELATIONSHIPS. *Ersoy MA, Topcu EH.* 

**OBJECTIVE**: Adult ADHD has dramatic impacts on various aspects of life and relationships. This study investigates how "gender roles" mediate the effects of ADHD on marriage.

**METHOD**: Sixty-two heterosexual couples were included in the study. The Marital Impact Checklist is used to assess the effects of ADHD on marriage. The Gender Roles Attitude Scale is used to measure gender roles in both the patient and the spouse.

**RESULTS**: The Turkish version of the Marital Impact Checklist is found to have good internal consistency and utility in research and clinical work with ADHD couples. The female non-ADHD partners reported feeling of "Unloved" and "Negative Impact" more than their male counterparts. Some subdomains of the gender roles of both the patient and their non-ADHD spouse seem to mediate the effect of adult ADHD's impact on marriage.

**CONCLUSION**: Sex and gender roles diversify how ADHD affects marriage

#### J Atten Disord. 2019 Feb;23:374-83.

A RANDOMIZED CONTROLLED TRIAL TO EXAMINE THE POSTTREATMENT EFFICACY OF NEUROFEEDBACK, BEHAVIOR THERAPY, AND PHARMACOLOGY ON ADHD MEASURES.

Moreno-Garcia I, Meneres-Sancho S, Camacho-Vara de RC, et al.

**OBJECTIVE**: To examine the efficacy of neurofeedback (NF), behavior therapy (BT), and pharmacology (PH) on the improvement of ADHD-related symptoms.

**METHOD**: Fifty-nine children with ADHD (M = 8.80 years, SD = 1.92 years) were randomly assigned to one of the three treatments in a pre/post assessment design. Mother- and teacher-rated ADHD scales and children were assessed using The Integrated Visual and Auditory Continuous Performance Test (IVA/CPT). **RESULTS**: The three treatments were effective on the IVA/CPT, but with different trends. BT and especially NF achieved improvement on response control and attention, and PH mainly in visual attention. On the rating scales, BT improved all measures, and NF and PH had a minor but interesting influence.

**CONCLUSION**: From a global perspective, behavior therapy had the most extensive results, but PH had the greatest capacity to improve overall attention. NF was able to improve both control response and inattention. Clinical implications are discussed

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J Atten Disord. 2019 Jan;23:65-75.

### WHAT IS A CLINICALLY RELEVANT IMPROVEMENT IN QUALITY OF LIFE IN ADULTS WITH ADHD?

Tanaka Y, Brod M, Lane JR, et al.

**OBJECTIVE**: To estimate a minimal clinically important difference (MCID) on the adult ADHD Quality of Life (AAQoL) scale.

**METHOD**: The MCID was determined from data from short-term (N = 537) and long-term (N = 440), placebocontrolled atomoxetine trials in adults with ADHD. For the anchor-based approach, change in clinician-rated Clinical Global Impressions-ADHD-Severity (CGI-ADHD-S) scores was used to derive MCID. For the distribution-based approach, baseline-to-endpoint mean (SD) changes in AAQoL scores corresponding to 0.5 SD were computed.

**RESULTS**: The MCID was similar (approximately 8-point difference) between the short-term and the long-term treatment groups when either the anchor-based or distribution-based approach was used.

**CONCLUSION**: These results suggest that approximately 8 points in the change from baseline on the AAQoL is a MCID

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J Atten Disord. 2019 Jan;23:76-86.

OCCUPATIONAL STATUS IS COMPROMISED IN ADULTS WITH ADHD AND PSYCHOMETRICALLY DEFINED EXECUTIVE FUNCTION DEFICITS.

#### Halleland HB, Sorensen L, Posserud MB, et al.

**OBJECTIVE**: Problems related to executive function (EF) are frequently reported in adults with ADHD. However, only a subgroup of patients show deficits on common neuropsychological tests designed to measure EF. We investigated whether this subgroup also had higher levels of functional impairments, including unemployment, than the ADHD group without such deficits.

**METHOD**: We defined executive function deficit (EFD) from selected tests from the Delis-Kaplan Executive Function System (D-KEFS) and assessed ADHD symptoms and psychiatric comorbidity with the use of questionnaires in 79 ADHD patients and 77 controls (IQ above 80 in both groups).

**RESULTS**: In the ADHD group, 24.3% had EFD. This subgroup showed significantly higher frequency of unemployment, more reading and writing problems, lower IQ scores, and more self-reported ADHD symptoms in childhood than the ADHD subgroup without EFD.

**CONCLUSION**: These findings indicate that it may be possible to identify individuals at risk of functional impairments, and emphasizes the importance of effective treatment programs targeting EF

Papadopoulos N, Sciberras E, Hiscock H, et al.

**OBJECTIVE**: Sleep problems are common in children with autism spectrum disorders (ASD) and ADHD and impact adversely on child and parent well-being. The study evaluated the efficacy of a brief behavioral sleep intervention in children with comorbid ADHD-ASD.

**METHOD**: A subsample of children with ADHD-ASD (n = 61; 5-13 years; 89% male) participating in the Sleeping Sound With ADHD study were included in the current investigation. The subsample comprised of 28 children randomized to the sleep intervention group, while 33 were randomized to usual clinical care. The intervention consisted of two clinical consultations and a follow-up phone call covering sleep hygiene and standardized behavioral strategies.

**RESULTS**: Children with ADHD-ASD who received the intervention had large improvements in sleep problems and moderate improvements in child behavioral functioning 3 and 6 months post-randomization. **CONCLUSION**: These findings suggest that a brief behavioral sleep intervention can improve sleep problems in children with ADHD-ASD

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J Atten Disord. 2019 Jul;23:1026-34.

### THE PREVALENCE OF "LATE-ONSET" ADHD IN A CLINICALLY REFERRED ADULT SAMPLE. Solanto MV.

**OBJECTIVE**: Three recent prospective longitudinal studies of population cohorts reported nontrivial rates of "adult-onset" ADHD. Given that this result is at odds with the neurodevelopmental conceptualization of ADHD, as well as with general clinical experience, we obtained report of onset of symptoms in a clinical sample of adults diagnosed with ADHD.

**METHOD**: One hundred four adults diagnosed with ADHD completed retrospective ratings of DSM-IV/DSM-5 ADHD symptoms between the ages of 5 and 12 years.

**RESULTS**: Fifty percent of the sample met full retrospective child diagnostic symptom criteria of six ADHD symptoms in either the inattentive or hyperactive-impulsive domains. Seventy-five percent met a less stringent criterion of four symptoms in either domain.

**DISCUSSION**: These results are interpreted in light of a dimensional model of ADHD that posits emergence of ADHD symptoms and corresponding impairment as a function of increasing performance demands and/or decreasing environmental supports during the course of development

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J Atten Disord. 2019 Jul;23:907-23.

HYPERACTIVE CHILD SYNDROME AND ESTIMATED LIFE EXPECTANCY AT YOUNG ADULT FOLLOW-UP: THE ROLE OF ADHD PERSISTENCE AND OTHER POTENTIAL PREDICTORS.

#### Barkley RA, Fischer M.

**OBJECTIVE**: We examined if ADHD Combined Type or Presentation (ADHD-C) reduced estimated life expectancy (ELE) at young adulthood and if the persistence of ADHD to adulthood further adversely affected ELE.

**METHOD**: A young adult follow-up of 131 hyperactive and 71 control cases was used to derive 14 variables that were entered into a life expectancy calculator to generate ELE scores. Both ratings of executive function (EF) in everyday life and tests of EF and IQ were measured along with comorbid psychopathologies.

**RESULTS**: Childhood ADHD-C was associated with a 9.5-year reduction in healthy ELE, and a 8.4-year reduction in total ELE relative to control children by adulthood. The persistence of ADHD to adulthood was linked to a 12.7-year reduction in ELE. Several background traits accounted for more than 39% of variation in ELE.

**CONCLUSION**: Childhood ADHD-C predicts a significantly reduced ELE by adulthood, which is further reduced by the persistence of ADHD to adult follow-up

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#### J Atten Disord. 2019 Jun;23:817-27.

QUALITY OF LIFE AMONG CHILDREN AND ADOLESCENTS WITH TOURETTE DISORDER AND COMORBID ADHD: A CLINICAL CONTROLLED STUDY.

#### Erbilgin GS, Kilincaslan A.

**OBJECTIVE**: To examine (a) the quality of life (QOL) in children with Tourette's disorder (TD) and ADHD (TD + ADHD) compared with ADHD without tics (ADHD alone) and (b) the effects of the severity of tics, ADHD symptoms, comorbid diagnoses, and family functioning on QOL.

**METHOD**: The assessments included the Kiddie-Schedule for Affective Disorders and Schizophrenia, Yale Global Tic Severity Scale, ADHD Rating Scale, Pediatric Quality of Life Inventory, and Family Assessment Device.

**RESULTS**: The TD + ADHD group had poorer psychosocial QOL. Agreement between child and parent ratings was higher in the TD + ADHD group, and children reported higher scores than their parents in both groups. Severity of tics and ADHD symptoms had stronger negative associations with parent-reported than child-reported QOL. Significant positive correlations were detected between QOL and family functioning in both groups.

**CONCLUSION**: Children with TD + ADHD have lower QOL than their peers with ADHD alone. Family functioning seems to affect QOL in both groups

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J Atten Disord. 2019 Feb;23:398-408.

ATTENTION, EXECUTIVE FUNCTION, BEHAVIOR, AND ELECTROCORTICAL FUNCTION, SIGNIFICANTLY IMPROVED WITH 19-CHANNEL Z-SCORE NEUROFEEDBACK IN A CLINICAL SETTING: A PILOT STUDY.

#### Wigton NL, Krigbaum G.

**OBJECTIVE**: Neurofeedback (NF) is gaining recognition as an evidence-based intervention grounded in learning theory, and 19-channel z-score NF (19ZNF) is a new NF model. This pilot study sought to evaluate the efficacy of 19ZNF in a clinical setting.

**METHOD**: Outcome measures framed groups such that 19ZNF was evaluated, as it relates to the neuropsychological constructs of attention (n = 10), executive function (n = 12), behavior (n = 14), and electrocortical functioning (n = 21). One-tailed t tests compared pre-post difference scores.

**RESULTS**: For all pre-post comparisons, the direction of change was in the predicted direction, and differences were statistically significant (p = .000 to p = .008, effect sizes 1.29 to 3.42).

**CONCLUSION**: Results suggest 19ZNF improved attention, executive function, behavior, and electrocortical function. This study provides beginning evidence of 19ZNF's efficacy, adds to what is known about 19ZNF, and offers an innovative approach for using quantitative electroencephalographic (QEEG) metrics as outcome measures

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#### J Atten Disord. 2019 Feb;23:325-32.

EFFECT OF ANODAL AND CATHODAL TRANSCRANIAL DIRECT CURRENT STIMULATION ON DLPFC ON MODULATION OF INHIBITORY CONTROL IN ADHD.

#### Soltaninejad Z, Nejati V, Ekhtiari H.

**OBJECTIVE**: The purpose of this study was to improve the inhibitory control functions through transcranial direct current stimulation (tDCS) in adolescents with ADHD symptoms.

**METHOD**: Twenty high school students with ADHD symptoms participated in this single-blinded, crossover, sham-controlled study. All the participants were tested during the application of Stroop and Go/No-Go tasks

that is used to measure inhibitory control, using 1.5 mA of tDCS for 15 min over the left dorsolateral prefrontal cortex (DLPFC).

**RESULTS**: Anodal stimulation on left DLPFC had no effect on interference inhibition during the Stroop task and increased the proportion of correct responses in the "Go stage" of the Go/No-Go test compared with sham condition. Cathodal stimulation on the left DLPFC increased the inhibition accuracy in the inhibition stage during Go/No-Go task in comparison with sham.

**CONCLUSION**: tDCS over the left DLPFC of adolescents who suffer from ADHD symptoms can improve inhibitory control in prepotent response inhibition

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#### J Atten Disord. 2019 Feb;23:363-73.

EXAMINATION OF A PARENT-ASSISTED, FRIENDSHIP-BUILDING PROGRAM FOR ADOLESCENTS WITH ADHD. *Gardner DM, Gerdes AC, Weinberger K.* 

**OBJECTIVE**: Youth with ADHD experience significant impairment in peer functioning. Based on recommendations from the literature, the current pilot study examined the effectiveness of a parent-assisted, friendship-building program at establishing mutual friendships and improving peer relationships in adolescents with ADHD.

**METHOD**: Participants included 20 adolescents with ADHD (ages 11-16 years) and their parent(s). Families completed the Program for the Evaluation and Enrichment of Relational Skills (PEERS). Measures of friendship quality, social knowledge, social self-efficacy, get-togethers, and peer conflict were completed at baseline and post-treatment. At post-treatment, participants also reported on the initiation of a new friendship. **RESULTS**: Baseline to post-treatment differences were examined using paired-samples t tests. The majority of participants reported the initiation of a new friendship at post-treatment. Adolescents also demonstrated significantly improved social knowledge and increased get-togethers. Effect sizes were large.

**CONCLUSION**: Following participation in PEERS, adolescents improved in several peer functioning domains and many initiated new friendships

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#### J Atten Disord. 2019 Feb;23:351-62.

### THE EFFICACY OF ADAPTED MBCT ON CORE SYMPTOMS AND EXECUTIVE FUNCTIONING IN ADULTS WITH ADHD: A PRELIMINARY RANDOMIZED CONTROLLED TRIAL.

#### Hepark S, Janssen L, de VA, et al.

**OBJECTIVE**: The aim of this study was to examine the effectiveness of mindfulness as a treatment for adults diagnosed with ADHD. A 12-week-adapted mindfulness-based cognitive therapy (MBCT) program is compared with a waiting list (WL) group.

**METHOD**: Adults with ADHD were randomly allocated to MBCT (n = 55) or waitlist (n = 48). Outcome measures included investigator-rated ADHD symptoms (primary), self-reported ADHD symptoms, executive functioning, depressive and anxiety symptoms, patient functioning, and mindfulness skills.

**RESULTS**: MBCT resulted in a significant reduction of ADHD symptoms, both investigator-rated and selfreported, based on per-protocol and intention-to-treat analyses. Significant improvements in executive functioning and mindfulness skills were found. Additional analyses suggested that the efficacy of MBCT in reducing ADHD symptoms and improving executive functioning is partially mediated by an increase in the mindfulness skill "Act With Awareness." No improvements were observed for depressive and anxiety symptoms, and patient functioning.

CONCLUSION: This study provides preliminary support for the effectiveness of MBCT for adults with ADHD

#### J Atten Disord. 2019 Jan;23:87-98.

#### STRATEGY SELECTION IN ADHD CHARACTERISTICS CHILDREN: A STUDY IN ARITHMETIC.

#### Sella F, Re AM, Lucangeli D, et al.

**OBJECTIVE**: It has been argued that ADHD characteristics children have difficulties in selecting the best strategy when they accomplish cognitive tasks. The detrimental influence of these poor strategy skills may be crucial for several aspects of academic achievement such as mathematical learning.

**METHOD**: Fourth- and fifth-grade children with ADHD symptoms and matched controls were asked to select the better of two rounding strategies in a computational estimation task (i.e., finding the best estimate of two-digit addition problems).

**RÉSULTS**: (a) Both control and ADHD children correctly executed a selected strategy, (b) ADHD children selected the best strategy less often than controls, (c) ADHD took more time to estimate sums of two-digit addition problems and provided poorer estimates, and (d) different factors predicted best strategy selections in each group.

**CONCLUSION**: These findings have important implications for further understanding the sources of differences in cognitive performance between ADHD and control children.

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#### J Atten Disord. 2019 Jun;23:828-37.

DIFFERENTIATING AUTISM SPECTRUM DISORDER FROM ADHD USING THE SOCIAL COMMUNICATION QUESTIONNAIRE.

#### Mouti A, Dryer R, Kohn M.

**OBJECTIVE**: This study examined the ability of the Social Communication Questionnaire (SCQ) to differentiate between autism spectrum disorder (ASD), ADHD, and typically developing (TD) children.

**METHOD**: Children (Mage = 11.27 years, SDage = 3.28) identified with ASD Severity Levels "1" and/or "2" (n = 28), ADHD (n = 44), dual diagnoses of ADHD and ASD (n = 29), and TD (n = 61) were assessed using the SCQ.

**RESULTS**: The SCQ differentiated between ASD and non-ASD groups. Children with ASD had higher total and domain scores on the SCQ than ADHD and TD children. The optimal cutoff total score of 13 was identified for differentiating between ASD and ADHD groups (area under the curve [AUC] = .96). Twenty eight of the 39 items were identified as significant in differentiating between ASD and ADHD.

**CONCLUSION**: The SCQ continues to be a well-validated screening tool for ASD and is suitable for determining whether further ASD assessment is warranted in children with ADHD symptoms

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#### J Autism Dev Disord. 2020 Jan;50:162-70.

SENTIMENT ANALYSIS IN CHILDREN WITH NEURODEVELOPMENTAL DISORDERS IN AN INGROUP/OUTGROUP SETTING. Vaucheret PE, Martino M, Hyland M, et al.

People punish transgressors with different intensity depending if they are members of their group or not. We explore this in a cross-sectional analytical study with paired samples in children with developmental disorders who watched two videos and expressed their opinion. In Video-1, a football-player from the participant's country scores a goal with his hand. In Video-2, a player from another country does the same against the country of the participant. Each subject watched the two videos and their answers were compared. The autism spectrum disorder (ASD) group showed negative feelings in Video 1 (M = - .1; Cl 95% - .51 to .31); and in Video 2 (M = - .43; Cl 95% .77 to - .09; t(8) = 1.64, p = .13), but the attention deficit hyperactivity disorder, learning disabilities, intellectual disability groups showed positive opinion in Video-1 and negative in Video-2. This suggests that children with ASD respect rules regardless of whether those who break them belong or not to their own group, possibly due to lower degrees of empathy

#### J Child Adolesc Psychopharmacol. 2019 Feb;29:75-76.

METHYLPHENIDATE-INDUCED NOCTURNAL BRUXISM ALLEVIATED BY ADJUNCTIVE CLONIDINE.

#### Naguy A, Elsori D, Alamiri B.

Stimulants-related bruxism has been previously reported; both diurnal and nocturnal. Here, authors report on a case of methylphenidate (MPH)-treated attention-deficit/hyperactivity disorder that developed nocturnal bruxism and failed multiple pharmacologic trials. Add-on clonidine has successfully helped with bruxisms while augmenting MPH response. This was achieved with great tolerability. This remains a viable option to deploy in such unusual clinical scenarios

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#### J Child Psychol Psychiatry. 2019 Apr;60:353-55.

### COMMENTARY: ADHD LIFETIME TRAJECTORIES AND THE RELEVANCE OF THE DEVELOPMENTAL PERSPECTIVE TO PSYCHIATRY: REFLECTIONS ON ASHERSON AND AGNEW-BLAIS, (2019).

#### Polanczyk GV, Casella C, Jaffee SR.

Asherson and Agnew-Blais review evidence from prospective, longitudinal studies in Brazil, New Zealand, Sweden, the United Kingdom and the United States showing that ADHD can emerge for the first time in adolescence or young adulthood. These findings defy conventional wisdom specifying that ADHD is, by definition, a disorder that emerges in childhood. We discuss possible explanations for the late-onset of ADHD, including the removal in adolescence or young adulthood of features of a young person's environment that played a buffering role against the emergence of symptoms and heterotypic continuity in a general liability to psychopathology that is present from childhood

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#### J Child Psychol Psychiatry. 2019 Apr;60:392-94.

# COMMENTARY: 'READY OR NOT HERE I COME': DEVELOPMENTAL IMMATURITY AS A DRIVER OF IMPAIRMENT AND REFERRAL IN YOUNG-FOR-SCHOOL-GRADE ADHD CHILDREN. A REFORMULATION INSPIRED BY WHITELY ET AL. (2019).

#### Sonuga-Barke EJS, Fearon RMP.

The search for objective biological tests, sufficiently reliable, and predictive enough to be diagnostic of psychiatric disorders, continues apace - yet their discovery remains a distant dream. It seems increasingly unlikely that current diagnostic structures and concepts map biologically in a straight forward way - with heterogeneity within, and sharing across, existing diagnostic boundaries being the biological rule rather than the exception. Indeed, it now appears that the science of biological psychiatry is more likely to redraw those boundaries than it is to confirm and mark them (Sonuga-Barke, Journal of Child Psychology and Psychiatry, 2016, 57, 1). Clinical identification of childhood psychiatric disorders therefore remains, for the foreseeable future at least, an exercise in regulated social perception - reliant on the fallible and subjective judgements of parents, teachers and clinicians. Social perception of this sort is an active and motivated process and therefore prone, like all social perception, to bias and distortions - both systematic and idiosyncratic. Progress has certainly been made over the last 50 years in reducing such judgement bias by, for instance filtering perceptions through the lens of standardised instruments (questionnaires and interviews) with carefully operationalised items and a degree of reliability and validity. However, such instruments often play only a peripheral role in actual diagnostic encounters and when they are used, there is still sufficient ambiguity to leave open plenty of room for interpretation. When we acknowledge that psychiatric diagnoses are social constructions - we are not saying that symptoms of inattention, impulsivity and hyperactivity are not real or do not cluster together in meaningful ways or that they do not cause real distress and disability but that their interpretation and meaning are often informed by social constructs such as ethnic or gender norms and stereotypes

### COMMENTARY: STUDIES OF PRENATAL ANTIDEPRESSANT EXPOSURES: WHAT CAN YOU RECOMMEND? A REFLECTION ON SUJAN ET AL. (2019).

#### Talati A, Weissman MM.

The review by Sujan et al. asks a question of clinical and public health importance: are antidepressant medications safe to use during pregnancy from the perspective of their potential effects on the infant and growing child? They provide a thorough review of the animal and human literature to date, focusing primarily on offspring neurodevelopmental outcomes (autism spectrum disorder, ASD, and attention deficit hyperactivity disorder, ADHD). They conclude, based on their review, that antidepressant exposure in pregnancy does not substantially increase the risk of these outcomes, and that women should therefore be reassured about the safety of these medications when used in pregnancy. While their review should be of interest to clinicians and researchers, we would advocate a more conservative approach. Even if associations with ASD and ADHD are equivocal, there is still evidence that SSRI exposure may be associated with outcomes occurring at other developmental timepoints. Clinical recommendations should be based on a fuller picture of potential risks and benefits to both the mother and the fetus, in the context of the mother's underlying depression. In this commentary, we also suggest some approaches that future observational studies may adopt to help strengthen the interpretability of findings

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#### J Child Psychol Psychiatry. 2019 Mar;60:229-31.

### EDITORIAL: CAN DYSREGULATED MYELINATION BE LINKED TO ADHD PATHOGENESIS AND PERSISTENCE? *Lesch KP.*

Converging evidence from new epidemiologic, genetic, epigenetic, neuroimaging, and experimental model findings are further refining a long-standing concept, regarding the underlying neurobiology of attention-deficit/hyperactivity disorder (ADHD): that ADHD onset and its persistence into adulthood are the result of dysregulated myelination and associated alterations in neuronal plasticity - linked to disrupted brain maturation and the persistence of cognitive and emotional impairments across the life span. If supported by further work, this concept represents a pathophysiologic mechanism amenable to therapeutic intervention

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#### J Clin Child Adolesc Psychol. 2019 Nov;48:825-39.

OPTIMAL ITEMS FOR ASSESSING SLUGGISH COGNITIVE TEMPO IN CHILDREN ACROSS MOTHER, FATHER, AND TEACHER RATINGS.

#### Saez B, Servera M, Becker SP, et al.

A recent meta-analysis identified optimal items for assessing sluggish cognitive tempo (SCT) as distinct from attention deficit/hyperactivity disorder inattention (ADHD-IN), and a preliminary study with teacher ratings of children in the United States found strong support for the convergent and discriminant validity of 15 SCT items. The current study evaluated whether the same 15 SCT items demonstrated convergent and discriminant validity from ADHD-IN in a large, community-based sample of children in Spain, and whether validity results were replicated across mother, father, and teacher ratings. Mothers, fathers, and teachers completed measures of SCT, ADHD-IN, ADHD-hyperactivity/impulsivity, oppositional defiant disorder, limited prosocial emotions, anxiety, depression, shyness, peer rejection, social impairment, and academic impairment on 2,142 Spanish children (49.49% girls; ages 8-13). The 15 SCT symptoms demonstrated convergent validity along with discriminant validity with ADHD-IN across all three informants. The SCT symptom ratings also showed measurement invariance across the informants. In addition, SCT and ADHD-IN factors had different and unique associations with the other symptom and impairment factors. The 15 SCT symptoms identified in this study-consistent across mother, father, and teacher ratings-appear appropriate to serve as a standard symptom set for assessing SCT in children. Use of a common set of symptoms in

future studies will advance our understanding of the SCT construct, including its etiology and developmental progression, associations with ADHD and other psychopathologies, links to impairment, and implications for clinical intervention

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### J Clin Child Adolesc Psychol. 2019;48:S1-S12.

### PREDICTING THERAPEUTIC EFFECTS OF PSYCHODIAGNOSTIC ASSESSMENT AMONG CHILDREN AND ADOLESCENTS PARTICIPATING IN RANDOMIZED CONTROLLED TRIALS.

#### Young AS, Meers MR, Vesco AT, et al.

This study explored predictors of improvement after completing a psychodiagnostic screening assessment but before randomization among youth who participated in two pilot randomized controlled trials of omega-3 supplementation and Individual-Family Psychoeducational Psychotherapy (PEP). Ninety-five youth (56.8% male, 61.1% White) ages 7-14 with mood disorders completed screening and baseline assessments (including Clinical Global Impressions-Improvement [CGI-I], Children's Depression Rating Scale-Revised, Young Mania Rating Scale), then were randomized into a 12-week trial of omega-3, PEP, their combination, or placebo. Between screening and randomization, 35.8% minimally improved (CGI-I = 3), 12.6% much improved (CGI-I < 3), totaling 48.4% improved. Caregiver postsecondary education (p = .018), absence of attention-deficit/hyperactivity disorder (p = .027), and lower screen depression severity (p = .034) were associated with CGI-I. Caregiver postsecondary education (p = .020) and absence of a disruptive behavior diagnosis (p = .038) were associated with depression severity improvement. Prerandomization improvement moderated treatment outcomes: Among youth who improved prerandomization, those who received PEP (alone or with omega-3) had more favorable placebo-controlled depression trajectories due to a lack of placebo response. This open-label trial of psychodiagnostic assessment provides suggestive evidence that psychodiagnostic assessment is beneficial, especially for those with depression and without externalizing disorders. Prerandomization improvement is associated with better placebo-controlled treatment response. Future research should test alternative hypotheses for change and determine if less intensive (shorter and/or automated) assessments would provide comparable results

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#### J Clin Child Adolesc Psychol. 2019 Jul;48:610-21.

### DIAGNOSTIC ACCURACY OF THE CASI-4R PSYCHOSIS SUBSCALE FOR CHILDREN EVALUATED IN PEDIATRIC OUTPATIENT CLINICS.

#### Rizvi SH, Salcedo S, Youngstrom EA, et al.

Diagnostic accuracy of the Diagnostic and Statistical Manual of Mental Disorders-oriented Child and Adolescent Symptom Inventory (CASI-4R) Psychotic Symptoms scale was tested using receiver operating characteristic analyses to identify clinically significant psychotic symptoms. Participants were new outpatients (N = 700), ages 6.0 to 12.9 years (M = 9.7, SD = 1.8) at 9 child outpatient mental health clinics, who participated in the Longitudinal Assessment of Manic Symptoms (LAMS) Study baseline assessment. Because LAMS undersampled participants with low mania scores by design, present analyses weighted low scorers to produce unbiased estimates. Psychotic symptoms, operationally defined as a score of 3 or more for hallucinations or 4 or more for delusions based on the Schedule for Affective Disorders and Schizophrenia (K-SADS) psychosis items, occurred in 7% of youth. K-SADS diagnoses for those identified with psychotic symptoms above threshold included major depressive disorder, bipolar spectrum disorder, attention deficit/hyperactivity disorder, posttraumatic stress disorder, psychotic disorders, and autism spectrum disorder. The optimal psychosis screening cut score (maximizing sensitivity and specificity) was 2.75+ (corresponding diagnostic likelihood ratio [DiLR] = 4.29) for the parent version and 3.50+ (DiLR = 5.67) for the teacher version. The Area under the Curve for parent and teacher report was .83 and .74 (both p < .001).

Parent report performed significantly better than teacher report for identifying psychotic symptoms above threshold (p = .03). The CASI-4R Psychosis subscale (J) appears clinically useful for identifying psychotic symptoms in children because of its brevity and accuracy

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#### J Clin Child Adolesc Psychol. 2019 Sep;48:749-64.

#### A LONGITUDINAL STUDY OF THE RELATION BETWEEN FAMILY FUNCTIONING AND PRESCHOOL ADHD SYMPTOMS. Breaux RP, Harvey EA.

The present study examined the bidirectional relation between family functioning and attentiondeficit/hyperactivity disorder (ADHD) symptoms across the preschool years. Participants included 197 (110 boys) 3-year-old children (M = 44.14 months, SD = 3.43; 60% White) with and without behavior problems and their parents who took part in a 3-year longitudinal study. Parenting, parent psychopathology, life stress, and child symptoms were assessed annually from ages 3 to 6. Cross-lagged models provided evidence for both parent and child effects for mothers. In particular, greater maternal overreactive parenting and life stress were predictive of more child ADHD symptoms, and greater child ADHD symptoms significantly predicted greater maternal life stress and depressive symptoms and lower warmth, controlling for child oppositional defiant disorder and parent ADHD symtoms. Child effects were evident for fathers' depression and life stress, but these did not remain controlling for paternal ADHD symptoms. Findings suggest that targeting child ADHD symptoms, maternal overreactive parenting, and maternal stress each hold promise for attenuating the negative mutual influence of child ADHD symptoms and family functioning over time

J Clin Child Adolesc Psychol. 2019 Sep;48:765-80.

TRAJECTORIES OF GLOBAL SELF-WORTH IN ADOLESCENTS WITH ADHD: ASSOCIATIONS WITH ACADEMIC, EMOTIONAL, AND SOCIAL OUTCOMES.

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#### Dvorsky MR, Langberg JM, Becker SP, et al.

Resilience models suggest that there are likely to be multiple trajectories of self-worth and that despite experiencing impairment, some youth with attention deficit/hyperactivity disorder (ADHD) may maintain a positive self-worth, which could buffer them against negative outcomes. The present study used a cohort-sequential longitudinal design to evaluate developmental trajectories of global self-worth in a sample of 324 middle-school-age adolescents (71% male) diagnosed with ADHD between ages 11 and 14 in predicting outcomes at age 15. Sex, medication status, and ADHD/oppositional defiant disorder symptom severity were included as covariates in the models. Using growth mixture modeling, 3 distinct self-worth trajectory groups were identified: (a) high and increasing (44.4% of participants), (b) moderate and decreasing (48.8%), and (c) low and decreasing (6.8%). Participants with high and increasing global self-worth were less likely to exhibit co-occurring depressive symptoms and had better social functioning and higher grades at age 15 relative to those in either decreasing trajectory. Implications of these findings for monitoring and supporting positive global self-worth for adolescents with ADHD are discussed

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J Clin Child Adolesc Psychol. 2019;48:S155-S167.

THE EFFECTS OF STIMULANT MEDICATION AND TRAINING ON SPORTS COMPETENCE AMONG CHILDREN WITH ADHD.

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

The current study examined the relative efficacy of behavioral sports training, medication, and their combination in improving sports competence among youth with attention deficit/hyperactivity disorder (ADHD). Participants were 73 youth (74% male; 81% Hispanic) between the ages of 5 and 12 diagnosed with Diagnostic and Statistical Manual of Mental Disorders (4th ed.) ADHD enrolled in a Summer Treatment Program (STP). The study consisted of a 2 (medication: methylphenidate, placebo) x 2 (sports training: instruction and practice, recreational play) between-groups design and was conducted over a 3-week period

during the STP. Sports training was conducted with a novel sport, badminton, to limit previous sport knowledge and to differentiate it from concurrent sports training that occurred within the STP. Objective and subjective measures of sports skills, knowledge, and behavior were collected. Results indicated that, relative to recreational play, brief sports training improved observed and counselor-rated measures of sports competence including sports skills, knowledge, game awareness, effort, frustration, and enjoyment. During sports training, medication incrementally improved children's observed rule following behavior and counselor-rated sportsmanship relative to placebo. In the absence of sports training, medication improved behavior, effort, and sport knowledge. Training in sports skills and rules produced the largest magnitude effects on sports-related outcomes. Therefore, skills training, rather than medication alone, should be used in conjunction with behavioral intervention to teach sports to youth with ADHD. It is recommended that medication be used only as an adjunct to highly structured sports skills training for youth who display high rates of negative behavior during sports activities

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#### J Clin Exp Neuropsychol. 2019 Feb;41:69-86.

THE ORIGIN OF THE CENTRALITY DEFICIT IN INDIVIDUALS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER. Yeari M, Vakil E, Schifer L, et al.

**INTRODUCTION**: Studies have shown that skilled and disabled readers recall central ideas, which are important to the overall comprehension of the text, to a greater extent than peripheral, less important ideas after reading. However, readers with attention-deficit/hyperactivity disorder (ADHD) recall significantly fewer central ideas than skilled readers. The present study was designed to examine whether difficulties in identifying, attending, and/or retrieving central ideas underlie their centrality deficit.

**METHOD**: 28 adult university students with ADHD and 27 control students read three expository texts (successively) to summarize their central ideas, while their eye-movements were recorded. After reading, the participants recalled, recognized, and estimated the centrality level of all text ideas, which were divided into central and peripheral based on pretest ratings.

**RESULTS**: The participants with ADHD recalled fewer central ideas than controls, although they recognized and estimated their centrality to the same extent as controls. Moreover, the participants with ADHD invested more time in rereading central ideas than peripheral ones, to a greater extent than controls.

**CONCLUSIONS**: The eye-movement data suggest that our university students with ADHD were aware of the reading task requirements, their difficulties, and the appropriate strategies for coping with them (i.e., rereading central ideas). More importantly, the present findings suggest that readers with ADHD have specific difficulty in retrieving central ideas that are available in their long-term memory. It supports the hypothesis that readers with ADHD establish fewer connections between text ideas during reading, and consequently benefit from a reduced number of retrieval cues after reading

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#### J Clin Psychiatry. 2019 Apr;80.

SLEEP-ASSOCIATED ADVERSE EVENTS DURING METHYLPHENIDATE TREATMENT OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A META-ANALYSIS.

#### Faraone SV, Po MD, Komolova M, et al.

**OBJECTIVE**: Sleep disturbances are a feature of attention-deficit/hyperactivity disorder (ADHD) and an adverse event (AE) of methylphenidate treatment. The authors sought to clarify methylphenidate-associated sleep problems and how studies are affected by confounding factors.

**DATA SOURCES**: Published studies in English collected via online databases and unpublished data from www.clinicaltrials.gov and US Food and Drug Administration websites. Sources were searched from inception to August 2017.

**STUDY SELECTION**: Included were blinded placebo-controlled studies of youth with ADHD conducted in naturalistic settings, leading to 35 studies yielding 75 observations of sleep-related AEs. These studies comprised 3,079 drug-exposed and 2,606 placebo-treated patients.

**DATA EXTRACTION**: Two PhD-level reviewers reviewed each study for inclusion. Four PhD/PharmD-level reviewers extracted data in duplicate. Discrepancies were resolved by discussion or, if needed, by the senior author.

**RESULTS**: Increased pooled relative risks (RRs) were found for methylphenidate-associated sleep-related AEs for insomnia (general), initial insomnia, middle insomnia, combined insomnia, and sleep disorder. Several sample or study design features were significantly associated with the RR for sleep-related AEs and the methylphenidate formulation studied (P < .05). After correction for confounding variables, significant differences among drugs were found for initial insomnia, insomnia (general), and sleep disorder (P < .0001) as the other categories could not be tested due to insufficient studies. The findings also show that the RR and its interpretation are constrained by the placebo AE rate.

**CONCLUSIONS**: Several types of insomnia and sleep problems are associated with methylphenidate treatment. Study design and sample features influence the RR statistic. By showing that the rate of placebo AEs impacts the RR, this study provides the field with a useful covariate for adjusting RR statistics

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#### J Clin Psychiatry. 2019 Apr;80.

INCIDENCE RATES OF TREATED MENTAL DISORDERS IN CHILDHOOD AND ADOLESCENCE IN A COMPLETE NATIONWIDE BIRTH COHORT.

#### Steinhausen HC, Jakobsen H.

**OBJECTIVE**: To investigate incidences, cumulative incidence rates, and risk factors of diagnosed mental disorders in a complete nationwide birth cohort across the entire period of childhood and adolescence.

**METHODS**: Based on nationwide Danish registries, the entire cohort of all children born in 1995 was followed up to December 31, 2013. Data for children who migrated during the period were censored in the time analyses, and death before age 18 years was considered a competing risk. Incidence rates and cumulative incidence rates for any first-time-diagnosed mental disorder and 10 major categories of mental disorders according to ICD-10 criteria were calculated for 68,982 individuals. In addition, the effects of age, sex, and further child- and family-related risk factors on mental disorders were analyzed.

**RESULTS**: The incidences of any mental disorder, substance use disorders, depression, and anxiety disorders showed an increase in adolescence, whereas those for autism spectrum disorders, attention-deficit/hyperactivity disorder, conduct disorder, and tic disorder increased during childhood and decreased thereafter. Males had higher incidence rates of any mental disorders, substance use disorders, autism spectrum disorders, ADHD, conduct disorder, and tic disorder. Females had higher risks for depressive, anxiety, obsessive-compulsive, and eating disorders. Several other risk and protective factors for any mental disorder were identified. The cumulative incidence rate at age 18 years amounted to 11.02% for any mental disorder.

**CONCLUSIONS**: These findings provide the most comprehensive estimates of the development, incidence rates, and contributing risk factors of registered mental disorders for the entire period of childhood and adolescence that have been calculated so far

#### J Clin Psychiatry. 2019 Sep;80.

PRENATAL EXPOSURE TO ACETAMINOPHEN AND THE RISK OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A NATIONWIDE STUDY IN TAIWAN.

#### Chen MH, Pan TL, Wang PW, et al.

**BACKGROUND**: Studies have suggested that a significant association exists between prenatal exposure to acetaminophen and the offspring's attention-deficit/hyperactivity disorder (ADHD) risk. However, this association has largely been unexplored among the Asian population, generally, and the Taiwanese population, specifically.

**METHODS**: In our study, 950 study pairs (children with ADHD [ICD-9-CM code: 314] and their mothers) and 3,800 control pairs (children without ADHD and their mothers) matched by demographic characteristics were identified between 1998 and 2008 from the Taiwan Longitudinal Health Insurance Database. Maternal use

of acetaminophen was assessed in the first trimester, second trimester, and third trimester of pregnancy and over the period from 3 months before pregnancy to the date of last menstrual cycle.

**RESULTS**: Logistic regression analysis with adjustments for demographic data, gestational infections, comorbid perinatal conditions, and maternal mental health disorders indicated that exposure to acetaminophen in the second trimester (odds ratio [OR] = 1.19; 95% CI, 1.00-1.40), both the first and second trimesters (OR = 1.28; 95% CI, 1.00-1.64), or in any trimester (OR = 1.20; 95% CI, 1.01-1.42) was associated with an increased risk of ADHD in offspring. Sensitivity analysis excluding gestational infections and maternal mental health disorders confirmed this association (OR = 1.33; 95% CI, 1.04-1.69).

**CONCLUSION**: Prenatal exposure to acetaminophen was associated with an increased risk of ADHD in offspring, regardless of gestational infections and maternal mental health disorders. Additional studies are necessary to clarify the underlying mechanisms by which prenatal exposure to acetaminophen leads to neurodevelopmental risks

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#### J Clin Psychiatry. 2019 May;80.

#### A 9-YEAR FOLLOW-UP OF ATTENTION-DEFICIT/HYPERACTIVITY DISORDER IN A POPULATION SAMPLE. Lecendreux M, Silverstein M, Konofal E, et al.

**BACKGROUND**: Prior follow-up studies of attention-deficit/hyperactivity disorder (ADHD) have mostly been from North America. They have provided a good deal of information about ADHD, but whether these results generalize to population samples and to other countries is not certain. Most prior studies have also not assessed predictors of possible new onsets of ADHD in non-ADHD youth or the validity of subthreshold forms of the disorder.

**METHODS**: 1,012 families were recruited at baseline, when a telephone interview assessed a child in the 6-12 years age range. The interview covered symptoms of ADHD, conduct disorder, and oppositional defiant disorder as well as family living situation, school performance, sleep disturbance, eating habits, use of supplemental iron, and history of ADHD treatment. Nine years later, the persistence of ADHD and its impairments and the emergence of new conditions were assessed. DSM-5 diagnostic criteria were used to diagnose ADHD.

**RESULTS**: 492 of the 1,012 participants seen at baseline were followed up 9 years later, at a mean age of 18 years. At follow-up, 16.7% of the children diagnosed with ADHD at baseline met full criteria for ADHD and 11.1% met criteria for subthreshold ADHD, yielding a persistence rate of 27.8%. Among children not diagnosed with ADHD at baseline, 1.1% met criteria for ADHD at follow-up. The persistence of ADHD and new onsets of ADHD were predicted by several baseline clinical features and by a family history of ADHD.

**CONCLUSIONS**: We replicated predictors of the persistence of ADHD found in prior studies and provide new data about predictors of new ADHD onsets in the population. Our findings about subthreshold ADHD support a dimensional conceptualization of the disorder, highlighting the potential clinical utility of a subthreshold diagnostic category. This study also contributes to the ongoing debate regarding adult-onset ADHD

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#### J Clin Psychol. 2019 Jan;75:221-37.

FAMILY ENVIRONMENT MODERATES THE RELATION OF SLUGGISH COGNITIVE TEMPO TO ATTENTION-DEFICIT/HYPERACTIVITY DISORDER INATTENTION AND DEPRESSION.

#### Fredrick JW, Luebbe AM, Mancini KJ, et al.

**OBJECTIVES**: The current study investigated whether a maladaptive family environment would moderate the strength of the relations of sluggish cognitive tempo (SCT) to attention-deficit/hyperactivity disorder inattention (ADHD-IN) and to depressive symptoms in a large sample of college students.

**METHODS**: Participants (n = 3,172), between the ages of 18-29 (M +/- SDage = 19.24 +/- 1.52; 69.8% women; 80.4% White) and enrolled in five universities in the United States completed self-report measures of symptomatology, interparental conflict, and family expressiveness of emotions.

**RESULTS**: A negative emotional climate strengthened relations of SCT with ADHD-IN and depressive symptoms. Moreover, the lack of a positive emotional climate strengthened the co-occurrence of SCT with depressive symptoms, though not with ADHD-IN.

**CONCLUSIONS**: The current study is the first to demonstrate that the family environment moderates the association between SCT and co-occurring symptomatology in young adults

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J Contemp Dent Pract. 2020 Feb;21:129-32.

A COMPARISON OF SALIVARY MERCURY LEVELS IN CHILDREN WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER WHEN COMPARED TO AGE-MATCHED CONTROLS: A CASE-CONTROL OBSERVATIONAL STUDY.

Barry MJ, Almotawah F, Pani SC, et al.

**AIM**: The aim of this study was to compare the level of mercury in the saliva of children with attention deficit/hyperactivity disorder (ADHD) as compared to age- and gender-matched controls in specific age groups.

**MATERIALS AND METHODS**: A case-control observational study design was used. In school children with ADHD and outpatient dental clinics of a university dental hospital, the participants were schoolchildren diagnosed with ADHD studying in the first grade (6-7 years), sixth grade (12-13 years), and ninth grade (15-16 years) and were gender-matched to children without ADHD attending regular classes in school. Ninety children with ADHD comprised the test group while 90 children without ADHD comprised the control group. **RESULTS**: In this study, we found that children with ADHD had higher levels of salivary mercury than their

age- and gender-matched counterparts; however, this difference was significant only in the 6-7 years of age group. The regression model showed a mild positive association between salivary mercury and ADHD; however, the association was not statistically significant. CONCLUSION: While there is some indication that salivary mercury may be higher in children with ADHD, there is insufficient evidence to establish a definite association between the two.

**CLINICAL SIGNIFICANCE**: The study highlights the need to evaluate existing evidence on the role of mercury, especially salivary mercury, in ADHD

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J Dev Behav Pediatr. 2019 Jan;40:54-59.

SUBJECTIVE VERSUS OBJECTIVE MEASURES OF MEDICATION ADHERENCE IN ADOLESCENTS/YOUNG ADULTS WITH ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

#### Schaefer MR, Wagoner ST, Young ME, et al.

**OBJECTIVE**: To examine the frequency of medication nonadherence using both objective and subjective data and to compare the differences between these measures in adolescents and young adults (AYAs) with attention-deficit hyperactivity disorder (ADHD).

**METHOD**: Fifty-four participants enrolled. Frequency (mean percent of prescribed doses not taken) of nonadherence was measured using subjective (visual analog scale) and objective (pill count and electronic monitoring) methods. Differences between measures were compared using t tests and analysis of variances. **RESULTS**: Objective measures showed that participants missed 40% to 43% of their prescribed doses. Contrastingly, subjective measures indicated that participants missed 25% of their prescribed doses. Frequency of nonadherence was significantly higher when relying on objective measures rather than on subjective measures (t[46] = -4.51, p < 0.01 for pill counts, and t[47] = -4.81, p < 0.01 for electronic monitoring).

**CONCLUSION**: Nonadherence is high in AYAs with ADHD. These individuals tend to overestimate their adherence when self-reporting. Physicians should exercise caution when prescribing based on patient report of adherence and use objective measures when possible

#### J Dev Behav Pediatr. 2019 Jan;40:72-74.

DIAGNOSTIC UNCERTAINTY IN A COMPLEX YOUNG MAN: AUTISM VERSUS PSYCHOSIS.

#### Fogler J, Kuhn J, Prock L, et al.

CASE: James is a 7(1/2)-year-old boy born in Vietnam to a mother with mental illness. Little is known about his early history; he spent the first 6 months of his life in an orphanage, followed by foster care and a disrupted adoption. He moved to the U.S. at age 1(1/2) and joined his current adoptive family at age 4 years. Shortly thereafter, James' psychiatric nurse practitioner diagnosed him with attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). Pragmatic language and syntax deficits were also noted from an early age James is now exhibiting anxiety, perseverative beliefs, and regression in his toileting. He began "talking to himself in his room" and using neologisms. A school-based evaluation resulted in educational diagnoses of ADHD and ASD based on social disconnectedness and invading others' personal space. James' parents felt "something else was going on" and sought a second opinion with a multidisciplinary team (consisting of a pediatric psychologist and a developmental pediatrician). Considering James' history, previous assessments, and their assessment battery (Behavior Assessment System for Children, Behavior Rating Inventory of Executive Function, and Autism Diagnostic Observation Schedule, and Rorschach Inkblot Test), the team characterized his current symptoms as an emerging psychotic disorder. Several consultations occurred over the next 9 months of the school term. First, clinicians in the psychiatry department confirmed symptoms of functional decline, cognitive disorganization, and hallucinations, which were attributed to posttraumatic stress rather than a psychotic disorder. Second, adding to the diagnostic uncertainty, when James started an atypical antipsychotic medication and was under good symptom control, the school team believed that ADHD-not psychosis-best accounted for his presentation. There was significant contention between the medical team and consulting school psychologist regarding the extent to which data from the parental history and Rorschach should be considered in formulating the patient's diagnosis. Two-and-a-half years later, James was weaned off risperidone to manage a new side effect of tics. He subsequently manifested significant paranoia with reactive aggression toward peers for imagined slights and insults that he could "swear he heard." A different school-contracted psychologist's re-evaluation corroborated the diagnosis of schizophrenia based on the several years of unfolding clinical observations. Acting from the supposition that early-onset psychosis was too rare and too stigmatizing a condition to apply to a "kid who's just having trouble paying attention," the first school psychologist remained adamant that ADHD and ASD were the most appropriate diagnoses, and James would be ill-served "pumped full of neuroleptics."He returns now to the original Developmental Behavioral Pediatric consulting team. What would you do to try to bridge this impasse?

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J Dev Behav Pediatr. 2019 Jan;40:20-31.

SLEEP PROBLEM DETECTION AND DOCUMENTATION IN CHILDREN WITH AUTISM SPECTRUM DISORDER AND ATTENTION-DEFICIT/HYPERACTIVITY DISORDER BY DEVELOPMENTAL-BEHAVIORAL PEDIATRICIANS: A DBPNET STUDY.

#### Won DC, Feldman HM, Huffman LC.

**OBJECTIVE**: To determine the percentage of children with autism spectrum disorder (ASD), attentiondeficit/hyperactivity disorder (ADHD), and combined ASD + ADHD who had sleep problems documented by developmental-behavioral pediatricians at diagnostic and follow-up visits at 12 US academic medical centers comprising the Developmental-Behavioral Pediatrics Research Network (DBPNet) and to identify the predictors of sleep problem documentation.

**METHODS**: Developmental-behavioral pediatricians completed encounter forms that covered sociodemographic, medical, clinician, and visit factors. There was 1 dependent variable, sleep problem documentation, for which 4 definitions were developed (Model 1 = Sleep Disorder coded; Model 2 = Sleep Disorder or polysomnogram coded; Model 3 = Sleep Disorder, polysomnogram, or sleep medication coded; and Model 4 = Sleep Disorder, polysomnogram, sleep medication, or clonidine coded).

**RESULTS**: Sleep problem documentation was 14.1% for Model 1, 15.2% for Model 2, 17.3% for Model 3, and 19.7% for Model 4. All values were lower (p < 0.001) than the reported prevalence of sleep problems in these conditions. For Model 4, predictors of sleep problem documentation were age group, ethnicity, medical insurance type, and DBPNet site.

**CONCLUSION**: Developmental-behavioral pediatricians in DBPNet under-reported sleep problems in children with ASD and ADHD. Variation among sites was substantial. Care plans for children with ASD and ADHD should specify which treating clinician(s) monitors sleep issues

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#### J Dual Diagn. 2019 Jul;15:177-83.

### DISCREPANCIES IN THE VALIDITY OF SELF-REPORTED CIGARETTE SMOKING IN ADULTS WITH AND WITHOUT ADHD. Gehricke JG, Gevorkian J, Stehli A, et al.

**Objective**: Attention-deficit/hyperactivity disorder (ADHD) is associated with an increased smoking prevalence and impairments in executive function, which may negatively affect the validity of self-reported smoking rates. This study compares the utility of self-reported smoking with salivary cotinine in adult smokers and nonsmokers with and without ADHD.

**Methods**: Participants (N = 82) were adult smokers and nonsmokers with and without ADHD (n = 35 ADHD and n = 47 controls) from an observational study. Odds ratios (ORs) for accuracy of self-reported smoking compared to salivary cotinine were calculated using diagnosis (ADHD vs. control), gender, age, education, employment, and number of cigarettes per day as predictors. Post-hoc analysis stratified sensitivity, specificity, and accuracy of self-reported smoking in individuals with ADHD and without ADHD.

**Results**: The initial analysis identified education as a significant independent predictor of odds of accuracy, OR = 6.22, p = .013, after adjusting for diagnosis, gender, age, employment, and cigarettes per day. Posthoc analysis revealed that sensitivity, specificity, and accuracy of self-reported smoking was 100% for individuals with ADHD who had more than high school education compared to those with high school or less, which was 83.3%, 45.5%, and 65.2%, respectively. Self-reported smoking of control participants with greater than a high school education had a sensitivity of 85.7%, a specificity of 91.7%, and an accuracy of 88.5%. Control participants with a high school or lower education had a sensitivity of 54.6%, a specificity of 90%, and an accuracy of 71.4% for their self-reported smoking.

**Conclusions**: Individuals with ADHD and high school or lower education showed the lowest specificity and accuracy in their self-reported smoking, which may affect documented smoking prevalence rates. This is a secondary analysis of data collected as part of a clinical trial registered as NCT00915798 at www.clinicaltrials.gov

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#### J Fluency Disord. 2019 Dec;62:105726.

#### PARENT PERCEPTIONS OF AN INTEGRATED STUTTERING TREATMENT AND BEHAVIORAL SELF-REGULATION PROGRAM FOR EARLY DEVELOPMENTAL STUTTERING.

#### Druker K, Mazzucchelli T, Hennessey N, et al.

**PURPOSE**: Recent research has identified approximately half of children who stutter present with self-regulation challenges. These manifest in elevated inattentive and/or impulsive behaviours, aligned with attention deficit hyperactivity disorder (ADHD) symptoms. These symptoms have been found to influence the child's responsiveness to their stuttering treatment, and may exacerbate the psychosocial consequences of stuttering for them and their families. Early stuttering intervention identifies parents as key agents of change in the management of their children's stuttering. This study sought feedback from parents regarding their experiences with an integrated stuttering treatment and behavioral self-regulation program for early developmental stuttering, addressing the child's self-regulation challenges.

**METHOD**: Eight parents of children who stutter who had co-occurring self-regulation challenges completed the integrated program. This incorporated the Triple P--Positive Parenting Program adapted for the developmental stuttering population, and the Curtin University Stuttering Program (CUSP). Semi-structured qualitative interviews were conducted to capture parents' reflections on, and experiences with, the integrated program.

**RESULTS**: Thematic analysis identified several major themes regarding the parents' experiences with the integrated program: emotional impact on parents, child self-regulation, link between stuttering and behaviour,

parent self-regulation, impact on family dynamics, and overall positive perceptions of the integrated program. All of the parents indicated they would recommend the program to future parents of children who stutter. **CONCLUSION**: This study provides insights into parents' perceptions regarding an integrated intervention approach for early stuttering and behavior management. It also indicates how adopting a holistic approach to stuttering intervention is positive and has social validity

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J Head Trauma Rehabil. 2019 Mar;34:87-95.

HEAD IMPACT BURDEN AND CHANGE IN NEUROCOGNITIVE FUNCTION DURING A SEASON OF YOUTH FOOTBALL. Rose SC, Yeates KO, Fuerst DR, et al.

**OBJECTIVE**: To determine the association of repetitive subconcussive head impacts with functional outcomes in primary and high school tackle football players.

SETTING: Youth football fields and an outpatient sports neurology clinic.

**PARTICIPANTS**: A total of 112 primary school (n = 55, age 9-12 years) and high school (n = 57, age 15-18 years) football players. DESIGN: A prospective cohort study.

**MAIN MEASURES**: Helmet-based sensors were used to record head impacts during practices and games during the 2016 football season. Impact g-forces were summed to yield a measure of cumulative impact. History of self-reported premorbid medical diagnoses was obtained preseason. Players completed assessments of a variety of outcomes both pre- and postseason: neuropsychological test performance, symptoms, vestibular and ocular-motor screening, balance, parent-completed attention-deficit hyperactivity disorder (ADHD) symptoms, and self-reported behavioral adjustment.

**RESULTS**: Average cumulative impact was 3700 (standard deviation = 2700) g-forces for the season and did not differ between age groups (P = .594). Cumulative impact did not predict pre- to postseason change scores on any outcome measures (all P > .05). Instead, younger age group and reported history of premorbid ADHD predicted change scores on several cognitive testing measures and parent-reported ADHD symptoms, while reported history of premorbid anxiety and depression predicted change scores on symptom reporting.

**CONCLUSIONS**: In youth tackle football, subconcussive head impacts sustained over the course of a single season may not be associated with neurocognitive functional outcomes. The absence of a significant association may reflect the relatively short follow-up interval, and signals the need for studies across multiple seasons

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J Int Neuropsychol Soc. 2018 Oct;24:977-94.

SYSTEMATIC REVIEW AND META-ANALYSIS OF EXECUTIVE FUNCTIONS IN PRESCHOOL AND SCHOOL-AGE CHILDREN WITH NEUROFIBROMATOSIS TYPE 1.

#### Beaussart ML, Barbarot S, Mauger C, et al.

**OBJECTIVES**: Neurofibromatosis type 1 (NF1) is a genetic disorder in which the most frequent complication in children is learning disabilities. Over the past decade, growing arguments support the idea that executive dysfunction is a core deficit in children with NF1. However, some data remain inconsistent. The aim of this study was to determine the magnitude of impairment for each executive function (EF) and clarify the impact of methodological choices and participant's characteristics on EFs.

**METHODS**: In this meta-analysis, 19 studies met the selection criteria and were included with data from a total of 805 children with NF1 and 667 controls. Based on the Diamond's model (2013), EF measures were coded separately according to the following EF components: working memory, inhibitory control, cognitive flexibility, planning/problem solving. The review protocol was registered with PROSPERO (International prospective register of systematic reviews; CRD42017068808).

**RESULTS**: A significant executive dysfunction in children with NF1 is demonstrated. Subgroup analysis showed that the impairment varied as a function of the specific component of executive functioning. The effect size for working memory and planning/problem solving was moderate whereas it was small for inhibitory control and cognitive flexibility. Executive dysfunction seems to be greater with increasing age

whereas assessment tool type, intellectual performance, attention deficit hyperactivity disorder and control group composition did not seem to affect EF results.

**CONCLUSIONS**: EF deficits are a core feature in children with NF1 and an early identification of executive dysfunctions is essential to limit their impact on the quality of life. (JINS, 2018, 24, 977-994)

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J Int Neuropsychol Soc. 2018 Mar;24:283-93.

AMPHETAMINE MODESTLY IMPROVES CONNERS' CONTINUOUS PERFORMANCE TEST PERFORMANCE IN HEALTHY ADULTS.

#### MacQueen DA, Minassian A, Henry BL, et al.

**OBJECTIVES**: Amphetamine improves vigilance as assessed by continuous performance tests (CPT) in children and adults with attention deficit hyperactivity disorder (ADHD). Less is known, however, regarding amphetamine effects on vigilance in healthy adults. Thus, it remains unclear whether amphetamine produces general enhancement of vigilance or if these effects are constrained to the remediation of deficits in patients with ADHD.

**METHODS**: We tested 69 healthy adults (35 female) on a standardized CPT (Conner's CPT-2) after receiving 10- or 20-mg d-amphetamine or placebo. To evaluate potential effects on learning, impulsivity, and perseveration, participants were additionally tested on the Iowa Gambling Task (IGT) and Wisconsin Card Sorting Task (WCST).

**RESULTS**: Participants receiving placebo exhibited the classic vigilance decrement, demonstrated by a significant reduction in attention (D') across the task. This vigilance decrement was not observed, however, after either dose of amphetamine. Consistent with enhanced vigilance, the 20-mg dose also reduced reaction time variability across the task and the ADHD confidence index. The effects of amphetamine appeared to be selective to vigilance since no effects were observed on the IGT, WCST, or response inhibition/perseveration measures from the CPT.

**CONCLUSIONS**: The present data support the premise that amphetamine improves vigilance irrespective of disease state. Given that amphetamine is a norepinephrine/dopamine transporter inhibitor and releaser, these effects are informative regarding the neurobiological substrates of attentional control. (JINS, 2018, 24, 283-293)

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J Med Internet Res. 2019 Apr;21:e12831.

GUIDELINE DEVELOPMENT FOR TECHNOLOGICAL INTERVENTIONS FOR CHILDREN AND YOUNG PEOPLE TO SELF-MANAGE ATTENTION DEFICIT HYPERACTIVITY DISORDER: REALIST EVALUATION.

#### Powell L, Parker J, Harpin V, et al.

**BACKGROUND**: Attention deficit hyperactivity disorder (ADHD) is a complex neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity. ADHD can affect the individual, the individual's family, and the community. ADHD is managed using pharmacological and nonpharmacological treatments, which principally involves others helping children and young people (CAYP) manage their ADHD rather than learning self-management strategies themselves. Over recent years, technological developments have meant that technology has been harnessed to create interventions to facilitate the self-management of ADHD in CAYP. Despite a clear potential to improve the effectiveness and personalization of interventions, there are currently no guidelines based on existing evidence or theories to underpin the development of technologies that aim to help CAYP self-manage their ADHD.

**OBJECTIVE**: The aim of this study was to create evidence-based guidelines with key stakeholders who will provide recommendations for the future development of technological interventions, which aim to specifically facilitate the self-management of ADHD.

**METHODS**: A realist evaluation (RE) approach was adopted over 5 phases. Phase 1 involved identifying propositions (or hypotheses) outlining what could work for such an intervention. Phase 2 involved the identification of existing middle-range theories of behavior change to underpin the propositions. Phase 3 involved the identification and development of context mechanism outcome configurations (CMOCs), which

essentially state which elements of the intervention could be affected by which contexts and what the outcome of these could be. Phase 4 involved the validation and refinement of the propositions from phase 1 via interviews with key stakeholders (CAYP with ADHD, their parents and specialist clinicians). Phase 5 involved using information gathered during phases 1 to 4 to develop the guidelines.

**RESULTS**: A total of 6 specialist clinicians, 8 parents, and 7 CAYP were recruited to this study. Overall, 7 key themes were identified: (1) positive rewarding feedback, (2) downloadable gaming resources, (3) personalizable and adaptable components, (4) psychoeducation component, (5) integration of self-management strategies, (6) goal setting, and (7) context (environmental and personal). The identified mechanisms interacted with the variable contexts in which a complex technological intervention of this nature could be delivered.

**CONCLUSIONS**: Complex intervention development for complex populations such as CAYP with ADHD should adopt methods such as RE, to account for the context it is delivered in, and co-design, which involves developing the intervention in partnership with key stakeholders to increase the likelihood that the intervention will succeed. The development of the guidelines outlined in this paper could be used for the future development of technologies that aim to facilitate self-management in CAYP with ADHD

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#### J Nurs Scholarsh. 2019 Mar;51:138-46.

PSYCHIATRIC DISORDERS AFTER ATTENTION-DEFICIT/HYPERACTIVITY DISORDER: A NATIONWIDE POPULATION-BASED STUDY IN TAIWAN.

#### Huang YF, Chiou HY, Chung CH, et al.

**PURPOSE**: To investigate the risk for psychiatric disorders in patients newly diagnosed with attention deficit hyperactive disorder (ADHD) from two longitudinal groups of children with and without ADHD.

**STUDY DESIGN**: In total, 1,745 children newly diagnosed with ADHD and 6,980 participants without ADHD were identified from Taiwan's National Health Insurance Research Database in 2005 and followed until 2010. Risks for psychiatric disorders in the ADHD and non-ADHD groups were compared.

**RESULTS**: The ADHD group was 3.82 times more likely to develop psychiatric disorders than their counterparts. The ADHD group showed the highest risk for oppositional defiant disorder, followed by adult ADHD and autism spectrum disorder. Moreover, the time effects of psychiatric disorders in the ADHD group were significant. Patients with ADHD subtypes had a significant risk for psychiatric disorders compared to their counterparts.

**CONCLUSIONS**: A high risk for psychiatric disorders was revealed in this study among children with ADHD. Childhood ADHD, the duration after the ADHD diagnosis, and the ADHD subtype were associated with psychiatric disorders.

**CLINICAL RELEVANCE**: Various psychiatric disorders were observed in children after they had been newly diagnosed with ADHD, indicating a need for integrated care that includes medical practitioners, family members, social workers, and early intervention workers for patients newly diagnosed with ADHD to decrease the risk for comprehensive psychiatric disorders

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J Paediatr Child Health. 2018 Oct;54:1073-76.

USE OF PSYCHOTROPIC MEDICATIONS IN GENERAL PAEDIATRIC PRACTICE. *Hazell P*.

Paediatricians contribute the greatest proportion of prescriptions for psychotropic medication to children between the ages of 3 and 14 years in Australia. Medications indicated for attention-deficit hyperactivity disorder are the most commonly prescribed, followed by antidepressants and antipsychotics. Outside treatment for attention-deficit hyperactivity disorder, most prescribing is 'off label'. There are few searchable, up-to-date resources to guide psychotropic prescribing to children. The skill level required to manage pharmacotherapy is determined by the condition and the characteristics of the patient. Psychotropic medication should always be considered within the context of other interventions and environmental factors that influence emotions, cognition and behaviour. Beware the 'medication fallacy' that arises out of a misconception that if one medication does not work, there must be another that will

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#### J Paediatr Child Health. 2018 Oct;54:1065-67.

ATTENTION DEFICIT HYPERACTIVITY DISORDER: SOME CHALLENGING CLINICAL SCENARIOS. Efron D.

Paediatricians generally have good skills in the assessment and management of attention deficit hyperactivity disorder. In most cases this is not difficult - the paediatrician's role is clear, and evidence-based treatment can be delivered. There are however some clinical situations which present diagnostic, ethical and/or management dilemmas for paediatricians in relation to possible attention deficit hyperactivity disorder. This Viewpoint article addresses some of these scenarios

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#### J Paediatr Child Health. 2019 Jan; 55:74-81.

#### CAN THE BAYLEY SCALES OF INFANT DEVELOPMENT AT 18 MONTHS PREDICT CHILD BEHAVIOUR AT 7 YEARS? Gould JF, Hunt E, Roberts RM, et al.

**AIM**: Infants born preterm (<37 weeks' gestation) are at risk of poor neurodevelopmental outcomes; hence, many neonatal centres routinely follow up infants using the Bayley Scales of Infant Development (BSID), although the predictive validity of the BSID for children born preterm is questionable. Our objective is to evaluate the predictive capacity of the BSID for behavioural functioning at school age of children born preterm.

METHODS: Children (n = 657 children born <33 weeks' gestation) were enrolled at birth from five neonatal centres around Australia. A psychologist assessed child development at 18 months using the BSID-II. When children were 7 years (corrected age) of age, parents completed the Strengths and Difficulties Questionnaire, the Behavior Rating Inventory of Executive Function and the Conners 3rd Edition Attention Deficit Hyperactivity Disorder Index. We explored associations between BSID-II at 18 months and behaviour scores at 7 years and examined the interaction effect of the use of an allied health service between the BSID-II and behaviour assessments.

**RESULTS:** For every one-point increase on the BSID-II Mental Development Index, behaviour scores decreased by 0.07 points for the Strengths and Difficulties Questionnaire Total Difficulties (95% confidence interval (CI) -0.10, -0.03), 0.12 points for the Behavior Rating Inventory of Executive Function Global Executive Composite (95% CI -0.21, -0.04) and 0.16 points for the Conners 3rd Edition Attention Deficit Hyperactivity Disorder Index (95% CI -0.26, -0.05).

CONCLUSION: The BSID-II at 18 months was weakly associated with parent-reported behaviour at 7 years in children born preterm

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J Pediatr Surg. 2019 Oct;54:2024-27.

#### NO INCREASED RISK OF ATTENTION DEFICIT HYPERACTIVITY DISORDERS IN PATIENTS WITH HIRSCHSPRUNG DISEASE. Granstrom AL, Skoglund C, Wester T.

PURPOSE: Hirschsprung disease (HSCR) has previously been associated with increased need of special education services despite normal intelligence. The aim of this study was to assess the risk of attention deficit hyperactivity disorders (ADHD) in individuals with HSCR in a population-based cohort.

METHODS: This was a nationwide, population-based cohort study. The study exposure was HSCR and the study outcome was ADHD. The cohort included all individuals with HSCR registered in the Swedish National Patient Register between 1964 and 2013 and ten age- and sex-matched controls per patient, randomly selected from the Population Register.

RESULTS: The cohort comprised 739 individuals with HSCR and 7390 controls. Twenty-six of the 739 individuals with HSCR and 202 of the 7390 controls were diagnosed with ADHD, Odds ratio (OR) 1.30, Confidence interval (CI) 95% 0.84-1.93, indicating no difference in risk for ADHD. The mean age at diagnosis of ADHD was not different between the groups; 18.1years (SD 8.4) vs 16.7years (SD 7.8), p=0.39. Down syndrome did not affect the risk for ADHD, OR 2.26 (CI 95% 0.68-5.53). Female gender decreased the risk for ADHD, OR 0.58 (CI 95% 0.40-0.83).

**CONCLUSIONS**: There is no increased risk of ADHD in patients with Hirschsprung disease. **LEVEL OF EVIDENCE**: Prognosis study, level of evidence: Level I

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#### J Phys Act Health. 2019 Jun;16:416-22.

#### PHYSICAL ACTIVITY, SCREEN TIME, AND SLEEP IN CHILDREN WITH ADHD.

Tandon PS, Sasser T, Gonzalez ES, et al.

**Background**: Children with attention deficit hyperactivity disorder (ADHD) are at increased risk for poor health and obesity. The authors describe obesity-related movement behaviors in children with ADHD, determine higher risk groups, and compare with children with other disorders.

**Methods**: Physical activity (PA), sleep, and screen time of children with ADHD (aged 6-18 y) were compared with recommendations and with behaviors of children with autism, asthma, and a normative group using 2011 National Survey of Child Health data.

**Results**: Approximately one-third of children with ADHD participated in daily PA and half in sports in the past year. Older children with ADHD were less likely to get daily PA, get enough sleep, and limit screen time to <2 hours per day. Obese children had lower odds of daily PA. Children who had lower socioeconomic status, or severe ADHD, had lower odds of sports participation. Children with ADHD had 50% lower odds of sports participation than children with asthma.

**Conclusions**: Children with ADHD did not engage in recommended amounts of PA, sleep, and screen time. Children with ADHD who are older, poor, obese, and/or with more severe symptoms are at higher risk for suboptimal movement behaviors. These domains represent novel treatment targets in ADHD youth

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#### J Psychopharmacol. 2019 Apr;33:511-21.

VORTIOXETINE FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER IN ADULTS: A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, PROOF-OF-CONCEPT STUDY.

#### Biederman J, Lindsten A, Sluth LB, et al.

**BACKGROUND**: Stimulants remain the mainstay of treatment for attention-deficit hyperactivity disorder (ADHD) but are often associated with insufficient response or poor tolerability, leading to many patients not wishing to be treated with controlled substances. AIMS: This randomized, placebo-controlled, proof-of-concept study (NCT02327013) evaluated the efficacy of a multimodal antidepressant, vortioxetine, in the treatment of ADHD, using a two-stage sequential parallel comparison design.

**METHODS**: Patients aged 18-55 years with a diagnosis of ADHD (DSM-5) and a total score 24 on the Adult ADHD Investigator Symptom Rating Scale (AISRS) were randomized in study stage I with a 1:1:3 ratio to six weeks of treatment with vortioxetine 10 or 20 mg/day, or placebo (n = 227). In study stage II, placebo non-responders (AISRS total score reduction <30% from stage I baseline) were re-randomized with a 1:1:1 ratio to six weeks of vortioxetine 10 or 20 mg/day, or placebo (n = 59).

**RESULTS**: Across the two study stages combined, ADHD symptoms improved by approximately eight AISRS points in all treatment groups, showing no difference from placebo for either dose of vortioxetine, the study thus failing to meet its primary endpoint. However, both doses of vortioxetine separated from placebo in improving overall patient functioning, as measured by the Sheehan Disability Scale.

**CONCLUSION**: Studies are warranted to further investigate this suggested benefit of a multimodal antidepressant for patient functioning in ADHD while addressing issues of non-adherence and placebo response. The study confirmed vortioxetine 10 mg and 20 mg as generally well-tolerated

#### J Psychosoc Nurs Ment Health Serv. 2019 Nov;57:45-55.

### EFFECT OF A SOLUTION-FOCUSED APPROACH ON SELF-EFFICACY AND SELF-ESTEEM IN TURKISH ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVITY DISORDER.

#### Karakaya D, Ozgur G.

The aim of the current research was to evaluate the effect of a solution-focused approach on levels of self-efficacy and self-esteem in adolescents with attention-deficit/hyperactivity disorder (ADHD). A mixed design was used, where the quantitative aspect was a randomized controlled study and the qualitative aspect was a case study design. Adolescents with ADHD (N = 41) were randomized into intervention or control groups. Control groups received existing treatment in outpatient clinics, whereas interviews based on a solution-focused approach were conducted with the intervention groups. After the interventions, differences were noted between groups with time, self-efficacy, and self-esteem, with increases in self-efficacy and self-esteem. Significant differences were found between postintervention and follow-up scores. Six themes were determined in the qualitative findings. Nurses in the adolescent mental health field can use the principles and techniques of the solution-focused approach when providing care

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#### J Psychosom Res. 2019 Aug;123:109727.

#### ASSOCIATIONS OF FATIGUE AND SLEEP DISTURBANCE WITH NINE COMMON MENTAL DISORDERS. McCallum SM, Batterham PJ, Calear AL, et al.

#### Wiccallulli Sw, Dallernalli PJ, Calear AL, et al.

**OBJECTIVE**: To investigate the contribution of nine mental/substance use disorders to fatigue and sleep disturbance.

**METHODS**: 3620 Australians aged 18years or older recruited from the general community via Facebook during January-February 2016 completed an online survey assessing demographic characteristics, diagnosed medical conditions and nine mental disorders. Outcome measures were Patient Reported Outcomes Measurement Information System (PROMIS(R)) fatigue and PROMIS sleep disturbance.

**RESULTS**: Overall, 56% of the sample met criteria for at least one mental disorder. Linear regression models of sleep disturbance revealed all mental disorders except obsessive compulsive disorder (beta=0.038) had independent associations with sleep disturbance, with generalised anxiety disorder (GAD) (beta=0.173), major depressive disorder (MDD) (beta=0.117) and post-traumatic stress disorder (PTSD) (beta=0.111) making the greatest contribution. Inclusion of fatigue in the model attenuated the effects of panic disorder, MDD and attention-deficit hyperactive disorder (ADHD) to non-significance. For the outcome of fatigue, GAD (beta=0.223), MDD (beta=0.176) and PTSD (beta=0.147) made the greatest contributions, although all disorders had significant independent relationships. After adjusting for sleep disturbance, all mental disorders continued to make a significant contribution except for alcohol use disorder and substance use disorder.

**CONCLUSION**: Sleep disturbance and fatigue have independent associations with many mental disorders after correcting for comorbidity and known confounds. The disorders providing the greatest contribution to sleep disturbance and fatigue were GAD and MDD. Sleep disturbance and fatigue may be appropriate transdiagnostic targets for improving symptoms and global functioning for people with mental disorders

#### JAMA Netw Open. 2019 Jun;2:e196405.

PRENATAL RISK FACTORS AND PERINATAL AND POSTNATAL OUTCOMES ASSOCIATED WITH MATERNAL OPIOID EXPOSURE IN AN URBAN, LOW-INCOME, MULTIETHNIC US POPULATION.

#### Azuine RE, Ji Y, Chang HY, et al.

**Importance**: The opioid epidemic increasingly affects pregnant women and developing fetuses, resulting in high rates of neonatal abstinence syndrome. However, longitudinal studies that prospectively observe newborns with neonatal abstinence syndrome or with maternal opioid use and examine their long-term physical and neurodevelopmental outcomes are lacking.

**Objective**: To examine prenatal risk factors associated with maternal opioid use during pregnancy and the short-term and long-term health consequences on their children. Design, Setting, and Participants: This cohort study analyzed data from the Boston Birth Cohort, an urban, low-income, multiethnic cohort that

enrolled mother-newborn pairs at birth at Boston Medical Center (Boston, Massachusetts) starting in 1998, and a subset of children were prospectively observed at Boston Medical Center pediatric primary care and subspecialty clinics from birth to age 21 years. Data analysis began in June 2018 and was completed in May 2019.

**Exposures**: In utero opioid exposure was defined as maternal self-reported opioid use and/or clinical diagnosis of neonatal abstinence syndrome.

**Main Outcomes and Measures**: Pregnancy outcomes, postnatal child physical health, and major neurodevelopmental disabilities, documented in maternal and child medical records.

**Results**: This study included 8509 Boston Birth Cohort mother-newborn pairs for prenatal and perinatal analyses. Of those, 3153 children continued to receive pediatric care at Boston Medical Center and were included in assessing postnatal outcomes. Overall, 454 of the 8509 children (5.3%) in the Boston Birth Cohort had in utero opioid exposure. At birth, opioid exposure was associated with higher risks of fetal growth restriction (odds ratio [OR], 1.87; 95% CI, 1.41-2.47) and preterm birth (OR, 1.49; 95% CI, 1.19-1.86). Opioid exposure was associated with increased risks of lack of expected physiological development (OR, 1.80; 95% CI, 1.17-2.79) and conduct disorder/emotional disturbance (OR, 2.13; 95% CI, 1.20-3.77) among preschoolaged children. In school-aged children, opioid exposure was associated with a higher risk of attention-deficit/hyperactivity disorder (OR, 2.55; 95% CI, 1.42-4.57).

**Conclusions and Relevance**: In this sample of urban, high-risk, low-income mother-child pairs, in utero opioid exposure was significantly associated with adverse short-term and long-term outcomes across developmental stages, including higher rates of physical and neurodevelopmental disorders in affected children. Efforts to prevent the opioid epidemic and mitigate its health consequences would benefit from more intergenerational research

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#### JAMA Netw Open. 2019 Jun;2:e196118.

ASSOCIATION OF GENETIC RISK FOR RHEUMATOID ARTHRITIS WITH COGNITIVE AND PSYCHIATRIC PHENOTYPES ACROSS CHILDHOOD AND ADOLESCENCE.

#### Jones HJ, Hubbard L, Mitchell RE, et al.

**Importance**: The association of rheumatoid arthritis (RA) with cognitive and psychiatric phenotypes has been recognized. However, it is not known whether these phenotypes are a consequence of disease-related factors, such as pain, or reflect shared etiological factors.

**Objective**: To investigate whether genomic risk for RA is associated with cognitive and psychiatric symptoms in children and adolescents.

**Design, Setting, and Participants**: This cohort study analyzed data from 3296 to 5936 adolescents (depending on outcome) from the Avon Longitudinal Study of Parents and Children. Clinical and questionnaire data were collected periodically from September 6, 1990, with collection ongoing, and analyzed from August 21, 2017, to May 21, 2018.

**Exposures**: Polygenic risk scores (PRSs) for RA.

**Main Outcomes and Measures**: Measures of cognition (including IQ, working memory, verbal learning, processing speed, problem solving, selective attention, and attentional control) and psychopathology (including anxiety, depression, negative symptoms, psychotic experiences, attention-deficit/hyperactivity disorder, and hyperactive and inattentive symptoms) in childhood and adolescence.

**Results**: Polygenic risk scores for RA were generated for 7977 children and adolescents (3885 [48.7%] female). Of these 7977 participants, 9 (0.11%) had a known diagnosis of RA at age 22 years. Increased PRS for RA was associated with lower total IQ (beta, -0.05; 95% CI, -0.07 to -0.02; P < .001), performance IQ (beta, -0.03; 95% CI, -0.06 to -0.005; P = .02), and verbal IQ (beta, -0.05; 95% CI, -0.08 to -0.02; P < .001) at age 8 years (mean [SD] age at measurement, 8.6 [0.3] years) and symptoms of hyperactivity and inattention from ages 4 to 16 years, with the strongest evidence of association at age 13 years (mean [SD] age at assessment, 13.2 [0.2] years). The odds ratio at this age per SD increase in PRS was 1.25 (95% CI, 1.12-1.39) (P < .001). There was little evidence of association between the RA PRS and other measures of cognition and psychopathology. Gene-based analyses indicated that polygenic signal for RA was enriched for immune pathways (q </= 0.05). No equivalent associations were seen for polygenic risk associated with inflammatory bowel disease or multiple sclerosis.

**Conclusions and Relevance**: These findings support an association between genetic risk for RA and neural phenotypes, suggesting that cognitive impairment in RA is not simply secondary to disease-related processes or treatment effects. These results may suggest that genetic susceptibility for RA might affect psychological well-being in early life and reinforce the emerging link between mental health and the immune system

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#### JAMA Netw Open. 2019 Apr;2:e191435.

Association of Maternal Use of Benzodiazepines and Z-Hypnotics During Pregnancy With Motor and Communication Skills and Attention-Deficit/Hyperactivity Disorder Symptoms in Preschoolers. Lupattelli A, Chambers CD, Bandoli G, et al.

**Importance**: The reproductive safety of benzodiazepine/z-hypnotic exposure on child longer-term developmental risks remains unresolved.

**Objective**: To quantify the association of motor, communication, and attention-deficit/hyperactivity disorder (ADHD) symptoms in preschoolers with gestational benzodiazepine/z-hypnotic exposure by timing and duration and coexposure to opioids or antidepressants.

**Design, Setting, and Participants**: Nationwide, population-based Norwegian Mother and Child Cohort Study, recruiting pregnant women from 1999 to 2008, with child follow-up from ages 6, 18, and 36 months to ages 5, 7, and 8 years. Follow-up of teenagers is ongoing. The study included women with depressive/anxiety (n = 4195), sleeping (n = 5260), or pain-related (n = 26 631) disorders before and/or during pregnancy. Exposures: For the timing analyses, children exposed to benzodiazepines/z-hypnotics in midpregnancy (weeks 17-28) or late pregnancy (week 29 or later) vs those born to nonmedicated women. For the duration and coexposure analyses, benzodiazepine/z-hypnotic treatment for multiple 4-week intervals vs 1 and co-use of benzodiazepine/z-hypnotic with opioids or antidepressants vs sole benzodiazepine/z-hypnotic use.

**Main Outcomes and Measures**: Parent-reported motor and communication skills (Ages and Stages Questionnaires) and ADHD symptoms (Conners' Parent Rating Scale-Revised) at child median age of 5.1 years (interquartile range, 5.0-5.3 years) as standardized mean scores. General linear propensity scoreadjusted and marginal structural models were fitted. Analyses were stratified by maternal disorder.

**Results**: Of 41146 eligible pregnancy-child dyads, 36086 children (18 330 boys and 17756 girls) were included, of whom 283 (0.8%) were prenatally exposed to benzodiazepines/z-hypnotics (134 in the depressive/anxiety, 60 in the sleeping, and 89 in the pain-related disorders). There was no increased risk for greater ADHD symptoms or fine motor deficits after intrauterine benzodiazepine/z-hypnotic exposure at different time points. Children born to women with depressive/anxiety disorders who took benzodiazepines/z-hypnotics in late pregnancy had greater gross motor (weighted beta, 0.67; 95% CI, 0.21-1.13) and communication (weighted beta, 0.35; 95% CI, 0.04-0.65) deficits than unexposed children. There was no evidence for substantial duration or coexposure associations.

**Conclusions and Relevance**: These findings suggest no substantial detrimental risk on child fine motor and ADHD symptoms after prenatal benzodiazepine/z-hypnotic exposure alone or in combination with opioids or antidepressants. Residual confounding by indication and/or a higher drug dose regimen among women with anxiety/depression may explain the moderate association of gross motor and communication deficits with late-pregnancy benzodiazepine/z-hypnotic use

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#### JAMA Neurol. 2019 Apr;76:454-61.

ASSOCIATION OF TOURETTE SYNDROME AND CHRONIC TIC DISORDER WITH METABOLIC AND CARDIOVASCULAR DISORDERS.

#### Brander G, Isomura K, Chang Z, et al.

**Importance**: There are limited data concerning the risk of metabolic and cardiovascular disorders among individuals with Tourette syndrome (TS) or chronic tic disorder (CTD).

**Objective**: To investigate the risk of metabolic and cardiovascular disorders among individuals with TS or CTD over a period of 40 years.

**Design, Settings, and Participants**: This longitudinal population-based cohort study included all individuals living in Sweden between January 1, 1973, and December 31, 2013. Families with clusters of full siblings discordant for TS or CTD were further identified. Data analyses were conducted from August 1, 2017, to October 11, 2018.

**Exposures**: Previously validated International Classification of Diseases diagnoses of TS or CTD in the Swedish National Patient Register.

**Main Outcomes and Measures**: Registered diagnoses of obesity, dyslipidemia, hypertension, type 2 diabetes, and cardiovascular diseases (including ischemic heart diseases, arrhythmia, cerebrovascular diseases and transient ischemic attack, and arteriosclerosis).

Results: Of the 14045026 individuals in the cohort, 7804 individuals (5964 males [76.4%]; median age at first diagnosis, 13.3 years [interguartile range, 9.9-21.3 years]) had a registered diagnosis of TS or CTD in specialist care. Of 2675482 families with at least 2 singleton full siblings, 5141 families included siblings who were discordant for these disorders. Individuals with TS or CTD had a higher risk of any metabolic or cardiovascular disorders compared with the general population (hazard ratio adjusted by sex and birth year [aHR], 1.99; 95% CI, 1.90-2.09) and sibling controls (aHR for any disorder, 1.37; 95% CI, 1.24-1.51). Specifically, individuals with TS or CTD had higher risks for obesity (aHR, 2.76; 95% CI, 2.47-3.09), type 2 diabetes (aHR, 1.67; 95% CI, 1.42-1.96), and circulatory system diseases (aHR, 1.76; 95% CI, 1.67-1.86). The risk of any cardiometabolic disorder was significantly greater in males than in females (aHR, 2.13; 95%) CI, 2.01-2.26 vs aHR, 1.79; 95% CI, 1.64-1.96), as was the risk of obesity (aHR, 3.24; 95% CI, 2.83-3.70 vs aHR, 1.97; 95% CI, 1.59-2.44). The risks were already evident from childhood (the groups were significantly different by age 8 years) and were significantly reduced with the exclusion of individuals with comorbid attention-deficit/hyperactivity disorder (aHR, 1.52; 95% CI, 1.42-1.62), while excluding other comorbidities did not significantly affect the results. Compared with patients with TS or CTD who were not taking antipsychotics, patients with a longer duration of antipsychotic treatment (>1 year) had significantly lower risks of metabolic and cardiovascular disorders.

**Conclusions and Relevance**: The findings of this study suggest that TS and CTD are associated with a substantial risk of metabolic and cardiovascular disorders. The results highlight the importance of carefully monitoring cardiometabolic health in patients with TS or CTD across the lifespan, particularly in those with comorbid attention-deficit/hyperactivity disorder

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#### JAMA Psychiatry. 2019 Feb;76:162-71.

#### Association of Antipsychotic Treatment With Risk of Unexpected Death Among Children and Youths. Ray WA, Stein CM, Murray KT, et al.

**Importance**: Children and youths who are prescribed antipsychotic medications have multiple, potentially fatal, dose-related cardiovascular, metabolic, and other adverse events, but whether or not these medications are associated with an increased risk of death is unknown.

**Objective**: To compare the risk of unexpected death among children and youths who are beginning treatment with antipsychotic or control medications.

**Design, Setting, and Participants**: This retrospective cohort study was conducted from 1999 through 2014 and included Medicaid enrollees aged 5 to 24 years in Tennessee who had no diagnosis of severe somatic illness, schizophrenia or related psychoses, or Tourette syndrome or chronic tic disorder. Data analysis was performed from January 1, 2017, to August 15, 2018.

**Exposures**: Current, new antipsychotic medication use at doses higher than 50 mg (higher-dose group) or 50 mg or lower chlorpromazine equivalents (lower-dose group) as well as control medications (ie, attention-deficit/hyperactivity disorder medications, antidepressants, or mood stabilizers) (control group).

**Main Outcomes and Measures**: Deaths during study follow-up while out of hospital or within 7 days after hospital admission, classified as either deaths due to injury or suicide or unexpected deaths. Secondary outcomes were unexpected deaths not due to overdose and death due to cardiovascular or metabolic causes.

**Results**: This study included 189361 children and youths in the control group (mean [SD] age, 12.0 [5.1] years; 43.4% female), 28377 in the lower-dose group (mean [SD] age, 11.7 [4.4] years; 32.3% female), and 30120 in the higher-dose group (mean [SD] age, 14.5 [4.8] years; 39.2% female). The unadjusted incidence

of death in the higher-dose group was 146.2 per 100000 person-years (40 deaths per 27354 person-years), which was significantly greater than that in the control group (54.5 per 100000 population; 67 deaths per 123005 person-years) (P < .001). The difference was primarily attributable to the increased incidence of unexpected deaths in the higher-dose group (21 deaths; 76.8 per 100000 population) compared with the control group (22 deaths; 17.9 per 100000 population). The propensity score-adjusted hazard ratios were as follows: all deaths (1.80; 95% CI, 1.06-3.07), deaths due to unintentional injury or suicide (1.03; 95% CI, 0.53-2.01), and unexpected deaths (3.51; 95% CI, 1.54-7.96). The hazard ratio was 3.50 (95% CI, 1.35-9.11) for unexpected deaths not due to overdose and 4.29 (95% CI, 1.33-13.89) for deaths due to cardiovascular or metabolic causes. Neither the unadjusted nor adjusted incidence of death in the lower-dose group differed significantly from that in the control group.

**Conclusions and Relevance**: The findings suggest that antipsychotic use is associated with increased risk of unexpected death and appear to reinforce recommendations for careful prescribing and monitoring of antipsychotic treatment for children and youths and to underscore the need for larger antipsychotic treatment safety studies in this population

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#### JAMA Psychiatry. 2019 Mar;76:271-79.

A NATIONWIDE STUDY IN DENMARK OF THE ASSOCIATION BETWEEN TREATED INFECTIONS AND THE SUBSEQUENT RISK OF TREATED MENTAL DISORDERS IN CHILDREN AND ADOLESCENTS.

#### Kohler-Forsberg O, Petersen L, Gasse C, et al.

**Importance**: Infections have been associated with increased risks for mental disorders, such as schizophrenia and depression. However, the association between all infections requiring treatment and the wide range of mental disorders is unknown to date.

**Objective**: To investigate the association between all treated infections since birth and the subsequent risk of development of any treated mental disorder during childhood and adolescence.

**Design, Setting, and Participants**: Population-based cohort study using Danish nationwide registers. Participants were all individuals born in Denmark between January 1, 1995, and June 30, 2012 (N = 1098930). Dates of analysis were November 2017 to February 2018.

**Exposures**: All treated infections were identified in a time-varying manner from birth until June 30, 2013, including severe infections requiring hospitalizations and less severe infection treated with anti-infective agents in the primary care sector.

**Main Outcomes and Measures**: This study identified all mental disorders diagnosed in a hospital setting and any redeemed prescription for psychotropic medication. Cox proportional hazards regression was performed reporting hazard rate ratios (HRRs), including 95% CIs, adjusted for age, sex, somatic comorbidity, parental education, and parental mental disorders.

**Results**: A total of 1098930 individuals (51.3% male) were followed up for 9620807.7 person-years until a mean (SD) age of 9.76 (4.91) years. Infections requiring hospitalizations were associated with subsequent increased risk of having a diagnosis of any mental disorder (n = 42462) by an HRR of 1.84 (95% CI, 1.69-1.99) and with increased risk of redeeming a prescription for psychotropic medication (n = 56847) by an HRR of 1.42 (95% CI, 1.37-1.46). Infection treated with anti-infective agents was associated with increased risk of having a diagnosis of any mental disorder (HRR, 1.40; 95% CI, 1.29-1.51) and with increased risk of redeeming a prescription (HRR, 1.22; 95% CI, 1.18-1.26). Antibiotic use was associated with particularly increased risk estimates. The risk of mental disorders after infections increased in a dose-response association and with the temporal proximity of the last infection. In particular, schizophrenia spectrum disorders, obsessive-compulsive disorder, personality and behavior disorders, mental retardation, autistic spectrum disorder, attention-deficit/hyperactivity disorder, oppositional defiant disorder and conduct disorder, and tic disorders were associated with the highest risks after infections.

**Conclusions and Relevance**: Although the results cannot prove causality, these findings provide evidence for the involvement of infections and the immune system in the etiology of a wide range of mental disorders in children and adolescents

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#### JAMA Psychiatry. 2019 Mar;76:280-89.

### ASSOCIATION OF GENETIC RISK FACTORS FOR PSYCHIATRIC DISORDERS AND TRAITS OF THESE DISORDERS IN A SWEDISH POPULATION TWIN SAMPLE.

#### Taylor MJ, Martin J, Lu Y, et al.

**Importance**: Psychiatric traits associated with categorically defined psychiatric disorders are heritable and present to varying degrees in the general population. It is commonly assumed that diagnoses represent the extreme end of continuously distributed traits in the population, but this assumption has yet to be robustly tested for many psychiatric phenotypes.

**Objective**: To assess whether genetic risk factors associated with psychiatric disorders are also associated with continuous variation in milder population traits.

**Design, Setting, and Participants**: This study combined a novel twin analytic approach with polygenic risk score (PRS) analyses in a large population-based twin sample. Phenotypic and genetic data were available from the Child and Adolescent Twin Study in Sweden. Inpatient data were available for January 1, 1987, to December 31, 2014, and outpatient data for January 1, 2001, to December 31, 2013. The last day of follow-up was December 31, 2014. Data analysis was performed from January 1, 2017, to September 30, 2017.

**Main Outcomes and Measures**: Questionnaires that assessed traits of autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), learning difficulties, tic disorders (TDs), obsessive-compulsive disorder (OCD), anxiety, major depressive disorder (MDD), mania, and psychotic experiences were administered to a large Swedish twin sample. Individuals with clinical psychiatric diagnoses were identified using the Swedish National Patient Register. Joint categorical/continuous twin modeling was used to estimate genetic correlations between psychiatric diagnoses and continuous traits. The PRSs for psychiatric disorders were calculated based on independent discovery genetic data. The association between PRSs for each disorder and associated continuous traits was tested.

**Results**: Phenotype data were available for 13923 twin pairs (35.1% opposite sex and 31.7% same-sex females) at 9 years of age, 5165 pairs (36.9% opposite sex and 34.0% same-sex females) at 15 years of age, and 4273 pairs (36.5% opposite sex and 34.4% same-sex females) at 18 years of age. Genetic data were available for 13412 individuals (50.2% females). Twin genetic correlations between numerous psychiatric diagnoses and corresponding traits ranged from 0.31 to 0.69. Disorder PRSs were associated with related population traits for ASD (beta [SE] = 0.04 [0.01] at 9 years of age), ADHD (beta [SE] = 0.27 [0.03] at 9 years of age), TDs (beta [SE] = 0.02 [0.004] at 9 years of age), OCD (beta [SE] = 0.13 [0.05] at 18 years of age), anxiety (beta [SE] = 0.18 [0.08] at 9 years of age; beta [SE] = 0.07 [0.02] at 15 years of age; and beta [SE] = 0.40 [0.17] at 18 years of age), MDD (beta [SE] = 0.10 [0.03] at 9 years of age; beta [SE] = 0.11 [0.02] at 15 years of age; and beta [SE] = 0.41 [0.10] at 18 years of age), and schizophrenia (beta [SE] = 0.02 [0.01] at 18 years of age). Polygenic risk scores for depressive symptoms were associated with MDD diagnoses (odds ratio, 1.16; 95% CI, 1.02-1.32).

**Conclusions and Relevance**: These results suggest that genetic factors associated with psychiatric disorders are also associated with milder variation in characteristic traits throughout the general population for many psychiatric phenotypes. This study suggests that many psychiatric disorders are likely to be continuous phenotypes rather than the categorical entities currently defined in diagnostic manuals, which has strong implications for genetic research in particular

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Lancet Child Adolesc Health. 2019 Dec;3:844-45. ADHD DIAGNOSES: ARE 116 200 PERMUTATIONS ENOUGH? Cortese S, Rohde LA.

Lancet Child Adolesc Health. 2019 Jun;3:398-407.

OBESITY CLASS VERSUS THE EDMONTON OBESITY STAGING SYSTEM FOR PEDIATRICS TO DEFINE HEALTH RISK IN CHILDHOOD OBESITY: RESULTS FROM THE CANPWR CROSS-SECTIONAL STUDY.

Hadjiyannakis S, Ibrahim Q, Li J, et al.

**BACKGROUND**: Disease severity in paediatric obesity is usually defined using the body-mass index (BMI). Although informative at the population level, its usefulness on an individual level has limitations. The use of a clinical staging system-Edmonton Obesity Staging System for Pediatrics (EOSS-P)-in identifying health risk has been proposed. This study aimed to examine the association between BMI class and EOSS-P stage. **METHODS**: This cross-sectional study was done in children with obesity aged 5-17 years who enrolled in the Canadian Pediatric Weight Management Registry (CANPWR) between May 31, 2013, and Oct 27, 2017, involving ten multidisciplinary paediatric weight management clinics in Canada. We classified participants into WHO BMI classes (class I as 2-3 SD scores, class II as >3 SD scores, and class III as >4 SD scores above the WHO growth standard median), and applied the EOSS-P staging system (stages 0, 1, and 2/3) based on the clinical assessment of coexisting metabolic, mechanical, mental health, and social milieu issues. Clinical information was extracted from medical records and reported using standardised case report forms. Associations of BMI class with EOSS-P stage were examined in children with complete data.

**FINDINGS**: Of the 847 children with complete data, 546 (64%) had severe obesity based on BMI class (ie, class II or III) and 678 (80%) were EOSS-P stage 2/3. Stage 2/3 obesity-related health issues were common; mental health concerns were most common (520 [61%] of 847 children), followed by metabolic (349 [41%] of 847 children), social milieu (179 [21%] of 847 children), and mechanical (86 [10%] of 847 children) health issues. Mental health issues (eg, anxiety and attention-deficit hyperactivity disorder) were equally distributed across BMI classes, metabolic health issues were slightly more common in higher BMI classes, and mechanical (eg, musculoskeletal issues and sleep apnoea) and social milieu (eg, bullying and low household income) issues increased with increasing BMI class. Of children with class I obesity, 206 (76%) of 270 had overall EOSS-P stage 2/3, compared with 195 (85%) of 229 with class III obesity.

**INTERPRETATION**: Physical and mental health issues were highly prevalent among children with obesity irrespective of BMI class. Participants with class III obesity carried the greatest health risk across subcategories of the EOSS-P. As BMI class increased, a concomitant increased disease burden in mechanical and social milieu issues was observed, whereas metabolic and mental health risks were high across BMI classes.

**FUNDING**: Canadian Institutes of Health Research, Ontario Ministry of Health, McMaster University, and McMaster Children's Hospital

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Medicina (B Aires). 2019;79:57-61.

ATTENTION DEFICIT/HYPERACTIVITY DISORDER. STUDY HABITS.

Calleja-Perez B, Parraga JL, Albert J, et al.

Attention deficit / hyperactivity disorder (ADHD) is one of the most prevalent disorders in the child-youth population, with a known impact on learning and school performance. Lack of attention, associated executive dysfunction and comorbid problems -particularly those related to learning and anxiety-, strongly determine this conceptual domain. Affected youths have more problems for taking notes, completion of homework, school programming and less motivation to study. Despite greater dedication to homework and greater use of support resources, school failure and nonachievement of curricular objectives are more frequent in these patients. The early diagnosis of ADHD and its comorbidities, the adequate and individualized psychoeducational and pharmacological intervention, have been shown to improve academic prognosis in the short and long term. For this purpose, the active participation of health and education professionals is essential

#### Medicina (B Aires). 2019;79:72-76.

### TRANSITION OF ADOLESCENTS WITH ATTENTION DEFICIT/HYPERACTIVITY DISORDER. IMPLICATIONS FOR TREATMENT OF ADULTS.

#### Martinez-Raga J, Lopez-Cervero M.

Attention deficit hyperactivity disorder (ADHD) is a chronic, complex and multifactorial neurodevelopmental disorder associated with high rates of concurrent psychiatric disorders, along with problems and complications on different areas of individual functioning. ADHD is not exclusively a childhood disorder, 40-60% persisting into adulthood with an estimated prevalence of 2.5-5%. Adolescence is a stage where great and continuous changes occur, associated with a lower adherence to treatment, a greater vulnerability to the emergence of academic problems, more risk-behaviors, the onset of substance use and higher rates of other comorbid disorders. The transition to adult services or units also occurs at this stage, requiring greater coordination between child/adolescent and adult services to ensure continuity of care in a phase of life in which the patient is particularly vulnerable. As in the case of children and adolescents, the recommended treatment for adults with ADHD is the multimodal and multidisciplinary approach, that combines medication with psychological or psychosocial strategies, such as psycho-education, cognitive behavioral therapy or coaching, adapted to the individual needs of each patient. Clinical guidelines recommend psycho-stimulant drugs as first-line treatments for adult patients with ADHD

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#### Mol Psychiatry. 2019 Jul;24:1053-64.

SYNAPTIC AND TRANSCRIPTIONALLY DOWNREGULATED GENES ARE ASSOCIATED WITH CORTICAL THICKNESS DIFFERENCES IN AUTISM.

#### Romero-Garcia R, Warrier V, Bullmore ET, et al.

Differences in cortical morphology-in particular, cortical volume, thickness and surface area-have been reported in individuals with autism. However, it is unclear what aspects of genetic and transcriptomic variation are associated with these differences. Here we investigate the genetic correlates of global cortical thickness differences (DeltaCT) in children with autism. We used Partial Least Squares Regression (PLSR) on structural MRI data from 548 children (166 with autism, 295 neurotypical children and 87 children with ADHD) and cortical gene expression data from the Allen Institute for Brain Science to identify genetic correlates of DeltaCT in autism. We identify that these genes are enriched for synaptic transmission pathways and explain significant variation in DeltaCT. These genes are also significantly enriched for genes dysregulated in the autism post-mortem cortex (Odd Ratio (OR) = 1.11, Pcorrected 10(-14)), driven entirely by downregulated genes (OR = 1.87, Pcorrected 10(-15)). We validated the enrichment for downregulated genes in two independent data sets: Validation 1 (OR = 1.44, Pcorrected = 0.004) and Validation 2 (OR = 1.30; Pcorrected = 0.001). We conclude that transcriptionally downregulated genes implicated in autism are robustly associated with global changes in cortical thickness variability in children with autism

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#### Nat Hum Behav. 2019 Dec;3:1306-18. IDENTIFICATION OF NEUROBEHAVIOURAL SYMPTOM GROUPS BASED ON SHARED BRAIN MECHANISMS. Ing A, Samann PG, Chu C, et al.

Most psychopathological disorders develop in adolescence. The biological basis for this development is poorly understood. To enhance diagnostic characterization and develop improved targeted interventions, it is critical to identify behavioural symptom groups that share neural substrates. We ran analyses to find relationships between behavioural symptoms and neuroimaging measures of brain structure and function in adolescence. We found two symptom groups, consisting of anxiety/depression and executive dysfunction symptoms, respectively, that correlated with distinct sets of brain regions and inter-regional connections, measured by structural and functional neuroimaging modalities. We found that the neural correlates of these symptom groups were present before behavioural symptoms had developed. These neural correlates showed case-control differences in corresponding psychiatric disorders, depression and attention deficit hyperactivity disorder in independent clinical samples. By characterizing behavioural symptom groups based
on shared neural mechanisms, our results provide a framework for developing a classification system for psychiatric illness that is based on quantitative neurobehavioural measures

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### Neurobiol Dis. 2019 Oct;130:104479. Autism-associated NF1 deficiency disrupts corticocortical and corticostriatal functional connectivity in human and mouse.

#### Shofty B, Bergmann E, Zur G, et al.

Children with the autosomal dominant single gene disorder, neurofibromatosis type 1 (NF1), display multiple structural and functional changes in the central nervous system, resulting in neuropsychological cognitive abnormalities. Here we assessed the pathological functional organization that may underlie the behavioral impairments in NF1 using resting-state functional connectivity MRI. Coherent spontaneous fluctuations in the fMRI signal across the entire brain were used to interrogate the pattern of functional organization of corticocortical and corticostriatal networks in both NF1 pediatric patients and mice with a heterozygous mutation in the Nf1 gene (Nf1(+/-)). Children with NF1 demonstrated abnormal organization of cortical association networks and altered posterior-anterior functional connectivity in the default network. Examining the contribution of the striatum revealed that corticostriatal functional connectivity was altered. NF1 children demonstrated reduced functional connectivity between striatum and the frontoparietal network and increased striatal functional connectivity with the limbic network. Awake passive mouse functional connectivity MRI in Nf1(+/-) mice similarly revealed reduced posterior-anterior connectivity along the cingulate cortex as well as disrupted corticostriatal connectivity. The striatum of Nf1(+/-) mice showed increased functional connectivity to somatomotor and frontal cortices and decreased functional connectivity to the auditory cortex. Collectively, these results demonstrate similar alterations across species, suggesting that NF1 pathogenesis is linked to striatal dysfunction and disrupted corticocortical connectivity in the default network

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#### Neuropsychologia. 2019 Apr;127:84-92.

GIRLS' ATTENTIVE TRAITS ASSOCIATE WITH CEREBELLAR TO DORSAL ATTENTION AND DEFAULT MODE NETWORK CONNECTIVITY.

#### Rohr CS, Dimond D, Schuetze M, et al.

Attention traits are a cornerstone to the healthy development of children's performance in the classroom, their interactions with peers, and in predicting future success and problems. The cerebellum is increasingly appreciated as a region involved in complex cognition and behavior, and moreover makes important connections to key brain networks known to support attention: the dorsal attention and default mode networks (DAN; DMN). The cerebellum has also been implicated in childhood disorders affecting attention, namely autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD), suggesting that attention networks extending to the cerebellum may be important to consider in relation to attentive traits. Yet, direct investigations into the association between cerebellar FC and attentive traits are lacking. Therefore, in this study we examined attentive traits, assessed using parent reports of ADHD and ASD symptoms, in a community sample of 52 girls aged 4-7 years, i.e. around the time of school entry, and their association with cerebellar connections with the DAN and DMN. We found that cortico-cerebellar functional connectivity (FC) jointly and differentially correlated with attentive traits, through a combination of weaker and stronger FC across anterior and posterior DAN and DMN nodes. These findings suggest that cortico-cerebellar integration may play an important role in the manifestation of attentive traits

#### Nutrients. 2019 Oct;11.

### IS THERE AN OVERLAP BETWEEN EATING DISORDERS AND NEURODEVELOPMENTAL DISORDERS IN CHILDREN WITH OBESITY?

#### Wentz E, Bjork A, Dahlgren J.

This study aimed at assessing the prevalence of eating disorders (EDs) and ED symptomatology in children with obesity, and at investigating whether EDs occur more often among individuals with a comorbid attentiondeficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD). Seventy-six children (37 girls, 39 boys, age 5-16 years) were recruited at an outpatient obesity clinic. The adolescents completed ED instruments including The Eating Disorder Examination Questionnaire (EDE-Q) and The Eating Disorder Inventory for children (EDI-C). The parents of all participants were interviewed regarding the child's psychiatric morbidity. Diagnoses of ADHD and ASD were collected from medical records. Anthropometric data were compiled. Eight participants (11%) fulfilled the criteria for a probable ED and 16 participants (21%) had ADHD and/or ASD. Two adolescent girls had a probable ED and coexistent ADHD and ASD. No other overlaps between EDs and ADHD/ASD were observed. Loss of control (LOC) eating was present in 26 out of 40 (65%) adolescents, seven of whom had ADHD, ASD or both. LOC eating was not overrepresented among teenagers with ADHD and/or ASD. Weight and shape concerns were on a par with age-matched adolescents with EDs. EDs and ED behavior are more common among children/adolescents with obesity than in the general population. There is no substantial overlap between EDs and ADHD/ASD in adolescents with obesity

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#### Nutrients. 2019 Aug;11.

#### MILD-TO-MODERATE GESTATIONAL IODINE DEFICIENCY PROCESSING DISORDER.

#### Hay I, Hynes KL, Burgess JR.

This synopsis paper aims to identify if a common pattern of learning and social difficulties can be conceptualized across recent longitudinal studies investigating the influence of mild-to-moderate gestational iodine deficiency (GID) on offspring's optimal cognitive and psycho-social development. The main studies investigated are: The Southampton Women's Study (SWS)-United Kingdom: the Avon Longitudinal Study of Parents and Children (ALSPAC)-United Kingdom; the Gestational Iodine Cohort Longitudinal Study-Tasmania, Australia, and the Danish National Birth Cohort Case-Control Study-Denmark. In contrast to severe GID where there is a global negative impact on neurodevelopment, mild-to-moderate intrauterine iodine deficiency has subtler, but nonetheless important, permanent cognitive and psycho-social consequences on the offspring. This paper links the results from each study and maintains that mild-tomoderate GID is associated with a disorder that is characterized by speed of neural transmitting difficulties that are typically associated with working memory capacity difficulties and attention and response inhibition. The authors maintain that this disorder is better identified as Gestational lodine Deficiency Processing Disorder (GIDPD), rather than, what to date has often been identified as 'suboptimal development'. The Autistic Spectrum Disorder (ASD), Attention Deficit, Hyperactivity Disorder (ADHD), language and literacy disorders (learning disabilities and dyslexia) are the main manifestations associated with GIDPD. GIDPD is identified on IQ measures, but selectively and mainly on verbal reasoning IQ subtests, with individuals with GIDPD still operating within the 'normal' full-scale IQ range. Greater consideration needs to be given by public health professionals, policy makers and educators about the important and preventable consequences of GID. Specifically, more emphasis should be placed on adequate iodine intake in women prior to pregnancy, as well as during pregnancy and when lactating. Secondly, researchers and others need to further extend, refine and clarify whether GIDPD, as a nosological (medical classification) entity, is a valid disorder and concept for consideration

#### Optom Vis Sci. 2019 Sep;96:655-63.

### VISUAL PERCEPTUAL SKILLS IN ATTENTION-DEFICIT/HYPERACTIVITY DISORDER CHILDREN: THE MEDIATING ROLE OF COMORBIDITIES.

#### Redondo B, Molina R, Cano-Rodriguez A, et al.

**SIGNIFICANCE**: Attention-deficit/hyperactivity disorder (ADHD) has been commonly associated with alterations in visual perception. However, the individual behavior of visual perceptual skills and its relationship with different comorbidities remain unknown.

**PURPOSE**: The purpose of this study was to examine whether visual perceptual skills are impaired in children with ADHD, as well as to test the possible mediating role of comorbidities.

**METHODS**: Thirty-five nonmedicated ADHD (20 pure and 15 with comorbidities) and 35 age-matched controls completed the performance-based Test of Visual Perceptual Skills.

**RESULTS**: The analysis between total ADHD and controls favored the alternative hypothesis (greater values for children with ADHD) for visual memory, spatial relationships, sequential memory, and all the composite measures (Bayes factor [BF] range, 4.26 to 366.85). The analysis between pure ADHD and controls showed that data are more likely under the alternative hypothesis for spatial relationships, sequential memory, overall, basic, and sequencing (BF range, 3.82 to 21.71), whereas the comparison between ADHD with comorbidities and controls additionally favored the alternative hypothesis for visual discrimination (BF = 5.37). Lastly, data from the comparison between pure ADHD and ADHD with comorbidities were insensitive for favoring the null or alternative hypotheses in any subtest or composite scaled score (BF range, 0.33 to 0.66).

**CONCLUSIONS**: Our results suggest that some specific patterns of visual perception are altered in ADHD, especially for the total ADHD group. The current findings also evidence that comorbidities play an important role in the association between ADHD and visual perceptual skills. Future studies should address the mediating role of each specific type of comorbidity

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#### Otol Neurotol. 2019 Jul;40:754-60.

COMPREHENSIVE ANALYSIS OF FACTORS LEADING TO POOR PERFORMANCE IN PRELINGUAL COCHLEAR IMPLANT RECIPIENTS.

#### Panda S, Sikka K, Singh V, et al.

**OBJECTIVE**: To comprehensively analyze the prognostic factors responsible for affecting outcomes following cochlear implantation in prelinguals.

STUDY DESIGN: Retrospective cohort study from June 2004 to November 2015.

**SETTING**: Tertiary care center.

**PATIENTS**: Patients who had undergone cochlear implantation during June 2004 to November 2015 for prelingual sensorineural hearing loss with a minimum follow-up of 2 years.

**INTERVENTION**: Patients were evaluated for the presence of 20 risk factors possibly influencing postimplantation outcomes using a questionnaire.

**MAIN OUTCOME MEASURES**: Assessment for speech and auditory function was done at the last follow-up with speech intelligibility ratings (SIR) and categories of auditory performance (CAP) scores, respectively.

**RESULTS**: One hundred fifty-one patients were included in this study. On univariate analysis for CAP, age at implantation, noncompliance to pre and postimplantation auditory and speech habilitation, poor parental motivation, socioeconomic status and literacy were found to be associated with lower scores (p < 0.05). Whereas, for SIR, additionally, attention deficit hyperactivity disorder and inner ear malformation were statistically significant negative predictors on univariate analysis. Finally, factors responsible for low CAP scores on multivariate analysis were poor parental literacy, poor socioeconomic status, irregular pre/postimplantation rehabilitation, and attention deficit hyperactivity disorder. While for SIR, additionally age at implantation was also a significant negative predictor. Increasing IQ and duration of implant use were associated with higher CAP (univariate) and SIR scores (univariate and multivariate) (p < 0.05).

**CONCLUSION**: We were able to demonstrate negative impact of higher age at implantation, minimal cognitive disorder, adverse parental/socioeconomic profile, and poor compliance to pre/postimplantation auditory verbal habilitation on auditory and speech outcomes

### TOURETTE'S SYNDROME IS ASSOCIATED WITH AN INCREASED RISK OF TRAUMATIC BRAIN INJURY: A NATIONWIDE POPULATION-BASED COHORT STUDY.

#### Chen SF, Su YC, Wang LY, et al.

**INTRODUCTION**: Violent motor tics or severe self-harm behaviors have been reported in patients with Tourette's syndrome (TS) and leading to traumatic brain injury (TBI). The study aimed to determine the risk of TBI in TS patients, the effects associated with concurrent psychiatric disorders (attention-deficit/hyperactivity disorder (ADHD), obsessive-compulsive disorder (OCD), or depressive disorder), and the effects of medication treatment (antipsychotics, antidepressants, or clonidine) on the risk of TBI.

**METHODS**: Using the National Health Insurance Research Database of Taiwan, 2261TS patients and 20349 non-TS controls matched by gender and age were enrolled between 2000 and 2012, and followed until the end of 2013. Participants who developed TBI during the follow-up period were identified. Cox regression analysis was performed to examine the risk of TBI between TS patients and non-TS controls.

**RESULTS**: TS patients were associated with an increased risk of TBI compared to non-TS controls (hazard ratio (HR): 1.59, 95% confidence interval (95% CI): 1.37-1.85). Also, this study revealed TS patients with ADHD, OCD, or depressive disorder predicted a higher TBI incidence rate than those who did not, but the estimate was not statistically significant. Moreover, this study found that TS patients with frequent use of antipsychotics were associated with a lower risk of TBI than infrequent users (HR: 0.76, 95% CI: 0.57-0.99). **CONCLUSIONS**: This study highlights the need to pay more attention to the risk of TBI in TS patients, and the importance of adequate antipsychotic medication may reduce the risk of TBI

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#### Pediatr Clin North Am. 2019 Dec;66:1109-20.

#### PRESCRIPTION STIMULANTS: FROM COGNITIVE ENHANCEMENT TO MISUSE.

#### Wilens TE, Kaminski TA.

The nonmedical use of prescription stimulants has become increasingly pervasive among transitional age youth (TAY), aged 16 years to 26 years. Although therapeutically administered stimulants are regarded as safe and effective in TAY with attention-deficit/hyperactivity syndrome (ADHD), stimulant misuse is of concern due to prevalence, behavioral health and substance use correlates, and negative short-term and long-term outcomes. Although academic motivations primarily drive misuse, it is unclear whether prescription ADHD stimulants enhance cognition. Providers are advised to exercise precautions when prescribing ADHD medications, enhance surveillance for misuse, and screen those with misuse for ADHD and other psychopathology, executive dysfunction, and substance use disorders

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Pediatrics. 2019 Nov;144.

MENTAL HEALTH CONDITIONS AND HYPERTHYROIDISM.

#### Zader SJ, Williams E, Buryk MA.

**OBJECTIVES**: To evaluate the proportion of pediatric patients with concurrent diagnoses of hyperthyroidism and mental health conditions (MHCs) by using the Military Health System database. We hypothesized that the prevalence of mental health disorders would be higher in patients with hyperthyroidism compared with in the nonhyperthyroid population.

**METHODS**: The prevalence of hyperthyroidism and MHCs was calculated by using data extracted from the Military Health System Data Repository on military beneficiaries between 10 and 18 years old who were eligible to receive care for at least 1 month during fiscal years 2008 through 2016. Prevalence ratios were used to compare MHC diagnoses in those with versus without a diagnosis of hyperthyroidism.

**RESULTS**: There were 1894 female patients and 585 male patients diagnosed with hyperthyroidism during the study period. Prevalence ratios for MHCs in those with versus without hyperthyroidism ranged from 1.7 (attention-deficit/hyperactivity disorder [ADHD]) to 4.9 (bipolar disorder). Strikingly, suicidality was nearly 5 times more likely in patients diagnosed with hyperthyroidism than in patients who were never diagnosed with hyperthyroidism. For each of the MHCs examined, with the exception of suicidality, the MHC diagnosis was

more commonly made before the diagnosis of hyperthyroidism, with the highest proportion of patients being diagnosed with ADHD before receiving a diagnosis of hyperthyroidism (68.3%).

**CONCLUSIONS**: There is a clear association between hyperthyroidism and each of the following MHCs: ADHD, adjustment disorder, anxiety, bipolar disorder, depression, and suicidality. This study highlights the need to consider this association when evaluating patients with overlapping symptoms and for effective mental health screening tools and resources for clinicians

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Pharmacol Biochem Behav. 2019 Jul;182:22-34.

NEUROINFLAMMATION AS A RISK FACTOR FOR ATTENTION DEFICIT HYPERACTIVITY DISORDER. Dunn GA, Nigg JT, Sullivan EL.

Attention Deficit Hyperactivity Disorder (ADHD) is a persistent, and impairing pediatric-onset neurodevelopmental condition. Its high prevalence, and recurrent controversy over its widespread identification and treatment, drive strong interest in its etiology and mechanisms. Emerging evidence for a role for neuroinflammation in ADHD pathophysiology is of great interest. This evidence includes 1) the abovechance comorbidity of ADHD with inflammatory and autoimmune disorders, 2) initial studies indicating an association with ADHD and increased serum cytokines, 3) preliminary evidence from genetic studies demonstrating associations between polymorphisms in genes associated with inflammatory pathways and ADHD, 4) emerging evidence that early life exposure to environmental factors may increase risk for ADHD via an inflammatory mechanism, and 5) mechanistic evidence from animal models of maternal immune activation documenting behavioral and neural outcomes consistent with ADHD. Prenatal exposure to inflammation is associated with changes in offspring brain development including reductions in cortical gray matter volume and the volume of certain cortical areas -parallel to observations associated with ADHD. Alterations in neurotransmitter systems, including the dopaminergic, serotonergic and glutamatergic systems, are observed in ADHD populations. Animal models provide strong evidence that development and function of these neurotransmitters systems are sensitive to exposure to in utero inflammation. In summary, accumulating evidence from human studies and animal models, while still incomplete, support a potential role for neuroinflammation in the pathophysiology of ADHD. Confirmation of this association and the underlying mechanisms have become valuable targets for research. If confirmed, such a picture may be important in opening new intervention routes

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#### PLoS Med. 2019 Dec;16:e1002995.

MENTAL DISORDERS AND INTIMATE PARTNER VIOLENCE PERPETRATED BY MEN TOWARDS WOMEN: A SWEDISH POPULATION-BASED LONGITUDINAL STUDY.

#### Yu R, Nevado-Holgado AJ, Molero Y, et al.

**BACKGROUND**: Intimate partner violence (IPV) against women is associated with a wide range of adverse outcomes. Although mental disorders have been linked to an increased risk of perpetrating IPV against women, the direction and magnitude of the association remain uncertain. In a longitudinal design, we examined the association between mental disorders and IPV perpetrated by men towards women in a population-based sample and used sibling comparisons to control for factors shared by siblings, such as genetic and early family environmental factors.

**METHODS AND FINDINGS**: Using Swedish nationwide registries, we identified men from 9 diagnostic groups over 1998-2013, with sample sizes ranging from 9,529 with autism to 88,182 with depressive disorder. We matched individuals by age and sex to general population controls (ranging from 186,017 to 1,719,318 controls), and calculated the hazard ratios of IPV against women. We also estimated the hazard ratios of IPV against women in unaffected full siblings (ranging from 4,818 to 37,885 individuals) compared with the population controls. Afterwards, we compared the hazard ratios for individuals with psychiatric diagnoses with those for siblings using the ratio of hazard ratios (RHR). In sensitivity analyses, we examined the contribution of previous IPV against women and common psychiatric comorbidities, substance use disorders and personality disorders. The average follow-up time across diagnoses ranged from 3.4 to 4.8 years. In

comparison to general population controls, all psychiatric diagnoses studied except autism were associated with an increased risk of IPV against women in men, with hazard ratios ranging from 1.5 (95% CI 1.3-1.7) to 7.7 (7.2-8.3) (p-values < 0.001). In sibling analyses, we found that men with depressive disorder, anxiety disorder, alcohol use disorder, drug use disorder, attention deficit hyperactivity disorder, and personality disorders had a higher risk of IPV against women than their unaffected siblings, with RHR values ranging from 1.7 (1.3-2.1) to 4.4 (3.7-5.2) (p-values < 0.001). Sensitivity analyses showed higher risk of IPV against women in men when comorbid substance use disorders and personality disorders were present, compared to risk when these comorbidities were absent. In addition, increased IPV risk was also found in those without previous IPV against women. The absolute rates of IPV against women ranged from 0.1% to 2.1% across diagnoses over 3.4 to 4.8 years. Individuals with alcohol use disorders (1.7%, 1,406/82,731) and drug use disorders (2.1%, 1,216/57,901) had the highest rates. Our analyses were restricted to IPV leading to arrest, suggesting that the applicability of our results may be limited to more severe forms of IPV perpetration.

**CONCLUSIONS**: Our results indicate that most of the studied mental disorders are associated with an increased risk of perpetrating IPV towards women, and that substance use disorders, as principal or comorbid diagnoses, have the highest absolute and relative risks. The findings support the development of IPV risk identification and prevention services among men with substance use disorders as an approach to reduce the prevalence of IPV

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#### PLoS ONE. 2019;14:e0222806.

### RECONSIDERING THE ASSOCIATIONS BETWEEN SELF-REPORTED ALCOHOL USE DISORDER AND MENTAL HEALTH PROBLEMS IN THE LIGHT OF CO-OCCURRING ADDICTIONS IN YOUNG SWISS MEN.

#### Marmet S, Studer J, Lemoine M, et al.

**BACKGROUND**: Alcohol use disorder (AUD) is known to co-occur with other addictions, as well as with mental health problems. However, the effects of other addictions co-occurring with AUD on mental health problems were rarely studied and not considering them may bias estimates of the association between AUD and mental health problems. This study investigated which role co-occurring addictions play for the cross-sectional associations between self-reported AUD and mental health problems.

**METHOD**: Participants were 5516 young Swiss men (73.0% of those that gave written informed consent) who completed a self-report questionnaire. Using short screening questionnaires, we assessed three substance use disorders (alcohol, cannabis and tobacco), seven behavioural addictions (internet, gaming, smartphone, internet sex, gambling, work, exercise) and four mental health problems (major depression, bipolar disorder, attention deficit hyperactivity disorder (ADHD) and social anxiety disorder). Differences in the proportions of mental health problems were tested using logistic regressions between (1) participants with no AUD and AUD and AUD, (2) participants with no AUD and AUD alone and (3) participants with no AUD and AUD plus at least one co-occurring addiction.

**RESULTS**: Overall, (1) participants with AUD had higher proportions of major depression (Odds ratio (OR [95% confidence interval]) = 3.51 [2.73, 4.52]; ADHD (OR = 3.12 [2.41, 4.03]); bipolar disorder (OR = 4.94 [3.38, 7.21]) and social anxiety (OR = 2.21 [1.79, 2.73])) compared to participants with no AUD. Considering only participants with AUD alone compared to participants with no AUD (2), differences in proportions were no longer significant for major depression (OR = 0.83 [0.42, 1.64]), bipolar disorder (OR = 1.69 [0.67, 4.22]), social anxiety (OR = 1.15 [0.77, 1.73]) and ADHD (OR = 1.65 [1.00, 2.72]) compared to participants with no AUD. In contrast, (3) proportions of mental health problems were considerably higher for participants with AUD plus at least one other addiction when compared to participants with no AUD, with OR's ranging from 2.90 [2.27, 3.70] for social anxiety, 4.03 [3.02, 5.38] for ADHD, 5.29 [4.02, 6.97] for major depression to 6.64 [4.44, 9.94] for bipolar disorder.

**CONCLUSIONS**: AUD was associated with all four measured mental health problems. However, these associations were mainly due to the high proportions of these mental health problems in participants with AUD plus at least one co-occurring addiction and only to a lesser degree due to participants with AUD alone (i.e. without any other co-occurring addictions). Hence, estimates of the association between AUD and mental health problems that do not consider other addictions may be biased (i.e. overestimated). These findings imply that considering addictions co-occurring with AUD, including behavioural addictions, is

important when investigating associations between AUD and mental health problems, and for the treatment of AUD and co-morbid disorders

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#### PLoS ONE. 2019;14:e0218469.

ATTENTION DEFICIT HYPERACTIVITY DISORDER AND FUTURE ALCOHOL OUTCOMES: EXAMINING THE ROLES OF COPING AND ENHANCEMENT DRINKING MOTIVES AMONG YOUNG MEN.

#### Grazioli VS, Gmel G, Rougemont-Bucking A, et al.

**OBJECTIVE**: Although there is evidence that Attention Deficit Hyperactivity Disorder (ADHD) symptoms are positively related to alcohol use and related problems among young adults, little research has examined the mechanisms that might explain this association. In response, this study examined the mediating effects of coping and enhancement drinking motives on the prospective associations between ADHD symptoms and alcohol outcomes.

**METHOD**: Participants (N = 4,536) were young men from the Cohort Study on Substance Use Risk Factors. Measures of ADHD symptoms and those of drinking motives, heavy episodic drinking (HED) and alcohol use disorder symptoms were used from the baseline and 15-month follow-up assessments.

**RESULTS**: Findings indicated that the associations of ADHD-inattention symptoms with alcohol use disorder (AUD) symptoms and with HED were partially and completely mediated through drinking motives, respectively, whereas drinking motives did not mediate the ADHD-hyperactivity/impulsivity-symptoms-alcohol outcomes associations.

**CONCLUSION**: Results indicated that coping and enhancement motives partially explained the ADHDinattention symptoms-subsequent alcohol outcomes association. These findings suggest that interventions targeting enhancement and coping motives may help prevent problematic drinking among young men with elevated ADHD-inattention symptoms

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#### PLoS ONE. 2019;14:e0201939.

**OPPOSING EFFECTS OF IMPULSIVITY AND MINDSET ON SOURCES OF SCIENCE SELF-EFFICACY AND STEM INTEREST IN ADOLESCENTS.** 

#### Marriott LK, Coppola LA, Mitchell SH, et al.

Impulsivity has been linked to academic performance in the context of Attention Deficit Hyperactivity Disorder, though its influence on a wider spectrum of students remains largely unexplored, particularly in the context of STEM learning (i.e. science, technology, engineering, and math). STEM learning was hypothesized to be more challenging for impulsive students, since it requires the practice and repetition of tasks as well as concerted attention to task performance. Impulsivity was assessed in a cross-sectional sample of 2,476 students in grades 6-12. Results show impulsivity affects a larger population of students, not limited to students with learning disabilities. Impulsivity was associated with lower sources of self-efficacy for science (SSSE), interest in most STEM domains (particularly math), and self-reported STEM skills. The large negative effect size observed for impulsivity was opposed by higher mindset, which describes a student's belief in the importance of effort when learning is difficult. Mindset had a large positive effect size associated with greater SSSE, STEM interest, and STEM skills. When modeled together, results offer that mindset interventions may benefit impulsive students who struggle with STEM. Together, these data suggest important interconnected roles for impulsivity and mindset that can influence secondary students' STEM trajectories

#### PLoS ONE. 2019;14:e0225529.

## A DAILY DIARY STUDY ON MALADAPTIVE DAYDREAMING, MIND WANDERING, AND SLEEP DISTURBANCES: EXAMINING WITHIN-PERSON AND BETWEEN-PERSONS RELATIONS.

#### Marcusson-Clavertz D, West M, Kjell ONE, et al.

Cross-sectional and experimental research have shown that task-unrelated thoughts (i.e., mind wandering) relate to sleep disturbances, but there is little research on whether this association generalizes to the daylevel and other kinds of task-unrelated mentation. We employed a longitudinal daily diary design to examine the within-person and between-person associations between three self-report instruments measuring mind wandering, maladaptive daydreaming (a condition characterized by having elaborate fantasy daydreams so insistent that they interfere with daily functioning) and sleep disturbances. A final sample of 126 participants self-identified as experiencing maladaptive daydreaming completed up to 8 consecutive daily reports (in total 869 daily observations). The scales showed acceptable-to-excellent within-person reliability (i.e., systematic day-to-day change) and excellent between-person reliability. The proportion of between-person variance was 36% for sleep disturbances, 57% for mind wandering, and 75% for maladaptive daydreaming, respectively (the remaining being stochastic and systematic within-person variance). Contrary to our pre-registered hypothesis, maladaptive daydreaming did not significantly predict sleep disturbances the following night, B = -0.00 (SE = 0.04), p = .956. Exploratory analyses indicated that while nightly sleep disturbances predicted mind wandering the following day, B = 0.20 (SE = 0.04), p < .001, it did not significantly predict maladaptive daydreaming the following day, B = -0.04 (SE = 0.05), p = .452. Moreover, daily mind wandering did not significantly predict sleep disturbances the following night, B = 0.02 (SE = 0.05), p = .731. All variables correlated at the between-person level. We discuss the implications concerning the differences between maladaptive daydreaming and mind wandering and the possibility of targeting sleep for mind wandering interventions

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#### PLoS ONE. 2019;14:e0219778.

### USE AND VALIDITY OF CHILD NEURODEVELOPMENT OUTCOME MEASURES IN STUDIES ON PRENATAL EXPOSURE TO PSYCHOTROPIC AND ANALGESIC MEDICATIONS - A SYSTEMATIC REVIEW.

#### Hjorth S, Bromley R, Ystrom E, et al.

In recent years there has been increased attention to child neurodevelopment in studies on medication safety in pregnancy. Neurodevelopment is a multifactorial outcome that can be assessed by various assessors. using different measures. This has given rise to a debate on the validity of various measures of neurodevelopment. The aim of this review was twofold. Firstly we aimed to give an overview of studies on child neurodevelopment after prenatal exposure to central nervous system acting medications using psychotropics and analgesics as examples, giving special focus on the use and validity of outcome measures. Secondly, we aimed to give guidance on how to conduct and interpret medication safety studies with neurodevelopment outcomes. We conducted a systematic review in the MEDLINE, Embase, PsycINFO, Web of Science, Scopus, and Cochrane databases from inception to April 2019, including controlled studies on prenatal exposure to psychotropics or analgesics and child neurodevelopment, measured with standardised psychometric instruments or by diagnosis of neurodevelopmental disorder. The review management tool Covidence was used for data-extraction. Outcomes were grouped as motor skills, cognition, behaviour, emotionality, or "other". We identified 110 eligible papers (psychotropics, 82 papers, analgesics, 29 papers). A variety of neurodevelopmental outcome measures were used, including 27 different psychometric instruments administered by health care professionals, 15 different instruments completed by parents, and 13 different diagnostic categories. In 23 papers, no comments were made on the validity of the outcome measure. In conclusion, establishing neurodevelopmental safety includes assessing a wide variety of outcomes important for the child's daily functioning including motor skills, cognition, behaviour, and emotionality, with valid and reliable measures from infancy through to adolescence. Consensus is needed in the scientific community on how neurodevelopment should be assessed in medication safety in pregnancy studies. Review registration number: CRD42018086101 in the PROSPERO database

## ADHD, STIGMA AND CONTINUUM BELIEFS: A POPULATION SURVEY ON PUBLIC ATTITUDES TOWARDS CHILDREN AND ADULTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER.

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

ADHD is a mental illness of high epidemiological and clinical importance, embedded in a complex sociocultural context. We estimated the prevalence of attitudes related to ADHD in a representative population survey in Germany (n=1008) after presenting an unlabelled vignette of a child or an adult with ADHD. Relations of personal experience, interpersonal contact and continuum beliefs with emotions and social distance were calculated using path models. About two-thirds of the German public indicated they believe in a continuum of ADHD symptoms, and half stated that they know somebody among family or close friends with a comparable problem. About one-quarter of respondents felt annoyed by the depicted person. While an adult with ADHD was most frequently accepted as a work colleague or neighbor, about one-quarter of the German general population rejected renting a room or giving a job recommendation. Personal Experience (both vignettes) and contact (adult vignette) were related to a higher belief in a continuum of symptoms, while explanation of variance was low. A belief in a continuum of symptoms was related to more pro-social reactions and less social distance. This study indicates that emphasizing aspects of a continuum of symptoms should be considered within the disorder model of ADHD

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#### Psychol Assess. 2019 Nov;31:1357-67.

# PROPOSED SPECIFIERS FOR CONDUCT DISORDER (PSCD): PRELIMINARY VALIDATION OF THE PARENT VERSION IN A SPANISH SAMPLE OF PRESCHOOLERS.

#### Lopez-Romero L, Romero E, Colins OF, et al.

The Proposed Specifiers for Conduct Disorder (PSCD) scale (Salekin & Hare, 2016) was developed as a measure of the broader construct of psychopathy in childhood and adolescence. In addition to conduct disorder (CD) symptoms, the PSCD addresses the interpersonal (grandiose-manipulative), affective (callousunemotional), and lifestyle (daring-impulsive) traits of psychopathic personality. The PSCD can be scored by parents and teachers. The present study is a preliminary test of the psychometric properties of the PSCD-Parent Version in a sample of 2,229 children aged 3 to 6 years. Confirmatory factor analyses supported both a 3- and 4-factor structure being invariant across gender groups. The validity of the PSCD was also supported by convergent-divergent associations with an alternative measure of psychopathic traits as well as by the expected relations with fearlessness, conduct problems, reactive and proactive aggression, attention-deficit hyperactivity disorder and oppositional defiant disorder symptoms, and social competence skills. Overall, the PSCD is a promising alternative measure for assessing early manifestation of the broader construct of psychopathy in children. Its use should facilitate discussion of the conceptualization, assessment, predictive value, and clinical usefulness of the psychopathic construct as it relates to CD at early developmental stages

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Psychol Med. 2019 Jan;49:287-94.

A LONGITUDINAL STUDY ON PSYCHOSOCIAL CAUSES AND CONSEQUENCES OF INTERNET GAMING DISORDER IN ADOLESCENCE.

#### Wartberg L, Kriston L, Zieglmeier M, et al.

**BACKGROUND**: In 2013, Internet gaming disorder (IGD) was incorporated in the current version of the DSM-5. IGD refers to a problematic use of video games. Longitudinal studies on the etiology of IGD are lacking. Furthermore, it is currently unclear to which extent associated psychopathological problems are causes or consequences of IGD. In the present survey, longitudinal associations between IGD and adolescent and parental mental health were investigated for the first time, as well as the temporal stability of IGD.

**METHODS**: In a cross-lagged panel design study, family dyads (adolescent with a parent each) were examined in 2016 (t1) and again 1 year later (2017, t2). Overall, 1095 family dyads were assessed at t1 and 985 dyads were re-assessed at t2 with standardized measures of IGD and several aspects of adolescent and parental mental health. Data were analyzed with structural equation modeling (SEM).

**RESULTS**: Male gender, a higher level of hyperactivity/inattention, self-esteem problems and IGD at t1 were predictors of IGD at t2. IGD at t1 was a predictor for adolescent emotional distress at t2. Overall, 357 out of the 985 adolescents received a diagnosis of IGD at t1 or t2: 142 (14.4%) at t1 and t2, 100 (10.2%) only at t1, and 115 (11.7%) only at t2.

**CONCLUSIONS**: Hyperactivity/inattention and self-esteem problems seem to be important for the development of IGD. We found first empirical evidence that IGD could prospectively contribute to a deterioration of adolescent mental health. Only a subgroup of affected adolescents showed IGD consistently over 1 year

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Psychol Med. 2019 Jan;49:217-23.

LONG-TERM EFFECTS OF STIMULANT TREATMENT ON ADHD SYMPTOMS, SOCIAL-EMOTIONAL FUNCTIONING, AND COGNITION.

#### Schweren L, Hoekstra P, Van LM, et al.

**BACKGROUND**: Methodological and ethical constraints have hampered studies into long-term lasting outcomes of stimulant treatment in individuals with attention-deficit/hyperactivity disorder (ADHD). Lasting effects may be beneficial (i.e. improved functioning even when treatment is temporarily ceased) or detrimental (i.e. worse functioning while off medication), but both hypotheses currently lack empirical support. Here we investigate whether stimulant treatment history predicts long-term development of ADHD symptoms, social-emotional functioning or cognition, measured after medication wash-out.

**METHODS**: ADHD symptoms, social-emotional functioning and cognitive test performance were measured twice, 6 years apart, in two ADHD groups (stimulant-treated versus not stimulant-treated between baseline and follow-up). Groups were closely matched on baseline clinical and demographic variables (n = 148, 58% male, age = 11.1). A matched healthy control group was included for reference.

**RESULTS**: All but two outcome measures (emotional problems and prosocial behaviour) improved between baseline and follow-up. Improvement over time in the stimulant-treated group did not differ from improvement in the not stimulant-treated group on any outcome measure.

**CONCLUSIONS**: Stimulant treatment is not associated with the long-term developmental course of ADHD symptoms, social-emotional functioning, motor control, timing or verbal working memory. Adolescence is characterised by clinical improvement regardless of stimulant treatment during that time. These findings are an important source to inform the scientific and public debate

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Psychol Med. 2019 Jan;49:84-91.

ATTENTION-DEFICIT/HYPERACTIVITY DISORDER AND RISK FOR PSYCHIATRIC AND NEURODEVELOPMENTAL DISORDERS IN SIBLINGS.

#### Jokiranta-Olkoniemi E, Cheslack-Postava K, Joelsson P, et al.

**BACKGROUND**: Probands with attention-deficit/hyperactivity disorder (ADHD) are at increased risk for several psychiatric and neurodevelopmental disorders. The risk of these disorders among the siblings of probands has not been thoroughly assessed in a population-based cohort.

**METHODS**: Every child born in Finland in 1991-2005 and diagnosed with ADHD in 1995-2011 were identified from national registers. Each case was matched with four controls on sex, place, and date of birth. The full siblings of the cases and controls were born in 1981-2007 and diagnosed in 1981-2013. In total, 7369 cases with 12 565 siblings and 23 181 controls with 42 753 siblings were included in the analyses conducted using generalized estimating equations.

**RESULTS**: 44.2% of the cases and 22.2% of the controls had at least one sibling diagnosed with any psychiatric or neurodevelopmental disorder (risk ratio, RR = 2.1; 95% CI 2.0-2.2). The strongest associations were demonstrated for childhood-onset disorders including ADHD (RR = 5.7; 95% CI 5.1-6.3), conduct and oppositional disorders (RR = 4.0; 95% CI 3.5-4.5), autism spectrum disorders (RR = 3.9; 95% CI 3.3-4.6), other emotional and social interaction disorders (RR = 2.7; 95% CI 2.4-3.1), learning and coordination disorders (RR = 2.6; 95% CI 2.4-2.8), and intellectual disability (RR = 2.4; 95% CI 2.0-2.8). Also, bipolar

disorder, unipolar mood disorders, schizophrenia spectrum disorders, other neurotic and personality disorders, substance abuse disorders, and anxiety disorders occurred at increased frequency among the siblings of cases.

**CONCLUSIONS**: The results offer potential utility for early identification of neurodevelopmental and psychiatric disorders in at-risk siblings of ADHD probands and also argue for more studies on common etiologies

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#### Psychol Serv. 2019 Nov;16:596-604.

### THE QUALITY OF ASSESSMENTS FOR CHILDHOOD PSYCHOPATHOLOGY WITHIN A REGIONAL MEDICAL CENTER. *Sattler AF, Leffler JM, Harrison NL, et al.*

Accurate assessment is essential to implementing effective mental health treatment; however, little research has explored child clinicians' assessment practices in applied settings. The current study thus examines practitioners' use of evidence-based assessment (EBA) instruments (i.e., self-report measures and structured interviews), specificity of identified diagnoses (i.e., use of specific diagnostic labels vs. nonstandardized labels, not otherwise specified [NOS] diagnoses, and adjustment disorder diagnoses), and documentation of Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev., DSM-IV-TR, American Psychiatric Association, 2000) criteria. Use of these practices was evaluated via analysis of documentation contained within a regional medical center's medical records. This analysis was limited to 2,499 session notes from patient appointments associated with psychiatric disorders newly diagnosed during 2013. In total, session notes were linked to 694 children aged 7 to 17. Results indicated that EBA use was low overall, although self-report measures were utilized relatively frequently versus structured interviews. Diagnostic specificity was also low overall and clinicians rarely documented full diagnostic criteria; however, EBA use was associated with increased diagnostic specificity. Further, clinicians practicing in psychological, psychiatric, and primary care settings were more likely to use self-report measures as compared to those practicing in an integrated behavioral health social work setting. In addition, structured interviews were most likely to be utilized by clinicians practicing in a psychological services setting. Finally, clinicians were more likely to use self-report measures when the identified primary concern was a mood disorder or attentiondeficit/hyperactivity disorder (ADHD). Based on these results, we provide suggestions and references to resources for clinicians seeking to improve the quality of their assessments via implementation of EBA

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Res Dev Disabil. 2019 Oct;93:103463.

ASSOCIATIONS BETWEEN PARENTING STRESS, PARENT MENTAL HEALTH AND CHILD SLEEP PROBLEMS FOR CHILDREN WITH ADHD AND ASD: SYSTEMATIC REVIEW.

#### Martin CA, Papadopoulos N, Chellew T, et al.

**BACKGROUND**: Children with attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) experience high rates of sleep problems. Their parents experience higher parenting stress and more mental health difficulties than parents of typically developing children.

**AIM**: To examine the association between child sleep problems, parenting stress and parent mental health for children with ADHD or ASD.

**METHODS**: MEDLINE Complete, EMBASE, PsycINFO and CINAHL Complete databases were searched. Studies needed to include: children aged 5-18 with ADHD or ASD, a child sleep measure, and a parenting stress or adult mental health measure. RESULTS: Eleven studies were identified (four ADHD, seven ASD). Six studies examined parenting stress (five cross-sectional, one longitudinal) and five found associations, of varying strengths, with child sleep problems. Six studies examined parent mental health (four cross-sectional, two longitudinal) and five found associations, of differing magnitudes, with child sleep problems.

**CONCLUSIONS**: These studies demonstrate child sleep problems are associated with poorer parent mental health and higher parenting stress.

**IMPLICATIONS**: Future longitudinal research including multiple measurements of child sleep problems and family functioning is required to clarify the directionality of associations. Such knowledge is key in adapting sleep interventions to better meet the needs of children with ADHD or ASD and their families

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#### Res Social Adm Pharm. 2019 Sep;15:1095-101.

A QUALITATIVE STUDY EXPLORING THE DECISION OF PARENTS TO USE MEDICATION IN ATTENTION-DEFICIT HYPERACTIVITY DISORDER.

#### Flood M, Hayden JC, Gavin B, et al.

**BACKGROUND**: Reported prevalence of ADHD in children varies greatly from country to country. There is a similar disparity between rates of medication prescriptions for ADHD, with significant variation existing between rates in USA and Europe. North American studies report that parents have concerns about starting and continuing ADHD medication in children, though little is known about experiences in other geographies and healthcare systems. These studies may inform supports required, and help understand if these concerns may result in different treatment patterns, in other geographies.

**OBJECTIVE**: To explore experiences of parents of children who used ADHD medication in Ireland.

**METHODS**: A qualitative methodology was employed. Data were gathered through in-depth semi-structured interviews with ten parents who had a child with ADHD and had commenced medication. Analysis was performed using a phenomenographic approach.

**RESULTS**: Four descriptive categories relating to parents' experiences of decision-making emerged. Symptom severity prior to diagnosis, duration of ADHD symptoms and parental struggle to make an informed risk/benefit decision influenced decision-making. The child's immediate response to medication was identified as an important factor facilitating persistence and adherence. Over time, parents sought to regain some control over and gain confidence in medication management and decision-making.

**CONCLUSIONS**: The decision to use medication in ADHD is difficult and dynamic for parents in Ireland. It is driven by a sense of urgency and powerlessness, mobilizing feelings of doubt, anxiety and guilt before concluding with a sense of autonomy and increased confidence. Lack of awareness of ADHD and treatments, alongside access to care issues, add to parental anxiety in Ireland. This is in contrast to previous North American studies. Current provisions of support and information at the time of ADHD diagnosis are insufficient. Initial reaction to medication options should be explored by clinicians and support continued over time

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Salud Publica Mex. 2019 Jul;61:514-23.

CHILDREN'S MENTAL HEALTH: A PRIORITY TO CONSIDER.

#### Caraveo-Anduaga JJ, Martinez-Velez NA.

**OBJECTIVE**: To Identify possible changes in the frequency of psychopathological syndromes in Mexican children population over a 15-year period using the Brief Screening and Diagnostic Questionnaire (CBTD in Spanish).

**MATERIALS AND METHODS**: Information gathered from different studies on the general population, schools and medical general practice are analyzed. Results from the Mexico City study were used as base rates for comparisons.

**RESULTS**: Higher prevalence of externalizing syndromes such as attention deficit and hyperactivity, oppositional and explosive conduct were very evident. Also, anxiety and depressive syndromes showed a notable increase. Prevalence of abnormal language and probable epilepsy were also increased on different age-groups.

**CONCLUSIONS**: Findings are discussed in light of longitudinal reports in the literature as well as on reports in adolescent population in Mexico

#### Scand J Public Health. 2020 May;48:303-07.

### GENDER- AND AGE-STRATIFIED ANALYSES OF ADHD MEDICATION USE IN CHILDREN AND ADOLESCENTS IN FINLAND USING POPULATION-BASED LONGITUDINAL DATA, 2008-2018.

#### Vuori M, Koski-Pirila A, Martikainen JE, et al.

**Aims**: This study examined medication use for attention-deficit/hyperactivity disorder (ADHD) among children and adolescents by gender in Finland during 2008-2018.

**Methods**: Aggregated data on medication use for ADHD from 2008 to 2018 were extracted from the nationwide register on reimbursed prescriptions. The annual prevalence of ADHD medication use was calculated as the number of children (6-12 years) and adolescents (13-17 years) per calendar year with at least one ADHD medication purchase divided by the number of children and adolescents in the population. Population prevalence for children was also examined by birth month.

**Results**: In 2008, the prevalence rates for males were 1.26% in children and 0.93% in adolescents, and for females 0.21% and 0.14%, respectively. In 2018, the prevalence rates for males were 4.42% in children and 4.21% in adolescents, and for females 0.99% and 1.28%, respectively. Male-to-female ratios decreased during the study period from 6.0:1 to 4.5:1 (children) and from 6.6:1 to 3.3:1 (adolescents). ADHD medication use was more common among males and females (aged 6-12 years) born in May-August or September-December than among males and females born in January-April.

**Conclusions**: The prevalence of ADHD medication use has continued to increase in Finland. Although use has increased more rapidly among females resulting in lower male-to-female ratios, medication use among females is considerably lower compared with males. Consequently, gender discrepancy in 2018 was relatively large, particularly among children. Future studies should also consider reporting annual prevalence by children's birth month

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Singapore Med J. 2019 Apr;60:168-72.

#### AN APPROACH TO PROBLEM BEHAVIOURS IN CHILDREN.

#### Lulla D, Mascarenhas SS, How CH, et al.

Behavioural problems in children are a relatively common occurrence but are a concern for parents. Such problems are often a reflection of the child's social stressors, environment and developmental state. Although a majority of behavioural problems are temporary, some may persist or are symptomatic of neurodevelopmental disorders or an underlying medical condition. Initial management of behaviour problems often involves helping parents to learn effective behaviour strategies to promote desirable behaviours in their children. This article highlights a general approach to evaluating and treating behavioural problems in children in the primary care setting. Sleep problems, eating disorders, and other emotional and developmental disorders, such as autism spectrum disorder and attention deficit hyperactivity disorder, are not within the scope of this article

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Sleep. 2019 Oct;42. MEASURING AND INTERPRETING PERIODIC LEG MOVEMENTS DURING SLEEP: EASY DOES IT. *Garbazza C, Hackethal S*.

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Sleep Med. 2019 Feb;54:101-12.

PRENATAL ALCOHOL EXPOSURE AND SLEEP-WAKE BEHAVIORS: EXPLORATORY AND NATURALISTIC OBSERVATIONS IN THE CLINICAL SETTING AND IN AN ANIMAL MODEL.

Ipsiroglu OS, Wind K, Hung YA, et al.

**INTRODUCTION**: Clinical research and studies using animal models have revealed a complex and relatively under-explored interaction between prenatal alcohol exposure (PAE) and alterations in sleep-wake behaviors.

**OBJECTIVES**: To utilize a structured naturalistic observation-based methodology, consisting of descriptive elements, to provide insight into possible links between altered sleep and disruptive daytime presentations in children and adolescents with fetal alcohol spectrum disorder (FASD). To apply a similar structured behavioral observation protocol in a PAE animal model to compare outcomes from the experimental and clinical studies utilizing naturalistic observational methodology.

**METHODS**: Forty pediatric patients with FASD (1.8-17.5 yrs, median age 9.4 yrs) and chronic sleep problems were assessed. In the PAE animal model, male offspring from PAE, Pair-Fed (PF), and ad libitum-fed Control (C) groups (n = 8/group) were assessed in the juvenile/preadolescent (23-25 days of age) and adolescent/pubertal (35-36 days of age) periods. RESULTS: In the clinical setting, we found that 95% of children with FASD showed disruptive or externalizing behaviors, 73% showed internalizing behaviors, 93% had circadian rhythm sleep disorders, all had chronic insomnia, and 85% had restless sleep, often with tossing/turning/kicking movements indicative of non-restorative sleep with hypermotor events. In the daytime, individuals showed excessive daytime sleepiness as well as hyperactive/hyperkinetic behaviors, an urge-to-move, and involuntary movements suggestive of hyperarousability. Alterations in sleep/wake behaviors in the PAE animal model paralleled the clinical data in many aspects, demonstrating greater sleep latencies, less total time asleep, more total time awake and longer awake bouts, more position changes, more time in transition, and longer transition bouts in PAE compared to PF and/or control animals.

**CONCLUSIONS**: Thus, our findings provide support for the power and validity of naturalistic observational paradigms in revealing dysregulated sleep-wake behaviors and their association and/or exacerbating relationship with day and nighttime behavioral problems, such as disruptive behaviors, externalizing and internalizing disorders, and daytime sleepiness

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Sleep Med. 2019 Apr;56:52-56.

SLEEP PROBLEMS AND INTERPERSONAL VIOLENCE IN YOUTH IN CARE UNDER THE QUEBEC CHILD WELFARE SOCIETY.

#### Langevin R, Hebert M, Bergeron SJ, et al.

**OBJECTIVE**: The objective this study was to investigate the relative contributions of gender, common mental health symptoms, and experiences of interpersonal violence to the presence of sleep disturbances in Youth in Care under Child Welfare Society admitted to residential facilities.

**METHODS**: A sample of 315 teenagers (14-18 years old) completed a self-reported questionnaire upon admission, followed by a medical consultation with a nurse and a physician. Information regarding experiences of interpersonal violence, mental health symptoms, and sleep disturbances was collected using a standardized questionnaire.

**RESULTS**: Anxiety, ADHD symptoms, and sexual abuse were associated with sleep disturbances, F(10, 264) = 5.95, p < 0.001. Results from hierarchical regression analyses revealed that experiences of interpersonal violence, more specifically sexual abuse, were associated with sleep disturbances over and beyond gender and the presence of mental health symptoms.

**CONCLUSIONS**: These results highlight practical implications for health professionals in terms of assessment and intervention for vulnerable youth exposed to interpersonal violence. Implications for research and practice are discussed

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Sleep Med. 2019 Feb;54:164-71.

#### AUTISTIC TRAITS AND SLEEP IN TYPICALLY DEVELOPING ADOLESCENTS.

#### Salmela L, Kuula L, Merikanto I, et al.

**OBJECTIVE**: Diagnosed autism spectrum disorders have been associated with a high prevalence of sleep problems, other psychiatric disorders and social deficits in adolescence. However, little is known about the possible connection between subclinical autistic traits and sleep. This study explored whether adolescents with elevated levels of subclinical autistic traits are at heightened risk for sleep problems.

**METHODS**: This study used data from the community cohort born in 1998. The sample consisted of 157 (57% girls) 17-year-old adolescents. Autistic traits were assessed using the Autism Spectrum Quotient (AQ). The Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), and the Adult ADHD Self-Report Scale were utilized to control for comorbid psychiatric symptoms. Sleep was measured with actigraphy and sleep quality was self-rated using the Pittsburgh Sleep Quality Index (PSQI). Associations between autistic traits and sleep were examined using logistic regression analysis.

**RESULTS**: Elevated levels of autistic traits were significantly associated with shorter weekday sleep duration. Moreover, autistic traits remained an independent predictor of short sleep duration when comorbid psychiatric symptoms were controlled for (OR 1.14; 95% CI: 1.03-1.26).

**CONCLUSIONS**: The results suggest that subclinical autistic traits should be considered as a possible underlying mechanism affecting adolescent sleep

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Soc Psychiatry Psychiatr Epidemiol. 2019 Dec;54:1565-74.

TRENDS IN PSYCHIATRIC DISORDERS PREVALENCE AND PRESCRIPTION PATTERNS OF CHILDREN IN ALBERTA, CANADA.

#### Leung BMY, Kellett P, Youngson E, et al.

**PURPOSE**: To describe the trends in the prevalence and incidence of children with psychiatric disorders, the types of medication prescribed, and the type of physician providing the prescriptions.

**METHOD**: This retrospective study linked six population-based administrative databases (2008-2015) in Alberta, Canada.

**RESULTS**: The prevalence of paediatric psychiatric disorders increased from 12.6 per 100 population in 2008 to 15.0 per 100 population in 2015, while the incidence rate increased from 2.0 per 100 population to 2.2 per 100 population in the same period. The proportion of patients dispensed any psychiatric medication increased from 21.4% in 2008 to 28.2% in 2015. Over the same period, dispensations for antidepressants increased from 7.0% to 11.2% and stimulants to treat ADHD, from 11.9% to 15.9%. For antidepressants, general practitioners (GPs) wrote the highest proportion of prescriptions (44.3% in 2011-48.1% in 2015), while paediatricians wrote the lowest proportion (8.7% in 2011-11.0% in 2015) and the proportion by psychiatrists decreased from 33.4% in 2011 to 27.2% in 2015. For stimulants to treat ADHD, paediatricians were the most frequent prescribers (36.9% in 2011-39.3% in 2015) followed by GPs as the second most frequent (33.1% in 2011-33.5% in 2015), while psychiatrists were the least likely to prescribe stimulants for ADHD.

**CONCLUSION**: The increasing trend of psychiatric diagnoses and medication prescriptions in the paediatric population is evident using population-based administrative databases. The lack of safety and adverse consequences of medication use in this cohort warrants additional monitoring data

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Soc Psychiatry Psychiatr Epidemiol. 2019 Nov;54:1299-309.

PRENATAL MATERNAL STRESS AND RISK OF NEURODEVELOPMENTAL DISORDERS IN THE OFFSPRING: A SYSTEMATIC REVIEW AND META-ANALYSIS.

#### Manzari N, Matvienko-Sikar K, Baldoni F, et al.

**PURPOSE**: Exposure to prenatal stress has been reported to affect the risk of adverse neurodevelopmental outcomes in the offspring; however, there is currently no clear consensus. The aim of this systematic review and meta-analysis was to examine the existing literature on the association between prenatal stress and autism spectrum disorder (ASD) and attention-deficit hyperactivity disorder (ADHD) in the offspring.

**METHODS**: Based on a registered protocol, we searched several electronic databases for articles in accordance with a detailed search strategy. We performed this study following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA).

**RESULTS**: Prenatal stress was significantly associated with an increased risk of both ASD (pooled OR 1.64 [95% CI 1.15-2.34]; I(2) = 90%; 15 articles) and ADHD (pooled OR 1.72 [95% CI 1.27-2.34]; I(2) = 85%; 12 articles).

**CONCLUSIONS**: This study suggests that prenatal stress may be associated with ASD and ADHD; however, several limitations in the reviewed literature should be noted including significant heterogeneity and there is a need for carefully controlled future studies in this area

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#### Soc Psychiatry Psychiatr Epidemiol. 2019 Dec;54:1555-64.

BARRIERS AND PREDICTORS OF MEDICATION USE FOR CHILDHOOD ADHD: FINDINGS FROM A UK POPULATION-REPRESENTATIVE COHORT.

#### Russell AE, Ford T, Russell G.

**PURPOSE**: Little is known about sociodemographic and clinical factors that predict and act as barriers to ADHD medication independently of symptom severity. We examined the proportion of children using medication for ADHD, age of initiation of medication, and predictors of medication use in a population-representative cohort.

**METHODS**: Data from the Millennium Cohort Study on child ADHD, medication use for ADHD at age 14 (in 2014-2015) and child, parent and sociodemographic variables were collated. Logistic regression models were used to identify factors that predict medication use for ADHD (the main outcome measure), adjusting for symptom severity at age seven.

**RESULTS**: The weighted prevalence of ADHD was 3.97% (N = 11,708). 45.57% of children with ADHD (N = 305) were taking medication. The median age at initiation was 9 years (range 3-14). Male gender (AOR 3.66, 95% CI 1.75, 7.66) and conduct problems at age seven (AOR 1.24 95% CI 1.04, 1.47) and 14 predicted medication use at age 14 after adjusting for symptom severity.

**CONCLUSIONS**: Our study is the first to assess predictors of medication whist adjusting for ADHD symptom severity. Girls with ADHD were less likely to be prescribed medication, even when they displayed similar ADHD symptom levels to boys. Conduct problems also predicted medication independently of ADHD symptoms. ADHD may be more often medicated in boys because clinicians may think a prototypical ADHD child is male, and perhaps conduct problems make boys more disruptive in the classroom, leading to boys being more often treated

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#### Soc Psychiatry Psychiatr Epidemiol. 2020 Mar;55:351-58.

### ADULT MOOD PROBLEMS IN CHILDREN WITH NEURODEVELOPMENTAL PROBLEMS: EVIDENCE FROM A PROSPECTIVE BIRTH COHORT FOLLOWED TO AGE **50**.

#### Addicoat A, Thapar AK, Riglin L, et al.

**PURPOSE**: Specific child neurodevelopmental (ND) disorders such as ADHD and learning problems are associated with concurrent and future (up to early adulthood) mood problems. However, it is unclear whether findings generalise to population traits as well as diagnoses, to general as well as specific neurodevelopmental domains, and whether risk associations extend to later adulthood or diminish with age. **METHODS**: We used data from a UK cohort of children born in 1958, the National Child Development Study (NCDS). ND problems were assessed at ages 7 and 11 years with parent- and teacher ratings of restlessness, hyperactivity and motor co-ordination difficulties, and by individual tests of reading, arithmetic and general cognitive ability. Mood (depression/anxiety) problems were assessed using the Malaise symptom screen at 23, 33, 42, and 50 years. Factor analyses were conducted to assess whether the specific neurodevelopmental domains could be aggregated into a general "ND" latent factor as well as specific factors. Associations with mood outcomes were then tested.

**RESULTS**: A bi-factor model with a general "ND" latent factor and specific "motor" and "cognition" factors fits the data well. The specific cognition and motor factor scores were associated with mood problems in early adulthood only. The "ND" factor demonstrated associations with mood problems at each adult follow-up (men - age 23 years: beta = 0.17; age 33: beta = 0.16; age 42: beta = 0.14; age 50: beta = 0.16; women - 23 years: beta = 0.25; 33 years: beta = 0.26; 42 years: beta = 0.14; 50 years: beta = 0.16; all ps < 0.01). Interactions by sex indicated that the association between this general factor and mood problems was more

pronounced for women than men at ages 23 years (beta = 0.09, p = 0.005) and 33 years (beta = 0.10, p = 0.003), but not at 42 or 50 years (ps > 0.8).

**CONCLUSIONS**: Our results suggest that, in a population-based cohort, a general, childhood neurodevelopmental difficulty factor is stably associated with mood problems in adult life

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#### Soc Sci Med. 2019 Jan;220:371-78.

TRAJECTORIES OF FAMILY POVERTY AND CHILDREN'S MENTAL HEALTH: RESULTS FROM THE DANISH NATIONAL BIRTH COHORT.

#### Pryor L, Strandberg-Larsen K, Nybo Andersen AM, et al.

Children exposed to socioeconomic adversity have elevated levels of psychological difficulties immediately and long-term. However, few studies have examined the consequences of long-term patterns of dynamic trajectories of family income. The Danish National Birth Cohort (DNBC) is a longitudinal, population-based birth cohort study (1996-2002). Data on household poverty from the year before birth until the child was 10 years of age (n=12 measures) were obtained from the National Danish Registries and modeled using semiparametric group-based modeling. Child mental health symptoms were measured at 11 years using mother and child-reported Strengths and Difficulties Questionnaires (n=40192), and the child-reported Stress in Childhood (SiC) scale (n=46284). Four categories of family socioeconomic position were identified: 1) No poverty (83.5%); 2) Intermittent poverty, representing families who alternate between being above and below the poverty cut-off (8.6%); 3) Poverty during the perinatal period (4.9%); and 4) Chronic poverty (3.0%). Controlling for several early life characteristics of the family, mother and child, intermittent poverty vs. no poverty was consistently associated with child psychological difficulties (any problem: RR=1.38, 95% CI: 1.16-1.64; conduct problems: RR=1.38, 95% CI: 1.16-1.64; and stress: RR=1.07, 95% CI: 1.02-1.12). An association was also found between perinatal poverty and children's symptoms of hyperactivity/inattention (RR=1.28, 95% CI=1.03; 1.59). We found no associations between chronic poverty and any of the outcome measures when adjusting for early life risk factors. Children growing up in households characterized by financial instability have elevated levels of psychosocial symptoms, especially externalizing behaviors, as well as stress in early adolescence

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Subst Use Misuse. 2019;54:1365-75.

PSYCHOLOGICAL RISK FACTORS FOR ALCOHOL, CANNABIS, AND VARIOUS TOBACCO USE AMONG YOUNG ADULTS: A LONGITUDINAL ANALYSIS.

#### Bierhoff J, Haardorfer R, Windle M, et al.

**BACKGROUND**: Alcohol, cannabis, and tobacco use are prevalent in young adults and may be differentially related to psychological symptoms characterized as externalizing or internalizing.

**OBJECTIVES**: This study examined the use of alcohol, cannabis, and various tobacco products in relation to externalizing (ADHD) versus internalizing factors (depression, anxiety), hypothesizing alcohol and cannabis use are associated with externalizing factors whereas tobacco use is related to internalizing factors. **METHODS**: Data from a 2-year longitudinal study of 2,397 US college students (aged 18-25) launched in 2014 were analyzed. Adult ADHD Self-Report Scale, Patient Health Questionnaire-9 item (assessing depressive symptoms), and the Zung Self-Rating Anxiety Scale scores were examined in relation to subsequent past 30-day use of alcohol, cannabis, and tobacco products (cigarettes, little cigars/cigarillos, smokeless tobacco, e-cigarettes, hookah), as well as nicotine dependence per the Hooked on Nicotine Checklist.

**RESULTS**: Participants were 20.49 (SD = 1.93) years old, 64.7% female, and 65.5% White. In multivariable analyses, greater ADHD symptoms predicted alcohol and cannabis use (p = .042 and p = .019, respectively). Cigarette and little cigar/cigarillo use were predicted by greater depressive (p = .001 and p = .002, respectively), and anxiety symptoms (p = .020 and p = .027, respectively). Nicotine dependence was correlated with greater anxiety symptoms (p = .026). Counter to hypotheses, smokeless tobacco use was

predicted by greater ADHD symptoms (p = .050); neither e-cigarette nor hookah use were predicted by these psychological symptoms.

**Conclusions/Importance**: Research examining risk factors for tobacco use must distinguish among the various tobacco products. Moreover, interventions may need to differentially target use of distinct substances, including among the range of tobacco products

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#### Transl Psychiatry. 2019 Sep;9:238.

### DYNAMICAL PROPERTIES OF ELEMENTAL METABOLISM DISTINGUISH ATTENTION DEFICIT HYPERACTIVITY DISORDER FROM AUTISM SPECTRUM DISORDER.

#### Austin C, Curtin P, Curtin A, et al.

Attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) are neurodevelopmental conditions of overlapping etiologies and phenotypes. For ASD, we recently reported altered elemental metabolic patterns in the form of short and irregular zinc and copper cycles. Here, we extend the application of these biomarkers of prenatal and early postnatal elemental metabolism to distinguish between individuals diagnosed with ADHD and/or ASD and neurotypical controls. We recruited twins discordant for ADHD, ASD and other neurodevelopmental diagnoses from national twin studies in Sweden (N = 74) diagnosed according to DSM-5 clinical consensus and standardized psychiatric instruments. Detailed temporal profiles of exposure to 10 metals over the prenatal and early childhood periods were measured using tooth biomarkers. We used recurrence quantification analysis (RQA) to characterize properties of cyclical metabolic patterns of these metals. Regularity (determinism) and complexity (entropy) of elemental cycles was consistently reduced in ADHD for cobalt, lead, and vanadium (determinism: cobalt, beta = -0.03, P = 0.017; lead, beta = -0.03, P = 0.016; and vanadium, beta = -0.03, P = 0.01. Entropy: cobalt, beta = -0.13, P = 0.017; lead, beta = -0.18, P = 0.016; and vanadium, beta = -0.15, P = 0.008). Further, we found elemental pathways and dynamical features specific to ADHD vs ASD, and unique characteristics associated with ADHD/ASD combined presentation. Dysregulation of cyclical processes in elemental metabolism during prenatal and early postnatal development not only encompasses pathways shared by ADHD and ASD, but also comprise features specific to either condition

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#### Turk Psikiyatri Derg. 2019;30:82-89.

EFFECTS OF NITRIC OXIDE SYNTHASE-1 EXON 1F-VNTR GENE POLYMORPHISM ON THE CLINICAL SYMPTOMS OF ALCOHOL DEPENDENCE, IMPULSIVITY AND COMORBID ATTENTION DEFICIT HYPERACTIVITY DISORDER. *Karakaya I, Gurel SC, Ayhan Y, et al.* 

**OBJECTIVE**: We planned to compare individuals with alcohol dependence (AD) and healthy controls on the frequency of NOS1 exon 1f-VNTR gene polymorphism and to investigate the effects of this polymorphism on the clinical symptoms of alcohol dependence, impulsiveness and comorbid attention deficit hyperactivity disorder (ADHD) symptoms.

**METHOD**: A total of 282 participants consisting of 153 patients and 129 age and gender matched healthy individuals were inluded in the study. All participants were evaluated with Structured Clinical Interview for DSM-IV Axis 1 disorders (SCID-I) and Michigan Alcohol Screening Test (MAST), Barratt Impulsiveness Scale (BIS-11), UPPS Impulsive Behavior Scale, Adult Attention Deficit and Hyperactivity Diagnosis Scale (ADHDS), Family History Research Diagnostic Criteria (FHDRC). The QF-PCR fragment protocols were used for genetic analyses. Allele fragments of </=176 bp and >176 bp sizes were separated and 3 different genotypes were determined as the SS, SL and LL. Associations of these genotypes with symptoms of AD severity, impulsiveness and comorbid ADHD were investigated.

**RESULTS**: The AD and control groups did not differ significantly on the basis of NOS1 exon 1f-VNTR gene polymorphism. Also, significant correlations between this polymorphism and symptoms of AD severity, impulsiveness and ADHD were not determined.

**CONCLUSION**: Results of our study do not indicate a significant association between the NOS1 exon 1f-VNTR genotypes and AD, subgroups of AD, impulsiveness or comorbid ADHD semptoms

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#### Z Kinder Jugendpsychiatr Psychother. 2020;48:215-23.

THE IMPROVEMENT OF INDIVIDUALLY DEFINED PROBLEM BEHAVIORS DURING A TELEPHONE-ASSISTED SELF-HELP INTERVENTION FOR PARENTS OF PHARMACOLOGICALLY TREATED CHILDREN WITH ADHD.

#### Dose C, Waschau F, von WE, et al.

Background: This study examined change in individually defined problem behaviors during a telephoneassisted self-help (TASH) intervention for parents of children with attention-deficit/hyperactivity disorder (ADHD).

Method: Parents of children with ADHD and functional impairment despite methylphenidate treatment participated in a 12-month TASH intervention (8 self-help booklets plus up to 14 counseling telephone calls). The severity of three individually defined target problems, of ADHD symptoms, and oppositional symptoms were rated at baseline and after 6 and 12 months; parental satisfaction with the intervention was assessed after 12 months. The problems were categorized according to the type of behavior and the disorder to which they were related (ADHD vs. oppositional symptoms).

Results: Repeated measures analyses of variance revealed a significant decrease in problem severity during the intervention. The change in problem severity was greater than the change in ADHD and oppositional symptoms. Correlations between problem severity and symptom severity were low to moderate. Correlations between the change in problem severity and parental satisfaction were moderate.

Discussion: The decrease in the individual problem severity during TASH is stronger than the decrease in ADHD and oppositional symptoms. Individually defined problems should be attended to in psychotherapy research to avoid underestimating the benefit of interventions by solely considering standardized measures



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# Teachers, not parents, are able to predict time processing skills in preschoolers

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Time processing difficulties are associated with developmental disorders. Questionnaires for assessing children's sense of time are available from primary school, but we lack valid proxy-report tools for younger children, who are not able to complete self-reports. This study aimed to assess the criterion validity of a questionnaire investigating preschoolers' sense of time from the points of view of their parents and teachers. One hundred seventy preschoolers were included in the sample. Their parents and teachers completed the Sense of Time Questionnaire, and the children were administered time reproduction and time discrimination tasks, both concurrently and 7 months later. The assessment of preschoolers' sense of time reported by teachers, but not by parents, predicted the children's time processing skills both concurrently and longitudinally. The teacher version of the Sense of Time Questionnaire constitutes a valid instrument for assessing and predicting preschoolers' time processing skills and can be used for clinical and research purposes.

#### Statement of contribution

#### What is already known on this subject?

- Time processing difficulties are associated with developmental disorders such as ADHD and dyscalculia.
- Early assessment of time processing skills is important for clinical (e.g., screening) and research purposes.
- We do not have valid questionnaires for assessing sense of time in young children.

#### What the present study adds?

- The sense of time ability reported by teachers predicts preschoolers' time processing skills.
- The sense of time ability reported by parents does not predicts preschoolers' time processing skills.
- The Sense of Time Questionnaire is a valid instrument for investigating time processing skills of 4–6 aged children.

The capability of processing and estimating time is a fundamental function of human life; individuals need to keep track of the temporal durations of inner and outer events to develop a sense of their own story and to interact properly with the surrounding

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environment. This need is also true for children; they are able, from infancy, to be aware of the temporal intervals between two events and to learn the durations associated with events (Droit-Volet, 2013). This intuition of durations, or subjective experience of the passing of time, is based on our inherited capacity of processing the flow of events together with their temporal characteristics and is called sense of time (Allman, Teki, Griffiths, & Meck, 2014; Droit-Volet, 2016). The centrality of the psychology of time in human cognition and behaviour is currently widely recognized (Hancock & Block, 2012), and time processing skills are studied in both typical and atypical development.

Time processing skills are already detectable in newborns (de Hevia, Izard, Coubart, Spelke, & Streri, 2014) and improves with age, arising from multiple factors: brain maturation, experience of the temporal regularities of events, and the emergence of conscious awareness of the passing of time (Droit-Volet, 2011, 2016). At preschool age, in children with typical development, time discrimination skills are on average accurate (Droit-Volet, 2011, 2016), and when they repeatedly experience the duration of events (e.g., in daily activities), they can accurately judge the length of temporal intervals (Friedman, 1990). However, they are often still not aware of the passage of time and of its relevance (Droit-Volet, 2013). Sensitivity to time systematically improves with age and reaches an adult-like level around 8–9 years of age (Droit-Volet, 2011, 2016). As for adults, time processing skills in children have been found following the Weber's law, with the ratio between two durations influencing their perception (Brannon, Libertus, Meck, & Woldorff, 2008) and with increased variability of time estimates as a function of stimulus duration (Droit-Volet, 2013). An additional point regards time intervals used in time processing tasks. Temporal durations in the range from tens of milliseconds (ms) to several seconds are processed by different brain mechanisms, with a specific network involved in processing durations below around 500 ms, and a different network involved with durations above around 500 ms (Buonomano & Karmarkar, 2002; Karmarkar & Buonomano, 2007). In particular, processing longer intervals is a task involving cognitive control, whereas durations below 500 ms are processed implicitly (Rammsayer, 1999). Importantly, the role of attention and executive functions emerged as a key factor in age-related changes observed in children's time processing skills and seems to be particularly influential at preschool age (Block, Hancock, & Zakay, 2010; Droit-Volet, 2003).

Time processing difficulties have been identified in association with developmental disorders, such as attention deficit hyperactivity disorder (ADHD; Smith, Taylor, Warner Rogers, Newman, & Rubia, 2002; Walg, Hapfelmeier, El-Wahsch, & Prior, 2017), developmental dyslexia (Casini, Pech-Georgel, & Ziegler, 2018), developmental dyscalculia (Moll, Göbel, Gooch, Landerl, & Snowling, 2016), autism spectrum disorder (ASD; Isaksson *et al.*, 2018), and borderline intellectual functioning (Di Nuovo *et al.*, 2017). Considering children who are of preschool age, time processing problems have been found in individuals at risk of developing difficulties in mathematics (Tobia, Rinaldi, & Marzocchi, 2018).

To date, literature about time processing in preschoolers with atypical development is rare; thus, the incidence of time processing impairments in this population is difficult to estimate. The scarcity of data on time processing skills in preschoolers is also due to a lack of instruments suitable for assessing time-related skills in young children, such as questionnaires that can be administered to significant adults. Parental reports are often included in screening and diagnostic assessments, and many studies have noted the value of parents as sources of information on the strengths and weaknesses of their children (e.g., Eiser & Morse, 2001; Goodman, 2001). Additionally, teacher reports have been found to be highly informative in developmental ages (e.g., Mathew, 2001; Nolan, Gadow, & Sprafkin, 2001). Parents' and teachers' judgements are grounded in different contexts (i.e., school and home environments) and therefore provide partially different but complementary information (Rescorla *et al.*, 2014). For this reason, among others, the reports of parents and teachers usually correlate at low-to-moderate magnitudes (De Los Reyes *et al.*, 2015).

Proxy-report and self-report questionnaires for investigating time processing skills have been used in the past, particularly for investigating these skills in primary and middle school in children with ADHD. Examples of questionnaires that can be completed by parents are the 'It's About Time' questionnaire (Barkley, 1998), which evaluates 8- to 12year-old children's sense of time and their capability for respecting deadlines, and the questionnaire proposed by Houghton, Durkin, Ang, Taylor, and Brandtman (2011), which assesses temporal regulation in the everyday lives of children and adolescents aged 5 and a half to 19 years. To date, to the best of our knowledge, questionnaires investigating children's time-related skills from the point of view of their teachers have been used on just one occasion; Rosselló and Servera (2015) administered a scale on time management to teachers of 9- to 13-year-old children with ADHD and typical development that was related to particular tasks (e.g., 'He/she has difficulty in managing time during exams') and events (e.g., 'He/she is able to chronologically order events or historical periods'). The results showed that the instrument is able to identify time processing difficulties in individuals with ADHD, with a similar accuracy in comparison with that of a questionnaire administered to children themselves ('Self-management of time' subscale of the 'Deficits in Executive Functioning Scale-Children and Adolescents'; Barkley, 2012). Considering the importance of the school context for individuals at developmental ages, the extent of time spent within school, and the differences in children's behaviour among contexts, the scarce literature on the point of view of teachers on their pupils' time processing skills shows a significant lack of understanding.

Another critical point is the validity of proxy-report questionnaires in reflecting the actual functioning of children. Time processing difficulties in atypical development have been found with multiple methods, including the use of questionnaires administered to parents, to children themselves, and, rarely, to teachers (e.g., Barkley, 1998; Rosselló & Servera, 2015), as well as the administration of experimental tasks investigating time reproduction or time discrimination (Di Nuovo *et al.*, 2017; Moll *et al.*, 2016; Plummer & Humphrey, 2009). Time reproduction and time discrimination are examples of time processing skills, and behavioural tasks assessing these components of time processing have been widely used. In the time reproduction task, individuals have to reproduce the duration of an auditory or visual stimulus, by pressing a designated response button (Crowder & Hohle, 1970); in the time discrimination task, individuals have to choose which of two durations presented through auditory or visual stimuli is longer or shorter or, alternatively, judge whether the length of the two durations is identical or different (Bindra & Waksberg, 1956).

Importantly, the congruity of evidence brought by questionnaires and experimental tasks in the same sample has not been considered in the past. In fact, a way to verify the validity of proxy-report questionnaires for assessing sense of time is investigating the agreement between time-related questionnaires and behavioural tasks by assessing time processing. An exception is a study showing time processing impairments both via parent and teacher questionnaires and via behavioural assessment in preschoolers at risk of developing difficulties in mathematics (Tobia *et al.*, 2018). Considering school-aged

children, a correlation between the score of a parent-report questionnaire assessing sense of time and a time processing measure (i.e., inter-tap interval in a free tapping task) has been identified in children with ASD (Isaksson *et al.*, 2018); similarly, Meaux and Chelonis (2005) found a concurrent correlation between the 'It's about time' score and time reproduction in children. This correlation can be considered to be the first evidence of the link between children's sense of time measured with proxy-report questionnaires and time processing skills directly observed in children. However, a more accurate way to verify this link would be both concurrently and longitudinally analysing the capability of Sense of Time Questionnaires (Tobia *et al.*, 2018) to predict children's performance in time processing tasks.

The availability of valid proxy-report questionnaires is particularly needed for preschoolers who are still not able to report their own time-related skills through a questionnaire and for whom the point of view of close adults is particularly important (e.g., Eiser & Morse, 2001). Some studies that investigated time processing skills in preschoolers (Droit-Volet & Wearden, 2001; Odic, 2018) used experimental measures that are difficult to use in an ecological way within the school context. In contrast, a questionnaire that can be completed by significant adults, such as parents or teachers, can be a useful tool that can also be used on a large scale, for example, in screening projects for identifying children's weaknesses. Furthermore, obtaining information regarding children's time processing skills can have a role in supporting the diagnostic process, considering the incidence of time-related problems in individuals with or at risk of developmental disorders such as ADHD (Smith *et al.*, 2002).

#### Aim of the study

The present study has the main aim of assessing the criterion validity of a proxy-report questionnaire investigating preschoolers' sense of time. The questionnaire has two parallel versions, one for teachers and one for parents, and has been developed for children aged 4–6. In particular, this 7-month-long longitudinal study investigated the predictive power of the two versions of the Sense of Time Questionnaire administered at Time 1 with respect to two tasks assessing time processing skills in preschoolers administered both at Time 1 and at Time 2: time reproduction and time discrimination. These tasks have been used in the past, showing their suitability for school-aged children and preschoolers (Odic, 2018; Tobia *et al.*, 2018).

Considering past evidence, which shows time-related difficulties in some developmental disorders and was derived with multiple methods (i.e., self- and proxyreport questionnaires *and* behavioural tasks), we expect that the observations of children's sense of time by parents and teachers, collected through a questionnaire, will both concurrently and longitudinally predict children's performance in time processing tasks. This hypothesis is further supported by preliminary evidence regarding a significant concurrent correlation between parent-report questionnaires' score and children's performance in time processing behavioural tasks (Isaksson *et al.*, 2018; Meaux & Chelonis, 2005), as found in school-aged children. Most evidence comes from studies investigating the points of view of parents. With the exception of one study (Rosselló & Servera, 2015), the literature on sense of time, as assessed by teachers, is limited. However, considering the high amount of time spent at school by children, we expect that the teacher version of the Sense of Time Questionnaire is also able to predict children's performance in the behavioural tasks administered. The identification of the significant predictive power of proxy-report questionnaires assessing sense of time on time processing skills in preschoolers would enable the use of evidence-based and valid questionnaires to assess young children's time processing skills for clinical and research purposes. This discovery is particularly relevant considering the high incidence of time processing deficits in developmental disorders.

#### Method

#### Participants

One hundred seventy preschoolers (42.9% females; mean age at Time 1 = 57.33 months, SD = 3.55, range = 50–65) were included in the sample. At the time of testing, the children were attending the last year of the Italian kindergarten, a 3-year programme that involves children aged 3–6 years. Nine schools in the areas of Milan and Bologna in northern Italy, and 35 teachers, were involved. Socioeconomic status, as indexed by mother's education, was diverse: 21.9% had less than high school diploma, 51.5% had completed high school, and 26.6% had a graduate or postgraduate degree. None of the children involved had a diagnosis of neurodevelopmental disorders according to teachers' report.

#### **Materials**

The children's sense of time was assessed at Time 1 through a proxy-report questionnaire administered to parents and teachers (Tobia *et al.*, 2018). The questionnaire consists of a 9-item scale (Appendix) investigating children's time-related habits and skills ('My child/ pupil autonomously realizes when a daily routine is approaching (e.g., lunch time; getting ready for outdoor activities)') and their use and comprehension of temporal words ('My child/My pupil' understands terms such as 'before' and 'after'); four filler items for di sguising the purpose of the questionnaire were also included. The responses were given on a 4-point Likert scale, ranging from 'Never' to 'Very often', with higher scores indicating better performance. The temporal words considered in the questionnaire, namely, yesterday, tomorrow, before, and after, were chosen because they could be adequately understood and produced by more than half of children aged 4–5 years (Busby Grant & Suddendorf, 2011). Cronbach's alpha values for the sense of time scale, assessed for the present sample, were  $\alpha = .83$  for parents and  $\alpha = .89$  for teachers.

Two computerized tasks assessing time processing were administered using E-Prime (Schneider, Eschman, & Zuccolotto, 2002), at Time 1 and at Time 2: time reproduction and time discrimination, two tasks largely used with children (Droit-Volet, 2013, 2016).

#### Time reproduction

The children were asked to reproduce the duration of a visually presented stimulus remaining on the screen for 0.5, 1, 3, or 5 s. The stimulus consisted of a light bulb turning on for the target duration and then turning off. Subsequently, the children were asked to turn the light bulb on again for the same duration by holding down the spacebar (for a similar procedure, see Moll *et al.*, 2016; Tobia *et al.*, 2018). After the presentation of three practice trials, 12 test trials were administered, with each target duration randomly presented three times. The same target duration was never presented two or three times in succession. The duration reproduced by the child was recorded, and a percentage of

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error for each duration was calculated, in order to account for the Weber's law (Brannon *et al.*, 2008) that assumes larger errors for longer durations. Then, two main scores were calculated: an absolute error score, that is the mean of the percentages of error not considering if they were under- or over-estimations, and a systematic error, that considered if the children's estimation were under- or over-estimation of the target durations. When the duration proposed by the child was shorter than 100 ms (1.87% of total responses) or longer than 15 s (0.07% of total responses), it was considered an outlier and eliminated.

#### Time discrimination

Two sounds (sine wave, 400 Hz), differing only in their duration, were presented. For the entire duration of each sound, a drawing of an animal wearing headphones appeared on the screen. The children were asked to identify the longest or shortest sound by indicating which animal 'listened' to the longest or shortest sound. An example of a trial is presented in Figure 1. For half of the trials, the right answer was on the right ('p' button), and for the remaining trials, it was on the left ('w' button); stickers were placed on the two buttons to help the child identify them. The session consisted of three practice trials followed by 36 experimental trials organized in two separate sessions of 18 trials with a pause in the middle. Stimuli's durations ranged from 0.3-4.5 s, and three ratios between couples of sounds were considered: 1:3, 1:2, and 2:3. The accuracy score, ranging from 0 to 36, and the reaction times (RTs) measured only on correct answers were considered for the present study. Responses given in <200 ms (0.48% of the total responses) were considered too fast to be meaningful and were therefore excluded from the analyses; additionally, responses that fell outside the within-subjects mean RT ( $\pm 2$  SD; 5.29% of the total responses) were not analysed. For a more detailed description of the task, see Tobia et al. (2018).



Figure 1. Example of a trial from the time discrimination task. [Colour figure can be viewed at wileyonlinelibrary.com]

#### Procedure

A 7-month-long longitudinal design was applied. Questionnaires were administered to parents and teachers at the beginning of the last year of kindergarten for their child/pupil (October; Time 1). Time processing tasks were individually administered to children at both the beginning (Time 1) and the end (May, Time 2) of the school year in a unique session that took place in a quiet room at their school during school hours. Examiners were graduate trainees in psychology. Ethical approval was obtained from the University of Milan-Bicocca ethics committee.

These tests were administered as part of a larger and in-progress research project investigating early intervention on numeracy skills in preschoolers, for which many measures were implemented. No unreported measures were tested for the purposes of the present study.

#### Results

The descriptive statistics for the questionnaires and the scores for the time processing tasks are presented in Table 1. Most of the scores were distributed normally (skewness between -2 and +2; Trochim & Donnelly, 2006). To test the difference between parents' and teachers' total score at the Sense of Time Questionnaire, a paired *t*-test was run, showing a significant higher score as reported by parents, compared to teachers, t(169) = 3.092, p = .002.

Two structural equation models, including confirmatory factor analysis (CFA), were run with the application of the maximum-likelihood estimator. The sense of time scores obtained from the parent and teacher questionnaires were inserted into the model as predictors (Time 1), whereas time discrimination and time reproduction of short (500 ms) and long (mean of 1,000, 3,000, and 5,000 ms) durations measured at Time 1 (first model) and Time 2 (second model) were the dependent variables. CFA allowed us to identify the latent variable of time discrimination, obtained by accuracy and RT scores as observed variables. The model also included a correlational link between the two questionnaire scores and between the two time processing tasks. Figure 2a,b shows the model's results (standardized parameters). Sense of time as reported by the teachers was a significant predictor of time discrimination and time reproduction of longer durations both at Time 1 and Time 2, whereas it significantly predicted time reproduction of 500 ms only longitudinally. Parents' report of sense of time was not a significant predictor of children's performances. The proportion of explained variance was 51-47% for time discrimination, 2–4% for time reproduction of 500 ms, and 3–7% for time reproduction of longer durations. Both models showed good fit indices (Hu & Bentler, 1999): model  $\chi^2(3) = .608 \ p > .05$ , RMSEA = .000, 90% confidence interval .000-.058, CFI = 1, TLI = 1, SRMR = .009 for the concurrent model; model  $\chi^2(2) = 4.483 \ p > .05$ , RMSEA = .054, 90% confidence interval .000-.150, CFI = .98, TLI = .90, SRMR = .025 for the longitudinal model.

Finally, the development of time processing skills between Time 1 and Time 2 was analysed. A repeated-measure MANOVA run on the systematic errors observed for the four durations in the time reproduction task at Time 1 and 2, showed a significant effect of Time, F(1,164) = 32.852, p < .001,  $\eta^2 = .167$ , duration, F(3,492) = 129.844, p < .001,  $\eta^2 = .442$ , and a significant interaction Time × Duration, F(3,492) = 23.595, p < .001,  $\eta^2 = .126$ . As showed in Figure 3, children were significantly more accurate at Time 2, compared to Time 1, in estimating durations of 500 ms (p < .001) and 1,000 ms

	Table	١.	Descrip	otive	statistics	for	the	questionnaire	s and	the	tasks	administe	ered
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	Mean (SD)	Range	Skewness (0.186)	Kurtosis (0.370)
Time I				
Sense of Time Questionnaire – parents	1.97 (0.51)	0.78 to 3.00	-0.037	-0.863
Sense of Time Questionnaire – teachers	1.81 (0.62)	0.22 to 3.00	-0.290	-0.490
Time reproduction absolute error for 500 ms (%)	178.03 (202.75)	8.20 to 921.27	1.554	1.690
Time reproduction absolute error for long <sup>a</sup> durations (%)	80.30 (47.79)	17.57 to 288.99	1.984	4.480
Time reproduction systematic error for 500 ms (%)	138.57 (222.38)	-78.80 to 921.27	1.371	1.126
Time reproduction systematic error for long durations (%)	1.67 (73.18)	-89.10 to 217.30	1.249	.707
Time discrimination accuracy	23.30 (5.66)	7 to 36	-0.207	-0.307
Time discrimination mean RT (ms)	2,514 (1181)	860 to 9,001	1.892	6.160
Time 2				
Time reproduction absolute error for 500 ms (%)	71.77 (80.67)	9 to 427.60	2.510	6.415
Time reproduction absolute error for long durations (%)	50.20 (21.89)	17.15 to 159.78	1.699	4.632
Time reproduction systematic error for 500 ms (%)	31.06 (93.02)	-72.60 to 427.60	2.097	4.636
Time reproduction systematic error for long durations (%)	-24.02 (32.57)	-91.64 to 98.65	0.763	1.411
Time discrimination accuracy Time discrimination mean RT (ms)	23.06 (6.30) 2,222 (972)	7 to 34 609 to 6,067	-0.460 1.318	-0.713 2.559

<sup>a</sup>Mean of 1000, 3000 and 5000 ms.

(p < .001), whereas durations of 3,000 ms and 5,000 ms were similarly underestimated at both testing points. Two repeated-measure ANOVAs were run on measures of accuracy and RTs in time discrimination. Accuracy was similar across the two testing points, F (1,168) = .175, p = .676,  $\eta^2$  = .001, whereas the effect of Time was significant for the RTs measure, F(1,168) = 11.869, p = .001,  $\eta^2 = .066$ , showing that children were significantly faster in discriminating durations at Time 2.

#### Discussion

This study's purpose was to assess the criterion validity of a proxy-report questionnaire investigating preschoolers' sense of time that can be administered to parents and teachers of children aged 4–6 years old. This aim was pursued with a 7-month-long design, in which the Sense of Time Questionnaire was administered at Time 1 to parents and teachers, and child's time processing skills were assessed both at Time 1 and Time 2 via time reproduction and time discrimination tasks.

First, a moderate correlation between parents' and teachers' points of view was found, in line with a past study that used the same questionnaires (Tobia *et al.*, 2018) and consistent with the literature reporting low-to-medium accordance between parallel



**Figure 2.** (a,b) Models concurrently (a) and longitudinally (b) predicting time discrimination and time reproduction, separated for 500 ms and longer durations. Plain arrows represent significant relationships at  $p \le .01$ ; dotted arrows represent non-significant relationships. The arrows above the dependent variables represent their residual variances. \* $p \le .05$ .

versions of the questionnaires administered to parents and teachers (De Los Reyes *et al.*, 2015). In accordance, the comparison between parents' and teachers' total score at the Sense of Time Questionnaire showed a significant difference, with parents reporting higher temporal skills.

The structural equation model that was applied showed that the evaluation of preschoolers' sense of time as reported by teachers, but not by parents, predicts the performance of children in time processing. In particular, sense of time as rated by teachers predicted time discrimination and time reproduction of long durations



Figure 3. Time reproduction % of systematic error for durations of 500, 1,000, 3,000, and 5,000 ms.

concurrently, as well as time discrimination and time reproduction of both short and long durations longitudinally. Globally, the profile of sense of time skills as reported by teachers showed a stronger predictive power towards the time discrimination task, and around half of variance of this task was explained by questionnaires' scores. Time discrimination is considered a less demanding task, in terms of general cognitive skills such as working memory and speed processing, and seems to be a more 'pure' measure of time processing, compared to time reproduction (Droit-Volet, Wearden, & Zélanti, 2015). Therefore, it is possible that the Sense of Time Questionnaire score, as rated by teachers, can more accurately predict time discrimination skills than time reproduction, that is the result of cognitive processes that go further beyond the sense of time as assessed by this questionnaire; in line with this observation, the variance explained by the questionnaire scores was low for the time reproduction task. Considering the differences in prediction power found based on duration lengths of the time reproduction task, it emerges that the Sense of Time Questionnaire is more able to predict the cognitive processes linked to the processing of long durations, namely cognitively controlled mechanisms that involve right hemispheric prefrontal and parietal cortices (Mangels, Ivry, & Shimizu, 1998). However, a weak but significant predictive link appeared towards reproduction of a short duration in the longitudinal model. This result can be partially due to the fact that, looking at absolute error percentage for the short duration (71.77) at Time 2, this is closer to the one emerged for long durations (50.20), compared to the same indices assessed at Time 1 (178.03 and 80.30, respectively). It emerged that between Time 1 and 2, the implicit process of time processing of short durations improved, leading to an absolute error percentage closer to the one for longer durations, and this could have led to our significant result in the longitudinal model. However, this result needs further investigation.

The lack of significant predictive role of the sense of time as rated by parents partially contrasts with our hypothesis; in fact, considering the preliminary results on the accordance between parent questionnaires and children's behavioural performance in time-related tasks (Meaux & Chelonis, 2005; Tobia et al., 2018), we expected the points of view of parents to be significantly linked to preschoolers' performance in time reproduction and time discrimination. However, preschool might be a period in which parents are more focused on their children's linguistic and number skills, whereas time processing skills might not be among the functions on which parents of preschoolers focus their attention; in other words, parents might not expect their children to have developed adequate time processing skills, or they might not view failures in this domain with apprehension. Beyond the lack of parents' attention to monitoring skills in this domain, another possible explanation for the failure of the parents' version of the Sense of Time Questionnaire in predicting preschoolers' time processing skills is related to the actual ability of parents in assessing their children's skills in this domain when they are so young. In fact, whereas teachers can base their judgement about a child's sense of time on direct comparisons with his/her classmates, parents usually do not have the opportunity to make comparisons with as many peers. Furthermore, daily routine at home is different compared to the routine at school: at home, parents can usually organize their routine in a flexible way to respond to their child's needs (e.g., waiting a few minutes for lunch if he/ she is finishing his/her preferred cartoon), whereas at school, daily routines are more rigid, and it is therefore easier to identify children's ability to keep up with such routines. Finally, past studies have involved children with developmental disorders or at risk of developing disorders, and most of these studies analysed primary school students and older children. It is possible that parents can adequately assess sense of time in older children or in children with impairments but not in a community sample of preschoolers, for whom teachers are more able to describe sense of time.

Responses given to questionnaires by parents and teachers are based on children's behaviour in specific contexts, that is, the result of multiple variables. In fact, children's time management and sense of time are the result of time processing skills and domaingeneral cognitive processes (memory, attention, decision-making; Block et al., 2010; Droit-Volet, 2003, 2016; Van Opstal & Verguts, 2013), as well as emotional variables (e.g., speeding up of time when involved in pleasant activities; Droit-Volet & Gil, 2009) and environmental factors (e.g., distraction stimuli; Barkley, Koplowitz, Anderson, & McMurray, 1997). Furthermore, time processing skills themselves involve many parts of the brain and multiple cognitive processes (Wittmann, 2009). Beyond these potential confounding factors, teachers' scores for the Sense of Time Questionnaire can predict children's performance in time processing behavioural tasks, making this instrument a valid tool for assessing time-related abilities in preschoolers. However, additional factors as executive functions could independently predict children's time processing behavioural performance as well as be partially involved in what the Sense of Time Questionnaire assesses (see, e.g., the role of executive functions in daily routines; Blasco, Saxton, & Gerrie, 2014). A following investigation should therefore assess these variables and include them as potential predictors of time processing skills.

An additional aim of this study was investigating changes in children's time processing skills between Time 1 and Time 2. Results on the time reproduction task showed an improvement in the reproduction of the shorter durations (500 and 1,000 ms) that were on average less overestimated at Time 2. This is in line with past studies showing that children underestimate long durations but overestimate short ones (Droit-Volet, 2010), and that they become more accurate in estimation with age (Droit-Volet, 2016). However,

time reproduction has been showed to be demanding in terms of working memory and information processing speed, and age-related differences in this task can also be the result of improvements with age in these general cognitive skills (Droit-Volet *et al.*, 2015). Accuracy scores in time discrimination were similar at the two testing points, but children resulted faster in giving their correct responses at Time 2. It is possible that 7-month period is too short for detecting significant changes in time discrimination accuracy, also because children probably use a similar strategy to solve the task at both testing points, not using counting as support for example (Wilkening, Levin, & Druyan, 1987). However, the fester responses could suggest an improvement in time processing. Also in this case, improvement in more general cognitive skills, such as information processing speed, can at least partially be the cause of this significant change.

This study has some limitations that should be addressed by future studies. First, considering the behavioural tasks administered, both time reproduction and time discrimination used visually presented stimuli, but in the time discrimination task an additional auditory stimulation was presented. Past studies showed differences in children's time processing skills based on the sensory modality of stimulation (Rattat, 2010; Zélanti & Droit-Volet, 2012); for this reason, future studies should consider this factor. Then, both the behavioural tasks used in this study required a motor response, and different levels of attentional and memory skills; including a measure of implicit (or 'pure'; Droit-Volet, 2013) time processing, as the temporal bisection task, would allow to avoid the interference of more general cognitive variables. Furthermore, the results regarding the longitudinal predictive power of questionnaires were developed in the course of one school year and covered a short period; further studies should investigate the capacity of proxy-report questionnaires assessing sense of time in predicting longterm outcomes regarding time processing skills, for example, from preschool to primary school, when some developmental disorders with associated time impairments are diagnosed (e.g., developmental dyslexia and dyscalculia). Finally, in the present study, two experimental time processing tasks were assessed, and these were chosen for being reliable tasks previously used in the literature. It would be interesting, however, to develop other more ecological tasks assessing sense of time in children's everyday lives.

#### Conclusion

This study showed that the evaluation of preschoolers' sense of time as reported by teachers, but not by parents, predicts children's time processing skills, both concurrently and longitudinally. Beyond the presented limitations, the implications of the present study's results are manifold. To date, this is the first questionnaire that can be used as a valid tool for assessing time processing skills in children aged 4-6, in particular using the point of view of their teachers. This point of view is particularly useful for large-scale screenings to identify children with a low sense of time or, considering the time processing difficulties associated with developmental disorders, this questionnaire can be associated with other proxy-report questionnaires investigating indicators of developmental disorders. In this case, this questionnaire can be used in the diagnostic process to more deeply describe the profile of disorders than can be identified in preschoolers, such as ADHD and ASD. Importantly, time processing difficulties have been identified as an independent neuropsychological component of ADHD that is part of a triple pathway model including timing, inhibition, and delay deficits (Sonuga-Barke, Bitsakou, & Thompson, 2010). Furthermore, the assessment of time-related skills may represent a valid method for distinguishing between ADHD versus other attention related psychiatric disorders (Walg *et al.*, 2017). The need for instruments for the assessment of time processing skills is therefore essential. Finally, considering the school context, the Sense of Time Questionnaire can be used to outline the profile of a class of preschoolers to plan school projects that improve this skill.

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Received 5 November 2018; revised version received 30 April 2019

#### Appendix: Sense of time scale

My child/pupil is able to end a time-limited activity before the time is over.

My child/pupil talks about past events in a correct way (speaking about them as they were already past and not as present or future events).

My child/pupil seems to know what to expect during daily routines (e.g., get ready for school/home; sneak time).

My child/pupil autonomously realizes when a daily routine is approaching (e.g., lunch time; get ready for outdoor activities).

My child/pupil asks 'what time is it?' or refers spontaneously to times and durations during the day.

My child/pupil understands terms such as 'yesterday' and 'tomorrow'.

My child/pupil correctly uses terms such as 'yesterday' and 'tomorrow'.

My child/pupil understands terms such as 'before' and 'after'.

My child/pupil correctly uses terms such as 'before' and 'after'.

### The Conners 3–short forms: Evaluating the adequacy of brief versions to assess ADHD symptoms and related problems

Clinical Child Psychology and Psychiatry 2019, Vol. 24(4) 791–808 © The Author(s) 2019 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/1359104519846602 journals.sagepub.com/home/ccp



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#### Abstract

The Conners' Rating Scales are widely used to assess attention deficit/hyperactivity disorder (ADHD) and related difficulties in children and adolescents. A short form of the scales is available, which, along with the several advantages of brief versions, also displays good psychometric properties. Nonetheless, no studies have confirmed them in cultural contexts different from the original one. The present study examined the psychometric properties of the Self-Report, Parent, and Teacher Conners 3–Short Forms in terms of reliability and validity in an Italian sample. Analyses were performed on 591 children and adolescents, 631 parents' ratings, and 325 teachers' ratings. To test for discriminative validity, ADHD clinical samples of 55 youth, 63 parents, and 15 teachers were compared to gender- and age-matched groups. Findings confirmed the original multidimensional structures and supported the Conners 3–Short Form scales as reliable and valid tools to assess ADHD and its main comorbid conditions.

#### **Keywords**

Attention deficit/hyperactivity disorder, Conners 3, short form, brief scale, psychometric properties

Attention deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder whose essential feature is a persistent pattern of inattention, hyperactivity, and impulsivity that interferes with functioning or development (American Psychiatric Association [APA], 2013). Nonetheless, it is often associated with other cognitive, social, and emotional impairments, including difficulties in executive functioning, poorer school performance, adverse peer and family relationships, and aggressive behavior (APA, 2013; Barkley, 1997; Capano, Minden, Chen, Schachar, & Ickowicz,

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2008; Spencer, Biederman, & Mick, 2007; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). ADHD is one of the most diagnosed disorders in childhood and adolescence, whose worldwide prevalence in school-aged children under 18 years old is estimated to be around 7% (Thomas, Sanders, Doust, Beller, & Glasziou, 2015). Focusing on Europe, prevalence seems to be lower than in the United States (Anderson, 1996; Timimi & Taylor, 2004). For instance, Spanish prevalence is estimated to be around 6.8% (Catalá-López et al., 2012), prevalence in Greece is about 6.0% (Skounti et al., 2010), German prevalence is about 4.8% (Huss, Hölling, Kurth, & Schlack, 2008), French prevalence of ADHD is between 3.5% and 5.6% (Lecendreux, Konofal, & Faraone, 2011), and Italian prevalence is estimated to reach 4% (http://old.iss.it/binary/adhd/cont/Registro\_nazion-ale\_dell\_ADHD\_2007\_2016.pdf).

Given the negative impact of ADHD symptoms and its associated complications, it is crucial to dispose of valid, reliable but nevertheless brief instruments that may help clinicians identifying not only ADHD symptoms, but also the most frequent comorbid difficulties evidenced in literature that complicate the youth's clinical profile. The diagnostic process should never be based only on rating scales, as a thorough clinical assessment including observations and interviews is needed. In fact, the clinical guidelines suggest that information should be obtained primarily from reports from parents or guardians, teachers, and mental health clinicians involved in the child's care (Subcommittee on Attention-Deficit/Hyperactivity Disorder et al., 2011). However, when combined with clinical expertise and other clinical tools, the Conners' Rating Scales (Conners, 1989, 1997, 2008) may represent a remarkable option to assist clinicians in ADHD diagnosis and screening. The advantages of the Conners scales have been supported by both studies confirming the excellent psychometric properties of the scales (e.g. Arias Martínez, Arias González, & Gómez Sánchez, 2013; Christiansen et al., 2016; Conners, Sitarenios, Parker, & Epstein, 1998; Izzo, Donati, & Primi, 2018a, 2019; Morales-Hidalgo, Hernández-Martínez, Vera, Voltas, & Canals, 2017) and clinical studies. In fact, research has demonstrated the effectiveness of the Conners scales in distinguishing people with ADHD from those with no clinical diagnoses; moreover, the Conners scales have been found to have predictive validity for the development of behavioral problems in adolescence (e.g. Gau, Soong, Chiu, & Tsai, 2006; Izzo, Donati, & Primi, 2018b; Lindquist, Carlsson, Persson, & Uvebrant, 2006; Mannuzza, Klein, Abikoff, & Moulton Iii, 2004; Rucklidge, 2006).

Despite the strengths of the Conners scales, the most recent edition included about 100 items for all three versions, filled in by parents (Conners 3–Parent; Conners 3-P), teachers (Conners 3–Teacher; Conners 3–T), and youth (Conners 3–Self-Report; Conners 3-SR) (Conners, 2008). Thus, some alternative forms of the scales have been developed to dispose of shorter assessment tools: two indices and the Conners 3 short forms. Nevertheless, the indices (i.e. the Conners 3 ADHD Index and the Conners 3 Global Index; Arias Martínez et al., 2013; Conners, 2008; Morales-Hidalgo et al., 2017) are structurally different from the Conners 3–long forms. In fact, the Conners 3 ADHD Index only assesses Inattention and Hyperactivity/Impulsivity, instead of presenting a clear multidimensional structure assessing ADHD and its most frequent comorbid conditions; and the Conners 3 Global Index is a general measure of psychopathology, instead of focusing on ADHD.

Instead, the short forms include the same Content scales present in the long form. In fact, they represent a restricted version of the long ones, including five to six items per each Conners 3–long form Content scale. The Content scales composing the short form of the Self-Report version (*Conners 3–Self-Report Scale–SF, Short Form*) are Inattention, Hyperactivity/Impulsivity, Learning Problems, Defiance/Aggression, and Family Relations. The Content scales composing the short form of the Parent version (*Conners 3–Parent Scale–SF, Short Form*) are Inattention, Hyperactivity/Impulsivity, Learning Problems, Executive Functioning, Defiance/Aggression, and Peer Relations. Eventually, the scales composing the short form of the Teacher (*Conners 3–Teacher*)

*Scale–SF, Short Form*) version are Inattention, Hyperactivity/Impulsivity, Learning Problems/ Executive Functioning, Defiance/Aggression, and Peer Relations.

If the Conners 3 long scales represent a remarkable option in the clinical field, the short form of the Conners 3 scales may be an even better solution, since they allow to gather a great amount of clinical information about school-aged children and adolescents from parent, teacher, and youth, though presenting a restricted pool of items. In fact, the Conners 3–short form scales combine the advantages of a brief assessment with the existence of a multifactorial structure that allows clinician to delineate an accurate, precise profile: instead of providing a unique total score, the multidimensionality of the scales allows to discriminate whether the child's difficulties would mainly affect the inattention area rather than the hyperactive/impulsive or the aggression spheres, thus enabling to identify which domain(s) may require an intervention. Notably, the dimensions are correlated between them, meaning that, though allowing to investigate the specific problematic area(s), the constructs examined by the scales are related each other, in line with the clinical definition of ADHD as a neurodevelopmental disorder often associated with difficulties in the areas of executive functioning, learning, aggression, and social relationships (APA, 2013). This structure pattern gives support to the strength of the Conners scales as a measure aiming to assess ADHD and its most frequently related impairments.

Unlike the previous brief versions (Conners, 1989, 1997), the short forms of the last edition of the Conners (2008) appear to be a valuable short instrument tool to measure ADHD symptoms and related problems as their items have been submitted to a thorough statistical procedure which allowed to select the most effective items from the full-length scales. In fact, according to the item discrimination analyses, the means and standard deviations of various clinical groups (i.e. ADHD, Major Depressive Disorder, Bipolar Disorder, Anxiety Disorders, Learning Disorders, and Conduct and Oppositional Defiant Disorders) were compared to the general population and among all those clinical groups. If the item did not discriminate well between the target clinical group and both the general population and the other clinical groups, the item was considered for exclusion from the short form. Moreover, item response theory (IRT) analyses were performed; IRT models provide a mathematical expression of the latent trait, theta ( $\theta$ ), which includes two parameters, namely a, that is, the ability of the item to discriminate between people with varying levels of the trait, and b, that is, the item location, which is the trait level required for a person to be as likely to choose a particular response category as to not respond in this category (Ostini & Nering, 2006). IRT also allows to obtain an estimate of the amount of information provided by each item, summarized with item information curves (IIC). Items that provided the least amount of discrimination (i.e. items with the smallest a parameter estimates), items with unusual b parameters (i.e. no gradual movement from one response option to the next), and items that provided the least amount of information (i.e. flat IICs) were considered for exclusion from the final solutions. Finally, the five items with the highest factor loadings from the exploratory analysis conducted on the long scales were regressed onto the full-length scale score to maximize the multiple correlation between the five items and the fulllength scale score to ensure that the shortened form would account for the maximum amount of variance in the full-length score. The listed analyses resulted in five to six items per each scale, so the short form of the Conners 3-P had 45 items, and the short forms of both the Conners 3-T and the Conners 3-SR had 41 items.

When examining their psychometric properties, the original short scales resulted to have adequate reliability in terms of internal consistency. In fact, the mean Cronbach's alpha for the *Conners 3–Parent Scale–SF* was .89, ranging from .85 to .92; the mean Cronbach's alpha for the *Conners 3–Teacher Scale–SF* was .91, ranging from .87 to .94; and the mean Cronbach's alpha for the *Conners 3–Self-Report Scale–SF* was .83, ranging from .77 to .89. Moreover, the scales showed good factorial validity, with results from the confirmatory factor analyses (CFAs) revealing that the six-factor model for the Conners 3-P and the five-factor models for both the Conners 3-SR and the Conners 3-T had adequate fit—that is, comparative fit index (CFI) values were higher than .90, root mean square error approximation (RMSEA) values were lower than .08, and all parameter estimates and all correlations were significant for all three versions. Also, good validity in terms of both across-informant correlations (expressed as the correlation between different informants' ratings of the same youth) was found, with mean parent to teacher correlation equal to .59 (ranging from .50 to .66), mean parent to youth correlation equal to .57 (ranging from .50 to .66), and mean teacher to youth correlation equal to .49 (ranging from .42 to .57). Eventually, discriminative validity, assessed with the ability to distinguish between clinical and non-clinical samples, was supported, being the means for the clinical group significantly higher than both the general population and other clinical groups, and being sensitivity and specificity values acceptable to high for all three versions (Conners, 2008).

The psychometric properties of the full-length forms of the Conners 3 scales have been previously tested and confirmed in cultural contexts different from the original one (Christiansen et al., 2016; Izzo et al., 2018a, 2019). Differently, the psychometric properties of the short forms of the Conners 3 have not been tested by any other study but the original one—in both the English version and the Spanish version, which was validated for the Spanish-speaking population of the United States (Conners, 2008). Thus, the excellent features characterizing the original edition have not been confirmed by other studies yet.

With these premises, the present study aimed at assessing the psychometric properties of the Conners 3–short form scales in the Italian version (Primi & Maschietto, 2017), as to validate them for the Italian context. The first goal was to find evidence of the internal structure of the scales by performing a CFA, as to probe the replicability of the original factors and give support to their multidimensional structure, in line with the original work (Conners, 2008). However, since any other studies but the original one have verified the structure of the short forms of the Scales, as to test whether the original structures were in fact the best fitting solutions. The first model replicated the original multidimensional structure (Conners, 2008). Then, since in the original work the correlations between the different dimensions of the short scales were particularly high (Conners, 2008), two more models were performed: a one-factor model that considered the conners 3 scales as being unidimensional, and a second-order factor model that hypothesized the existence of a second-order factor such as ADHD, which may break down into the dimensions originally found.

We also aimed to assess the reliability of the scales in terms of internal consistency as a measure of the accuracy of the test. Moreover, this study aimed to assess the across-informant correlations between the different versions (parent-teacher ratings, parent-youth rating, and teacher-youth ratings) as an evidence of the validity of the Conners 3-short form scales. In fact, since the Self-Report, Parent, and Teacher versions all measure similar constructs, concordance in scores across the different informants would provide support for the validity of the Conners 3-short form scales. However, considering that the different sources of information assess the child from different points of view—that is, the parent delineates a profile based on how the son behaves at home, the teacher describes the student according to what can be observed in class, and the child responds consistent with his or her personal perceptions and insights—a certain degree of incongruence between informants should be expected, so correlations should be moderate in size (Conners, 2008). In fact, it is not unusual that informant discrepancies occur (Achenbach, 2006; Achenbach, McConaughy, & Howell, 1987; De Los Reyes et al., 2015). In details, we expected to find correlations between informants around .36, in line with previous literature reporting the level of multiinformant correspondence when referring to externalizing problems (De Los Reyes et al., 2015). In addition, validity in terms of discriminative validity was examined by comparing a clinical

sample with a diagnosis of ADHD with a non-clinical sample, with the expectation that the scales were able to discriminate between these two groups.

# Method

### Participants

Six schools (two primary schools, two middle schools, and two high schools) were randomly selected from the schools present in the North-Center of Italy. However, one middle school declined to participate because it was already involved in other projects. Eventually, participants were 599 youths (53% males, age ranged from 8 to 18 years), 631 youth's parents (49% of youth was male, with age ranging from 6 to 18 years; 84% of the rating parents were mothers), and 409 youth's teachers (53% of youth was male, with age ranging from 6 to 18 years; 98% of the rating teachers were women). Some questionnaires were excluded because the percentage of omitted responses exceeded the allowable number reported in the original manual, which is equal to one item for all the Content scale (Conners, 2008). Thus, the final youth sample included 591 children and adolescents (54% males), attending primary (41%), middle (33%), and high schools (26%). Concerning the parent sample, instead, all questionnaires were completed or with an acceptable number of omitted responses, so the final sample included parent evaluations of 631 children and adolescents (49% of youth was male) attending primary (58%), middle (30%), and high schools (12%). Eventually, for the teacher sample, less than 80% of them returned the questionnaire completed or with an acceptable percentage of missing answers, so the final sample included teacher ratings of 325 youth (51% males; all rating teachers were women) belonging to primary (63%), middle (25%), and high schools (12%).

As to measure discriminative validity, a clinical sample of youth with a diagnosis of ADHD—and their parents and teachers—was involved in this study. Participants were 65 youth attending a clinical center in the North of Italy specialized in ADHD and other neuropsychological disorders, as well as their parents and teachers. After the analysis of missing cases, the study included ratings from a sample of 55 youth with ADHD (93% males aged 8–18 years), though 50% of them (n=28) had an additional diagnosis. Specifically, nine children had Oppositional Defiant Disorder (32%), nine had a Learning Disorder (32%), six had an Anxiety Disorder (21%), two had a mood disorder (7%), one had a Limited Cognitive Functioning (4%), and one had Motor Coordination Disorder (4%). For the Parent version, after deleting missing cases, the final sample included 63 youth's parent ratings (95% of rated youth was male, with age ranging from 6 to 18 years). Eventually, for the Teacher version, only 23% of them (n=15) returned the protocol completed or with an acceptable percentage of missing answers (100% of rated youth was male, with age ranging from 6 to 18 years).

The clinical samples were compared to gender and age-matched non-clinical samples for the Conners 3–Self-Report scale (n=55, 93% males), for the Conners 3–Parent scale (n=63; 95% males), and for the Conners 3–Teacher scale (n=15; 100% males). Descriptive statistics of the samples are reported in Table 1.

### Instruments

The short forms of the Self-Report, Parent, and Teacher Conners 3 Rating Scales (Italian version: Primi & Maschietto, 2017) include items aiming to measure youth's ADHD symptoms and their most frequent associated complications, that is, learning problems, defiance/aggression, and difficulties in social relationships. Content scales vary in number according to the specific version: the *Conners 3–Self-Report Scale–SF* contains 27 items loading onto the five Content scales, the

		General sample	Non-clinical sample	Clinical sample
Conners 3-SR	Males/females Age (range)	320/271 (N=591) M=12.26, SD=2.96 (8.00-18.91)	51/4 (N=55) M=12.08, SD=2.50 (8.00-17.58)	51/4 (N=55) M=12.21, SD=2.38 (7.75-17.58)
Conners 3-P	Males/females Age (range)	312/319 (N=631) M=10.75, SD=3.05 (6.00-18.75)	60/3 (N=63) M=10.92, SD=2.82 (6.16-18.33)	60/3 (N=63) M=11.58, SD=2.82 (6.00-17.58)
Conners 3-T	Males/females Age (range)	165/160 (N=325) M=10.47, SD=3.13 (6.00-18.75)	15/0 M=11.09, SD=3.02 (7.41–17.33)	15/0 M=11.11, SD=3.00 (7.33–17.16)

 Table 1. Descriptive statistics of the samples to examine the properties of all versions of the Conners 3 scales.

SR: Self-Report; P: Parent; T: Teacher.

*Conners 3–Parent Scale–SF* includes 31 items on its six Content scales, and the *Conners 3–Teacher Scale–SF* includes 27 items on its five Content scales. Items are rated on a Likert-type scale ranging from 0 (*not true at all/never*) to 3 (*very much true/very frequently*).

# Procedure

Participants were recruited in schools; to obtain the approval of this research, a study protocol in accordance with the criteria of the Declaration of Helsinki was reviewed and approved by each Head Teacher and school board of different primary, middle, and high schools of North-Center Italy. Parents and teachers were informed with a short study description and asked to provide their informed consent; furthermore, parents were asked to provide the informed consent to allow their children to take part in the research. Written informed consent was obtained from all participants (and from participants' parents in case of underage youth), and their confidentiality was ensured. All participants completed their questionnaire through a self-administered procedure, though parents completed it at home, whereas teachers and students completed it in class, during school-time. The time needed to complete the scales was approximately 10 minutes.

Concerning the clinical sample, parents of the patients attending the center were informed with a short study description and asked to provide their informed consent. Furthermore, they were asked both to provide the informed consent to allow their children to take part in the research, and to involve one of the child's teachers and to give them an informed consent as to obtain also a teacher rating. Written informed consent was obtained from all participants (and from participants' parents in case of underage youth), and their confidentiality was ensured. All participants completed their questionnaire through a self-administered procedure.

### Statistical analyses

A preliminary handling of missing values was performed, with values of omitted answers being estimated through the application of a formula calculating a prorated score, as referred in the original manual (Conners, 2008).<sup>1</sup> To examine the internal structure of the Conners 3-SR, Conners 3-P, and Conners 3-T short forms, CFAs employing the maximum likelihood (ML) estimator (AMOS software) were conducted on the Content scales, with factor covariances being analyzed; items were loaded onto their respective scales, and the scales correlated with

each other. Adequate fit for the model was defined according to the ratio of chi-square to its degrees of freedom ( $\chi^2/df$ ), the Tucker–Lewis Index (Tucker & Lewis, 1973), the CFI (Bentler, 1990), the Steiger–Lind Root Mean Square Error of Approximation Index (RMSEA; Steiger & Lind, 1980), and the standardized root mean square residual (SRMR; Bentler, 1995). In details, adequacy of the model was defined as TLI and CFI values equal to .90 or greater, RMSEA values of .06 or below, and SRMR values of .08 or below (Hu & Bentler, 1999). As to compare different CFA models to test which model had the best fit to data—that is, either the original structure, or the unidimensional model, or the second-order factor model-the following indices were examined: the Akaike Information Criterion (AIC; Akaike, 1974), the Consistent version of AIC (CAIC; Akaike, 1974), and the Bayesian Information Criterion (BIC; Schwarz, 1978). The AIC is derived from information theory and is generally used when comparing non-nested or nonhierarchical models estimated with the same data. The CAIC is a modified version of the AIC which adjusts for sample size. The BIC is another criterion for model selection that measures the trade-off between model fit and complexity of the model. Note that none of those criteria inform us directly about the quality of the model; we use them when we want to compare models and determine which of several models is the best, with smaller values suggesting a better fitting model (Busemeyer & Diederich, 2014).

To assess reliability, internal consistency of the Content scales through the Cronbach's alphas was obtained. To examine across-informant agreement as a validity measure, correlation coefficients (Pearson's r) were calculated among the three versions. In addition, to test for discriminative validity (i.e. to test how much the Conners 3 scales were able in distinguishing between youth with and without ADHD), a receiver operating characteristic (ROC) curve using those two groups was plotted for each Content scale of each version of the Conners 3 separately. The area under curve (AUC), sensitivity, and specificity were calculated for each Content scale of each version. As a "gold standard" to examine sensitivity and specificity of the scales, participants were either diagnosed with ADHD or not based on the scores on the second edition of the Conners (1997) and on a clinical interview. According to Marôco (2018), accuracy of sensitivity and specificity were good when values were higher than .80, and acceptable between .50 and .80. Moreover, t test comparisons were performed to compare the clinical and the nonclinical sample on the scores obtained for each Content scale of the Self-Report, Parent, and Teacher versions.

# Results

Preliminary item-level statistics showing the endorsement rates for each of the Likert-type categories were performed (Table 2). Overall, items showed a good level of variability in the answers suggesting a normal distribution, in line with values of both skewness and kurtosis—except for some items showing very low variability. However, these results are in line with the content of the involved items, since the critical items mostly belonged to the Defiance/Aggression scale (i.e. "I bully or threaten other people" and "He/She starts fights with other people").

# Structural validity

Concerning the *Conners 3–Self-Report Scale–SF*, a model replicating its original structure was performed. When comparing this model to both a one-factor model and a second-order factor model, goodness-of-fit indicators suggested that the original model had the best fit to data (Table 3). Each item loaded strongly and significantly on its hypothesized factor (Table 4), and the correlations between the five factors were all significant, ranging from .31 to .81 (Table 5).

Table 2. It	em an:	alysis show.	ing skew	ness,	kurto	sis, anc	l the r	espon	se rates (	%) for ea	ich of 1	the Lik	(t-t)	pe ca	egorie	s.					
	Conne	ars 3-SR						Conne	rs 3-P						Conner	s 3-T					
	ltem	Skewness	Kurtosis	Likert	-type ca	tegories		ltem	Skewness	Kurtosis	Likert-t	ype cate	gories		ltem	Skewness	Kurtosis	Likert-t	ype cate	gories	
		(0136)	(UZ - 3C)	0	_	2	e		(01 3c)	(4136)	0	_	5	س		(+1 3c)	(17-20)	0	_	~	
Inattention	m	0.98	0.14	50.6	32.3	13.5	3.6	17	0.50	-0.29	28.7	46.4	20.0	4.9	٣	1.12	.47	52.6	31.4	4.11	4.6
	S	0.84	-0.02	42.5	38.1	14.2	5.2	27	1.14	0.49	53.6	30.3	Ш.З	4.9	10	1.28	11.	56.3	28.3	9.2	6.2
	4	1.03	0.39	48.7	35.5	11.5	4.2	30	I. I	0.58	49.8	35.0	10.0	5.2	26	0.52	50	28.9	42.5	20.3	8.3
	16	0.31	-0.68	21.5	42.I	26.2	10.2	34	0.91	0.33	43.3	41.0	11.7	4.0	36	0.95	17	49.5	28.6	13.8	8.1
	18	0.96	0.28	48.2	36.4	12.2	3.2	4	I.I5	0.82	53.I	34.7	9.4	2.9	39	0.93	10	46.5	32.6	13.2	7.7
	27	10.1	0.21	47.7	34.3	12.0	5.9														
Hyperactivity/	_	0.77	-0.29	42.5	35.4	l 6.6	5.6	m	I.52	I.48	65.8	21.7	9.5	3.0	_	2.04	3.80	75.1	17.5	5.8	 2
Impulsivity	4	0.93	-0.30	50.4	26.4	14.6	8.6	ъ	I.83	2.70	72.4	18.4	7.4	8. 1	8	2.56	6.30	81.8	11.7	4.9	
	15	1.42	Ξ.	61.4	24.2	9.0	5.4	7	1.96	3.44	74.6	18.4	5.9	-	22	2.58	6.25	81.8	Ξ.	4.9	2.2
	29	1.09	0.31	52.3	30.3	12.0	5.4	13	3.34	II.58	88.7	8.	2.9	0.3	24	1.91	3.29	70.8	20.9	5.5	2.8
	31	0.41	-0.90	29.I	36.0	21.7	13.2	24	0.71	-0.60	43.3	30.I	18.4	8.2	30	I.53	09.1	67.4	22.2	8.9	
								28	1.19	0.90	55.8	33.0	9.0	2.2	32	2.03	3.83	75.7	18.2	5.2	0.9
Learning	6	1.42	1.33	61.9	26. I	9.0	3.0	8	I.59	1.93	65.0	24.2	7.4	3.4							
Problems	<u>n</u>	1.08	0.13	54.3	26.6	13.5	5.6	0	0.90	0.24	45.0	39.I	12.4	3.5							
	33	1.59	2.06	65.8	24.9	7.1	2.2	25	1.90	3.23	71.6	20.4	5.9	2.1							
	36	I.I6	0.50	51.3	32.3	9.1	7.3	36	I.03	0.08	54.0	27.6	14.4	4.0							
	38	0.77	-0.75	48.2	23.5	16.4	8.II	39	1.87	3.06	72.4	19.7	6.3	9. I							
Executive								_	2.18	4.67	78.6	17.3	3.6	0.5	4	I.26	.79	56.6	28.6	I 0.2	4.6
<b>Functioning</b> <sup>a</sup>								15	1.51	I.64	63.1	25.4	7.9	3.6	16	I.35	1.06	59.1	27.1	9.2	4.6
								20	1.06	0.71	48.5	38.5	9.5	3.5	8	1.25	00 <sup>.</sup> I	58.8	30.5	8.9	<u>8.</u>
								32	14.1	1.41	62.6	26.9	8.4	2.1	23	0.22	79	12.6	43.4	27.4	16.6
								35	0.71	-0.30	38.8	38.4	17.0	5.9	28	I.07	.12	53.5	27.1	I 3.2	6.2
															35	1.06	.35	52.0	32.0	12.3	3.7
Defiance/	œ	4.13	18.92	91.5	6.4	1.7	m.	4	6.37	47.50	96.0	3.2	0.6	0.2	ы	6.04	40.10	95.1	3.4	0.6	0.9
Aggression	0	3.04	9.06	85.8	8.5	3.7	2.0	61	3.86	I 5.42	92.7	6.7	0.6	0	7	2.42	5.87	81.8	I 4.8	3.1	3.0
	17	2.04	3.31	75.8	13.7	7.1	9.4 1	21	4.86	27.13	93.8	5.1	0.1	0.2	12	2.02	9.25	85.5	9.5	3.7	1.2
	30	I.33	1.19	56.0	31.6	8.0	4.4	23	7.43	67.38	96.8	2.7	0.3	0.2	I5	5.94	41.99	95.I	4.0	0.6	0.3
	32	4.41	21.51	91.7	5.9	I.5	œ <u>.</u>	26	1.22	1.27	58.5	34.7	5.7	-	17	3.72	14.27	91.7	7.1	1.2	0
	39	3.86	17.02	88.2	9.6	œ <u>.</u>	4.														
Relations <sup>b</sup>	61	1.96	3.23	71.4	19.3	5.2	4.	4	I.88	3.10	6.69	21.6	5.5	3.0	=	I.59	1.77	67.4	21.2	8.9	2.5
	22	0.90	Ц. Р	44.3	34.7	13.2	7.8	9	3.03	10.31	857	6.II	6.I	0.5	20	2.18	4.65	75.7	17.8	4.6	8. 1
	26	I.84	3.20	69.4	23.4	5.1	2.2	8	2.81	7.42	86.8	10.5	2.7	0	27	I.84	2.79	69.2	20.9	5.8	4.0
	34	I.35	1.06	59.9	26.6	9.6	3.9	38	4.08	18.11	91.1	6.2	2.1	0.6	29	2.17	4.63	74.8	18.8	4.3	2.2
	37	1.92	3.16	69.7	21.3	4.7	4.2	43	2.22	4.71	76.4	17.0	4.8	l.9	37	2.10	4.49	74.2	20.3	4.0	I.5

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SR: Self-Report; P: Parent; T: Teacher.

Likert-type categories: 0=not true at all; 1=just a little true; 2=pretty much true; 3=very much true. ∍Executive Functioning scale for the Conners 3-P scale and Learning Problems/Executive Functioning scale for the Conners 3-T scale. <sup>opeer</sup> Relations for both the Conners 3-P and the Conners 3-T scales, and Family Relations for the Conners 3-SR scale. The same procedure was conducted for the *Conners 3–Parent Scale–SF*, so a model testing the original structure was compared to both a one-factor model and a second-order factor model. Nonetheless, results showed that the original model had the best fit (Table 3). Factor loadings were all greater than .30 (p < .001; Table 4), and the correlations between the six factors were all significant, ranging from .13 to .93 (Table 5).

Eventually, to test for the structural validity of the *Conners 3–Teacher Scale–SF*, three CFAs on a model replicating its original structure, on a one-factor model, and on a second-order factor model were performed. Once again, results supported the original model as having the best fit to data (Table 3). Each item loaded strongly and significantly on its hypothesized factor (Table 4), and the correlations between the five factors were all significant, ranging from .37 to .89 (Table 5).

# Reliability

Concerning reliability, we aimed to measure the internal consistency of the content scales. For what concerns the *Conners 3–Self-Report Scale–SF*, Cronbach's alphas showed an acceptable internal consistency with alpha's values ranging from .63 to .79 (Table 6). For the *Conners 3–Parent Scale–SF*, the Content scales showed acceptable to high levels of reliability (ranging from .72 to .89), except for the Defiance/Aggression scale ( $\alpha$  = .47). Finally, for the *Conners 3–Teacher Scale–SF*, Cronbach's alphas were high, with values ranging from .84 to .94.

### Validity

As a measure of validity in terms of across-informant correlations, correlation coefficients were calculated among the three versions. We performed across-informant correlations both using the total summed scores (Table 7), and estimating the correlations among latent variables in a series of CFA models—one for each Content scale of the Conners 3 scales (see Supplementary Appendix 1). In both cases, the correlations were found to be all significant and moderate in size, indicating that there was a good deal of consistency between different informants' ratings of the same youth across the Conners 3–short form scores. Thus, the correlations were not high enough to suggest redundancy in collecting all three assessments.

As to measure discriminative validity, we compared the clinical sample with a non-clinical sample. Results for the *Conners 3–Self-Report–SF* showed that the scale had good discriminative validity. In fact, sensitivity and specificity values were acceptable, with sensitivity values ranging between .55 and .80, and specificity values ranging between .53 and .71. Moreover, children with a diagnosis of ADHD scored themselves as having more problems than the non-clinical sample on all the Content scales, except for the Family Relations scale, which did not present a significant difference between groups. The Cohen's *d* effect sizes were large (Cohen, 1988), with values ranging from .77 to 1.24, except for the Family Relations scale value, which was small (d=.22) (Table 8).

Concerning the *Conners 3–Parent Scale–SF*, results revealed an excellent discriminative validity, with sensitivity values ranging between .70 and .87, and specificity values ranging between .65 and .87. Furthermore, parents of the clinical group assessed their children as having more problems than parents of the non-clinical sample. The effect sizes were large (Cohen, 1988), ranging from 1.01 to 1.95 (Table 8).

In addition, sensitivity and specificity values for the *Conners 3–Teacher Scale–SF* were acceptable, with sensitivity values ranging between .51 and .73, and specificity values ranging between .66 and .80 (Table 8). Moreover, results showed a significant difference between the clinical and the nonclinical samples only for the Inattention (t(28)=-2.70; p < .05; d=.99) and the Learning Problems/ Executive Functioning Content scales (t(28)=-2.38; p < .05; d=.87), with teachers giving higher

Scale	Model	χ <sup>2</sup> (df)	ф	$\chi^{2/(df)}$	TLI	CFI	RMSEA	SRMR	AIC	BIC	CAIC
Conners 3-SR	Original model	650.87 (314)	100. >	2.07	06	6.	.04 (.04–.05)	.03	778.87	1059.31	1123.31
	One-factor model	2212.47 (350)	<b>100</b> .∕	6.32	.50	.5 I	.10 (.0910)	60.	2268.47	2391.16	2419.16
	Second-order model	809.19 (323)	00.∖	2.51	.86	.87	.05 (.05–.06)	.05	919.19	1160.19	1215.19
Conners 3-P	Original model	1132.82 (419)	100.∨	2.70	89.	.90	.05 (.05–.06)	.03	1286.82	1629.27	1706.27
	One-factor model	2551.55 (434)	<b>100</b> .∕	5.88	.68	.70	(1160.) 60.	.04	2675.55	2951.28	3013.28
	Second-order model	1880.45 (433)	<b>100</b> .∕	4.34	.78	.80	.07 (.07–.08)	.07	2006.65	2286.83	2349.83
Conners 3-T	Original model	992.27 (314)	00.∖	3.16	<u>.</u>	16.	.08 (.08–.09)	.03	1120.27	1362.43	I 426.43
	One-factor model	4640.45 (350)	100.∨	13.26	<u>4</u> .	<u>4</u> .	.20 (.19–.20)	.I5	4696.45	4802.40	4830.40
	Second-order model	1386.89 (323)	<b>100.</b> ∨	4.29	.84	.85	.10 (.1011)	.I3	1496.89	1705.00	1760.00
TLI: Tucker–Lewis	s Index; CFI: comparative fit i	index; RMSEA: root	mean square	error of a	pproximat	ion; SRN	1R: standardized r	oot mean se	quare residua	I; AIC: Akaiko	e informa-

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y j na. υ 50 סשקות P N. SLAI TLI: Tucker-Lewis Index; CFI: comparative fit index; RMSEA: root mean square error of approximation; SKM tion criterion; BIC: Bayesian information criterion; CAIC: Consistent version of AIC; SR: Self-Report.

Factor	Conners	; 3-SR	Conners	; 3-P	Conners	: 3-T
	ltems	Loadings	ltems	Loadings	ltems	Loadings
Inattention	3	.59	17	.81	3	.87
	5	.50	27	.87	10	.91
	14	.57	30	.65	26	.82
	16	.58	34	.61	36	.89
	18	.73	41	.89	39	.89
	27	.78				
Hyperactivity/Impulsivity	I	.41	3	.74	I.	.88
	4	.51	5	.65	8	.83
	15	.49	7	.40	22	.85
	29	.65	13	.62	24	.80
	31	.64	24	.75	30	.64
			28	.76	32	.74
Learning Problems	9	.54	8	.50		
	13	.32	10	.61		
	33	.63	25	.62		
	36	.47	36	.73		
	38	.71	39	.40		
Executive Functioning <sup>a</sup>			I	.78	14	.73
_			15	.45	16	.85
			20	.81	18	.77
			32	.54	23	.42
			35	.45	28	.70
					35	.83
Defiance/Aggression	8	.55	14	.59	5	.79
Defiance/Aggression	10	.60	19	.31	7	.72
	17	.65	21	.39	12	.68
	30	.44	23	.51	15	.79
	32	.53	26	.37	17	.70
	39	.40				
Relations <sup>b</sup>	19	.62	4	.66	11	.80
	22	.69	6	.65	20	.86
	26	.56	18	.62	27	.84
	34	.61	38	.50	29	.87
	37	.79	43	.62	37	.90

Table 4. Factor loadings for all the three versions of the scales.

SR: Self-Report; P: Parent; T: Teacher.

<sup>a</sup>Executive Functioning scale for the Conners 3-P scale and Learning Problems/Executive Functioning scale for the Conners 3-T scale.

<sup>b</sup>Peer Relations for both the Conners 3-P and the Conners 3-T scales, and Family Relations for the Conners 3-SR scale.

scores to those students belonging to the clinical sample rather than to the non-clinical group. However, given the small sample dimension, an evaluation of the effect sizes for the other three Content scales could be highly informative as an indicator of discriminative validity. As a result, the effect size for the Defiance/Aggression scale was small (d=.18), whereas the effect size for both the Hyperactivity/Impulsivity and Peer Relations scales was medium (respectively d=.55 and d=.58).

Conners 3-SR	Inattention	Hyperactivity/ Impulsivity	Learning Pro	oblems	Defiance/ Aggression	Family Relations
Inattention	_					
Hyperactivity/ Impulsivity	.71	—				
Learning Problems	.81	.57	—			
Defiance/Aggression	.44	.59	.40		_	
Family Relations	.35	.36	.31		.34	_
Conners 3-P	Inattention	Hyperactivity/ Impulsivity	Learning Problems	Executive Functioning	Defiance/ Aggression	Peer Relations
Inattention	_					
Hyperactivity/ Impulsivity	.60	_				
Learning Problems	.88	.48	_			
Executive Functioning	.93	.56	.90			
Defiance/Aggression	.41	.51	.38	.42	_	
Peer Relations	.28	.13	.32	.31	.39	—
Conners 3-T	Inattention	Hyperactivity/ impulsivity	Learning pro executive fu	blems/ nctioning	Defiance/ aggression	Peer relations
Inattention	_					
Hyperactivity/ Impulsivity	.55	_				
Learning Problems/ Executive Functioning	.89	.37				
Defiance/Aggression	.49	.72	.40			
Peer Relations	.55	.41	.55		.50	—

Table 5.	Factor	correlations	for the	Conners 3	scales.
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SR: Self-Report; P: Parent; T: Teacher.

All correlations were significant (p < .001).

Scale	Conners 3–Self-Report	Conners 3–Parent	Conners 3–Teacher
Inattention	.79	.89	.94
Hyperactivity/Impulsivity	.67	.82	.93
Learning Problems	.63	.72	_
Executive Functioning	_	.76	_
Learning Problems/Executive Functioning	—	_	.87
Defiance/Aggression	.65	.47	.84
Peer Relations	_	.72	.93
Family Relations	.76	_	_

Scale	Parent–Self-Report	Teacher–Self-Report	Parent–Teacher
Inattention	r=.39, p=.001	r=.26, p=.001	r=.39, p=.001
Hyperactivity/Impulsivity	r=.28, p=.001	r=.24, p=.001	r=.29, p=.001
Learning Problems <sup>a</sup>	r=.52, p=.001	r = .43, p = .001	r=.47, p=.001
Executive Functioning <sup>a</sup>	_	—	r=.32, p=.001
Defiance/Aggression	r=.10, p=.037	r=.18, p=.007	r=.18, p=.001
Peer Relations	—	—	r=.29, p=.001

Table 7. Across-informant correlations.

SR: Self-Report; T: Teacher; P: Parent.

The Family Relations Content scale is not reported, as it is present only in the SR version.

<sup>a</sup>Conners 3-T Learning Problems/Executive Functioning scale is correlated with the Conners 3-P Learning Problems and the Executive Functioning scales and with the Conners 3-SR Learning Problems scale.

# Discussion

Since their first edition, the Conners' Rating Scales have represented one of the most used instruments for helping clinicians in the assessment of ADHD in children and youth thanks to their several positive aspects, including the multi-informant assessment, the excellent psychometric properties in terms of reliability and validity, and their multidimensional structure, which allow clinicians to depict a remarkably detailed representation of the child/adolescent. Moreover, one of the most relevant advantages of the scales is the existence of both full-length and short forms, so that clinicians can choose the form that best fits the administration conditions.

The short forms of the Conners 3 scales appear notably profitable, given that they provide reliable and valid clinical information when the administration of the full-length forms is not allowed or practical, for example, due to limited time or when repeated measurements over time are required. Moreover, when facing a restricted pool of items, participants tend to maximize the response rates and reduce the omitted or false responses, thus improving the validity and the truthfulness of the results.

The Conners short forms have several advantages; nonetheless, any other studies but the original one has tested their properties. Thus, the present study examined the psychometric properties of the Conners 3–short forms in their Italian version, aiming to validate the Italian version of the questionnaires.

Concerning their structural validity, results confirmed the original structure for all three versions (*Conners 3–Self-Report–SF, Conners 3–Parent–SF*, and *Conners 3–Teacher–SF*). In fact, even when comparing the original model to both a one-factor and a second-order factor models, results confirmed that the original one best fitted to data, thus providing solidity to the Conners 3 factorial structure. This finding is in line with the theoretical, clinical definition of ADHD according to the *Diagnostic and Statistical Manual of Mental Disorders (DSM*; APA, 2013), which specifies the existence of two separate dimensions—that is, inattention and hyperactivity/impulsivity. Moreover, the Conners 3 scales' structure was both theoretical and psychometrically supported as being multidimensional, since they assess a series of aspects such as learning problems that, though being frequently comorbid to ADHD, are not strictly included in the clinical framework of ADHD. Some more concern may have been arisen when assessing the goodness of fit of the second-order factor model. In fact, the existence of a unique, higher-level factor embracing all dimensions of ADHD and comorbid difficulties could be hypothesized. Nonetheless, results did not support this model. Therefore, the study provided support for the short forms as presenting a multifactorial structure, which includes the same dimensions of the full-length form in its original version

	Scale	AUC	Sensitivity	Specificity	Non-clinic	al sample	Clinical s	ample	t (df)	đ	Cohen's d
					۶	SD	Σ	SD			
Self-Report	Inattention	.82	.80	.66	5.22	4.03	10.64	5.15	-6.15 (108)	00 100.	1.24
	Hyperactivity/ Impulsivity	11.	.70	.71	4.18	2.63	7.58	3.57	-5.68 (108)	<b>100</b> .∕	I.08
	Learning Problems	.75	.73	.66	3.86	3.10	6.95	3.58	-4.84 (108)	<.00 0	0.92
	Defiance/Aggression	.68	.55	.66	I.33	I.59	3.38	3.42	-4.04 (108)	<b>100</b> . <i>i</i>	0.77
	Family Relations	.54	.64	.53	2.76	2.66	3.44	3.37	-1.16 (108)	.247	0.22
Parent	Inattention	.90	.87	<u>18.</u>	4.59	3.49	11.13	3.23	-10.92 (124)	<b>100</b> . ~	I.95
	Hyperactivity/ Impulsivity	.83	.76	.72	3.60	3.92	10.16	5.52	-7.68 (124)	<b>100</b> .∕	1.37
	Learning Problems	.86	.75	8.	3.24	2.87	7.89	3.07	-8.78 (124)	<. 00. 2	1.57
	Executive Functioning	.90	.84	.87	3.11	2.37	9.03	3.78	-10.53 (124)	<b>100</b> .∕	I.88
	Defiance/Aggression	.80	.86	.65	.67	1.22	2.48	2.22	-5.67 (124)	<b>100</b> . ~	10.1
	Peer Relations	11.	.70	.75	I.I3	1.86	4.35	3.97	-5.84 (124)	<b>100</b> . V	1.04
Teacher	Inattention	.76	.73	.66	6.13	5.34	10.93	4.35	-2.70 (28)	.012	0.99
	Hyperactivity/ Impulsivity	.73	.73	.73	4.33	5.92	7.27	4.76	–I.50 (28)	.I46	0.55
	Learning Problems/ Executive Functioning	.75	.73	.80	5.53	4.97	9.53	4.22	-2.38 (28)	.025	0.87
	Defiance/Aggression	.58	.51	.73	I.53	2.20	1.93	2.19	500 (28)	.621	0.18
	Peer Relations	99.	.67	.60	2.20	2.60	4.00	3.51	-1.60 (28)	.121	0.58

Table 8. Discriminative validity for the Conners 3 short forms.

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AUC: area under the curve.

(Conners, 2008). This aspect is particularly relevant for clinicians. In fact, though the diagnostic process and decisions about interventions should be based not only on rating scales, but on a thorough clinical assessment based on clinical expertise and knowledge, the Conners 3–short forms scales may support clinicians in acquiring detailed information about specific, different clinical areas, thus drafting an accurate profile that would indicate the specific domain(s) of intervention.

Regarding the internal consistency of the scales, analyses showed acceptable to high Cronbach's alphas in our sample for all the three versions, except for the Defiance/Aggression scale of the *Conners 3–Parent–SF* scale, which showed questionable internal consistency. However, our results were lower than the original, American ones (Conners, 2008). Moreover, values were lower than the Spanish version of the *Conners 3–Parent–SF* and the *Conners 3–Self-Report–SF* scales, whose Cronbach's alphas were .84 (ranging from .73 to .89) and .78 (ranging from .75 to .86) respectively (Conners, 2008).

Furthermore, the across-informant correlations showed that ratings of the same youth from the three sources of information were moderately consistent, supporting the Conners 3–short forms as valid, but not redundant, measures. In fact, considering that the three versions (*Conners 3–Self-Report–SF, Conners 3–Parent–SF*, and *Conners 3–Teacher–SF*) aimed to measure similar constructs, the significant correlations give support to the validity of the scales. However, in line with both our hypothesis and previous studies (Achenbach, 2006; Achenbach et al., 1987; De Los Reyes et al., 2015), correlations were moderate in size, since the different informants experience the child's behavior from different points of view. This degree of incongruence supports the importance of having multi-informant versions, since they allow to gather information that, taken together, instead of overlapping, let clinicians have a global framework of the child.

In addition, the short forms of the Conners 3 displayed good discriminative validity, with acceptable to high values of both sensitivity and specificity. In fact, they were able to detecting significant differences between the ADHD clinical sample and the non-clinical sample. However, some exceptions need to be discussed. For instance, the Family Relations scale of the Self-Report version did not display a statistically significant difference between the two groups. Nonetheless, if we look at the item formulation of this scale (i.e. "My parents expect too much from me" and "My parents are too strict with me"), we can see that they describe some difficulties when relating with parents that are not distinctive of children and adolescents with ADHD. Moreover, because of the very small sample size, some Content scales of the Teacher version did not show a statistically significant difference between the two groups. However, effect sizes for those non-significant differences were good (i.e. moderate for the Hyperactivity/Impulsivity and Peer Relations scales, and small only for the Defiance/Aggression scale), indicating that, regardless of the sample size, a good discriminative validity could be assumed also for the *Conners 3–Teacher–SF* scale.

Although some relevant strengths characterize our study, as the big sample size of the nonclinical group and the recruitment of a clinical-matched sample, the present study does have some limitations. First, the clinical group—mostly referring to the Conners 3-T version—should be enlarged to better examine specificity and sensitivity of the scales. Furthermore, test–retest reliability should be examined—aiming to test the stability of the scores in different administrations and convergent and divergent validity should be assessed by comparing the Conners 3 scales with other measures of childhood psychopathology. Moreover, some more studies better examining the Defiance/Aggression Content scale of all three versions should be performed. In fact, the items of this scale displayed both the lowest variability in the answers and the lowest internal consistency. Eventually, measurement invariance—that is, same factor loadings between the different populations, same intercepts, and same error of measurement—should be tested for both age and gender. Future studies should be conducted to investigate these aspects. To conclude, our results confirmed the Conners 3 short forms as being an effective instrument for the detection of ADHD symptoms and its main comorbid problems in children and adolescents. These results have an impact on the clinical field, as the Conners 3 scales–short form resulted to be a reliable measure that may support clinician decisions, contribute to the definition of severity of the disorder, evaluate the presence of symptoms co-occurring with ADHD, and allow to check the evolutionary trajectories. The short timing required for compilation also makes it a tool that can be administered in close follow-ups as a measure of change and as an indicator of the effectiveness of ongoing treatment. Eventually, the presence of specific versions for the different informants (youth, parents, and teachers) may help clinicians in evaluating the patient's functioning in different life spans.

# Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

# Note

1. Prorated score = (Obtained raw score for scale)  $\times$  (Total # of items on scale)

Total # of items on scale with responses

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# Supplemental material

Supplemental material for this article is available online.

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Viola Angela Izzo is a PhD student working with Caterina Primi on the adaptation and development of scales measuring impulsivity. Her research interests mainly regard impulsivity, examined both in ADHD and in Impulse Control Disorders in Parkinson's Diseases.

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Caterina Primi is an Associate Professor in Psychometrics, and she is responsible for the lab Psychometrics at the NEUROFARBA Department. She is currently conducting research into a number of topics related to test development and adaptation.

# ORIGINAL ARTICLE



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# Cognitive behavioural therapy for help-seeking adolescents and young adults with at-risk-mental state: Effects on subclinical positive symptoms

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# Abstract

**Aim:** Cognitive behavioural therapy (CBT) is effective for at-risk-mental state (ARMS) in reducing/delaying transition to psychosis. However, previous systematic reviews pointed out the small number of trials as a limitation and suggested that additional outcomes should be evaluated, not only prevention of first psychosis episode. No study assessed the CBT effects on subclinical psychotic symptoms. The present study investigated the effects of CBT on the transition risk (primary outcome), and on over-all remission from ARMS and severity of subclinical symptoms, that is, unusual content of thought, non-bizarre ideas, perceptual abnormalities, disorganized speech (secondary outcome).

**Methods:** CBT consisted of 30 individual weekly sessions over 7 months. Fifty-eight participants with ARMS detected by the Comprehensive Assessment of At-Risk-Mental States were randomized to CBT or control condition.

**Results:** Respectively in the CBT and control groups, 1 (3.40%) and 5 (26.31%) participants at post-treatment and 3 (10.30%) and 8 (42.10%) at follow-up made transition with a difference between the two groups, despite at borderline significance. At post-treatment and follow-up, respectively, the number of participants recovered from ARMS was significantly higher in CBT (76.92% and 61.53%) than in control (10.52% and 15.80%). Participants in the control group reported lower reductions on all the subclinical symptoms over time as compared with those in CBT.

**Conclusions:** This is the first study assessing CBT on subclinical positive symptoms in ARMS. CBT seems to be a tailored approach able to produce short- and long-term benefits on this outcome.

### KEYWORDS

at-risk-mental state, cognitive behavioural therapy, psychosis, psychotherapy, subclinical positive symptoms

# 1 | INTRODUCTION

# 1.1 | At-risk-mental state

A subgroup of patients with first-episode psychosis seek psychiatric care before psychosis onset because they suffer from attenuated/

intermittent psychotic symptoms and psychosocial impairment (Häfner, Maurer, & An Der Heiden, 2013). This clinical picture has been defined as at-risk-mental state (ARMS; Yung et al., 2005). Ultra-High-Risk (UHR) criteria identified three ARMS subgroups: (a) attenuated psychotic symptoms (APS); (b) brief limited intermittent psychotic episodes (BLIPs) below duration criteria for brief psychotic episode; (c) genetic

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vulnerability (familiarity/schizotypal personality disorder and functioning decline during last year) (Yung et al., 2005). Yung et al. (2005) grouped subclinical positive symptoms of ARMS as unusual content of thoughts, non-bizarre ideas, perceptual disturbance and disorganized speech. A meta-analysis showed that transition risk was 18% at 6-month, 22% at 1-year, 29% at 2-year, 36% at 3-year follow-up (Fusar-Poli et al., 2012).

#### 1.2 Cognitive behavioural therapy (CBT) for ARMS

The CBT model assumes that the pathway from ARMS to psychosis is caused by catastrophic misinterpretations of psychotic-like symptoms, exacerbated by high emotional arousal (van der Gaag, Nieman, & Van den Berg, 2013). By analysing CBT trials for ARMS, Thompson et al. (2015) identified the following components: assessment, engagement, case formulation, psychoeducation, CBT strategies, treatment of depression-anxiety and social skills. The goal of CBT for ARMS is reducing the distress provoked by subclinical psychotic experiences.

In a meta-analysis of five randomized trials, van der Gaag et al. (2013) concluded that, although promising, more studies are required, and limitations of this meta-analysis included publication bias due to few studies and focus only on psychosis prevention. Further, secondary outcomes should be evaluated, including subclinical psychotic symptoms associated with ARMS. In another meta-analysis by Stafford, Jackson, Mayo-Wilson, Morrison, and Kendall (2013) on 11 trials, evidence of moderate quality showed an effect for CBT on reducing transition to psychosis at 12 months.

In the meta-analysis on seven trials by Hutton and Taylor (2014). CBT was also associated with reduced subthreshold symptoms at 12 months, but not at 6 or 18-24 months.

Okuzawa et al. (2014) conducted a systematic review of six studies assessing CBT as a core element for ARMS. Three trials showed a significant effect suggesting that CBT may be beneficial in delaying or preventing psychosis, but effect sizes to date appear small and further trials are needed (Okuzawa et al., 2014).

Schmidt et al. (2015) produced a guidance paper through metaanalysis of five CBT trials (mean therapy duration = 6.87 months, mean follow-up = 16.67). Control conditions were monitoring (Morrison et al., 2004, 2012) or supportive therapy (Addington et al., 2011; McGorry et al., 2013). CBT was recommended as a first-line strategy, but its effects were specific only for transition (Schmidt et al., 2015).

More recently, Devoe, Farris, Townes, and Addington (2019) conducted a meta-analysis of the effects of CBT on APS. In the pairwise analyses, CBT interventions were not associated with a significant reduction in attenuated symptoms compared to controls at 6 and 12 months. Neither was CBT associated with a reduction at 24-month follow-up. In the network meta-analysis of three studies, CBT was not significantly more effective in reducing APS compared to any other intervention at 6 and 12 months, but did at 18 months (Devoe et al., 2019). However, this meta-analysis did not assess the effects of CBT on each specific type of APS.

#### 1.3 **Rationale and objectives**

CBT is effective for ARMS adolescents and young adults in reducing transition risk. According to six systematic reviews (Devoe et al., 2019; Hutton & Taylor, 2014; Okuzawa et al., 2014; Schmidt et al., 2015; Stafford et al., 2013; van der Gaag, Smit, et al., 2013), further trials are needed. In addition, CBT should be evaluated on prevention of first psychosis episode as primary outcome and on further, secondary outcomes such as subclinical positive symptoms. More severe subclinical positive symptoms have been found to be predictors of a longer time to full remission (Lee et al., 2014).

The current study aimed at: (1) assessing whether CBT is more effective in reducing psychosis transition risk at post-treatment and 14-month follow-up in help-seeking adolescents and young adults at psychiatric services in comparison with supportive psychological intervention routinely delivered in services; (2a) assessing whether CBT is more effective in producing overall recovery from ARMS in comparison with supportive intervention, (2b) evaluating the effects of CBT on specific subclinical positive symptoms in comparison with supportive intervention. The number of transitions was the primary outcome, and overall remission of attenuated symptoms and severity scores on the different subclinical symptoms were the secondary outcomes (ie, unusual content of thought, non-bizarre ideas, perceptual abnormalities and disorganized speech). We hypothesized that CBT was more effective in producing recovery at post-treatment and follow-up than the supportive intervention. Following empirical data and the CBT model of ARMS which assume that subclinical psychotic symptoms are reinforced/maintained by biased cognitive interpretations of normally occurring psychotic phenomena, that is, dichotomous thinking/arbitrary inference (eg, Li, Lavoie, Whitford, Moritz, & Nelson, 2018; Thompson, Papas, Bartholomeusz, Nelson, & Yung, 2013; van der Gaag, Nieman, & Van den Berg, 2013), we hypothesized that CBT was able to produce more significant reductions on all the subclinical symptoms than the supportive intervention.

#### 2 **METHODS**

#### 2.1 **Eligibility criteria**

Participants were help-seeking individuals at psychiatric services and were included if being 16- to 35-year-old and meeting ARMS criteria at the Comprehensive Assessment of At-Risk-Mental States (CAARMS; Yung et al., 2005). Participants were excluded if diagnosed with mental retardation, neurological/developmental disorders, current/past psychosis/bipolar disorder, suicidal intent, they received prior CBT, they were on concurrent psychotherapy and they were on antipsychotics. Concomitant antidepressants were allowed if stable during the trial. Exit/discontinuation criteria were (a) voluntary discontinuation by the participant, (b) safety reasons judged by the investigator (ie, the participant met psychosis criteria or developed suicidality). Participants who developed a first episode of psychosis entered into routine psychiatric pathways.

Recruitment was made by leaflets/e-mails to psychiatric professionals and workshops to provide information on ARMS and encourage referrals. Help-seeking individuals at psychiatric services with suspicion of ARMS referred by professionals were assessed by the CAARMS.

# 2.2 | Baseline measures

Baseline axis I disorders were assessed through the structured clinical interview for DSM-IV-TR axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997; SCID-I Italian; Mazzi, Morosini, De Girolamo, Lussetti, & Guaraldi, 2000). The psychosis module was administered at post-treatment and follow-up. Personality disorders were investigated through the Structured Clinical Interview for DSM-IV-TR personality disorders (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1997; SCID-II Italian; Maffei et al., 1997).

# 2.3 | Primary outcomes

Primary outcomes were the number of participants reporting a first psychotic episode at post-treatment or follow-up, including also any psychotic/bipolar disorders according DSM-IV-TR (American Psychiatric Association, 2000). Diagnosis was assigned through the SCID-I. Development of first psychotic episode was assessed at 6-month post-treatment and 14-month follow-up or at the moment the psychologist conducting treatment, informed the researchers that transition had (probably) occurred. The Positive and Negative Syndrome Scales (PANSS; Kay, Opler, & Lindenmayer, 1989) was used to confirm psychosis at post-treatment/follow-up.

### 2.4 | Secondary outcomes

Secondary outcomes included overall remission of attenuated symptoms and severity scores on the different domains of subclinical psychotic symptoms, as assessed by the CAARMS scales (unusual content of thought, non-bizarre ideas, perceptual abnormalities and disorganized speech).

# 2.5 | Diagnostic reliability

The CAARMS, the SCID-I and the SCID-II were administered by two independent assessors, trained by internships in the administration of the instruments. Assessors were blind to treatment allocation. All diagnoses were reached by inter-rater consensus through staff meetings during the enrolment of participants. Inter-rater agreement was reached for all the included participants except two cases whose ARMS was not resolved initially. These participants were excluded by consensus of a third independent assessor.

# 2.6 | Treatment fidelity

CBT was delivered by psychologists with 4-year training in CBT and ARMS. Training included CBT manuals for ARMS, workshops with international experts, role-playing. Psychologists delivering CBT were on supervision by one expert with 30-year experience in CBT. Treatment fidelity was assessed by a random selection of sessions, audiotaped and subsequently rated by two psychologists trained in CBT not involved in the trial.

# 2.7 | Procedure

Participation was voluntary and uncompensated. All participants were offered antidepressants/anxiolytics according to needs. Prescription and management of medication were responsibility of the medical staff who was in contact with, but not involved in, the study and blind to group allocation. All the included participants were asked to provide written informed consent to participate after receiving a description of the aims and having the possibility to withdraw consent at any time without consequence for their treatment. Individuals under 18 years old required informed consent from both parents. Participants' identities remained anonymous. Materials containing personal information about participants were kept on electronic supports protected by passwords. The recruitment period lasted from January 2014 to September 2016. Participants were recruited in five public mental health centres of Florence and Prato, Tuscany (Italy). The research according to the Helsinki Declaration was approved by the Institutional Ethics Committee.

### 2.8 | CBT protocol

It consisted of 30 individual weekly 1-hour sessions for 7 months (Table 1). The protocol was CBT based on a manual for ARMS (van der Gaag, Nieman, & Van den Berg, 2013), whose efficacy was assessed in previous trials (Ising et al., 2016). The protocol of van der Gaag, Nieman, and Van den Berg (2013) was enriched with components targeting depression (cognitive restructuring/behavioural experiments testing depressive distortions), social skills (assertiveness training) and worry (metacognitive restructuring of worry effects). It was divided in phases: (1) introduction, (2) assessment, (3) engagement/goal setting, (4) normalization of psychotic-like experiences, (5) (meta)cognitive restructuring, (6) skills of emotion management, (7) intervention on depression, (8) intervention on worry, (9) intervention on social anxiety, (10) relapse prevention and (11) booster sessions (Table 1).

# 2.9 | Data analysis

Comparisons between CBT and control on baseline socio-demographic/ clinical characteristics were conducted through analysis of variance

# **TABLE 1** Components of the CBT protocol for each session and phase

Sessions	Phase	Psychotherapeutic components
1	Introduction and goal setting	<ul> <li>Defining agenda of the session</li> <li>Presentation of the ABC model</li> <li>Discussion of outcomes of interviews and questionnaires completed at pre-treatment</li> <li>Completing diaries</li> <li>Setting of therapeutic goals</li> <li>Presentation of the CBT techniques</li> <li>Discussion on rationale for homework</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
2	Assessment	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Completing diaries</li> <li>Identification of trigger situations</li> <li>Symptom monitoring</li> <li>Exploring automatic thoughts, intermediate beliefs and basic assumptions</li> <li>Downward arrow</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
3	Assessment	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Meeting with parents and family members</li> <li>Asking the family members for feedback about the session</li> <li>Take-home messages</li> </ul>
4	Engagement	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Case formulation</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
5-7	Normalization of psychotic experiences	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Normalizing information and psychoeducation on psychotic-like experiences</li> <li>Information on dopamine sensitization</li> <li>Written materials</li> <li>Flashcards</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
8-12	Cognitive restructuring and metacognitive intervention	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Introduction of cognitive distortions</li> <li>Written materials</li> <li>Cognitive and metacognitive restructuring</li> <li>Identifying alternative explanations</li> <li>Development of more functional thoughts</li> <li>Attentional training</li> <li>Flashcards</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>

# TABLE 1 (Continued)

1	ADEL I (CON	unded)	
	Sessions	Phase	Psychotherapeutic components
	13-15	Cognitive restructuring and metacognitive intervention	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Organizing of hierarchy</li> <li>Exposure and behavioural experiments</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
	16	Skills for emotions management	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Normalizing information and psychoeducation on emotions and bodily sensations</li> <li>Written materials on emotions</li> <li>Asking the patient for feedback about the session</li> <li>Homework</li> </ul>
	17	Skills for emotions management	<ul> <li>Review of previous sessions</li> <li>Defining agenda of session</li> <li>Discussion on homework</li> <li>Relaxation techniques (diaphragmatic breath, muscular progressive relaxation)</li> <li>Written materials</li> <li>Flashcards</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
	18-19	Intervention on depression	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Cognitive bias of depression</li> <li>Cognitive restructuring of depression bias</li> <li>Daily mood graph</li> <li>Behavioural experiments</li> <li>Behavioural activation</li> <li>Pleasant activities</li> <li>Flashcards</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
	20-21	Intervention on depression	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Intervention on procrastination</li> <li>Self-instructional training</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
	22-25	Intervention on worry	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Problem solving</li> <li>Time for worry</li> <li>Flashcards</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
	26-29	Intervention on social anxiety	<ul> <li>Review of previous session</li> <li>Discussion on homework</li> <li>Defining agenda of the session</li> <li>Psychoeducation on assertiveness and social skills</li> </ul>

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Sessions	Phase	Psychotherapeutic components
		<ul> <li>Completing assertiveness diaries</li> <li>Role playing on social skills</li> <li>Exposure on social cues and trigger situations</li> <li>Assertiveness exercises</li> <li>Exercises to strengthen self-esteem</li> <li>Flashcards</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Homework</li> </ul>
30	Relapse prevention	<ul><li>Overview of the psychotherapeutic course and key points</li><li>Asking the patient for feedback about the session</li><li>Relapse prevention</li></ul>
31	Booster session	<ul> <li>Review of the psychotherapeutic course</li> <li>Review of case formulation</li> <li>Review of psychoeducation on psychotic-like experiences</li> <li>Review of cognitive and metacognitive restructuring</li> <li>Completing ABC diaries on recent trigger situations</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Booster homework</li> </ul>
32	Booster session	<ul> <li>Review of the assertiveness concept</li> <li>Completing ABC diaries on recent trigger situations</li> <li>Asking the patient for feedback about the session</li> <li>Take-home messages</li> <li>Booster homework</li> </ul>

Abbreviations: ABC, activating event beliefs and behavioural consequences; CBT, cognitive behavioural therapy.

(ANOVA)/non-parametric statistics. Transition risk to psychosis (primary outcome) was analysed using Kaplan-Meier survival statistics. Participants lost to follow-up were coded conservatively as non-converters. Survival curves were compared using log-rank test.

Data at post-treatment and follow-up on subclinical psychotic symptoms (secondary outcome) were analysed using intention to treat analysis with last observation carry-forward. Analyses on these outcomes were conducted on the non-converters. The effects of treatments across time-points were analysed through linear mixed models on all the four CAARMS scale scores at post-treatment and follow-up separately, by entering the main effects of time and group (CBT vs control group) and group  $\times$  time interaction effects and baseline subclinical symptoms as covariates. Chi square was calculated to assess ARMS (recovery vs at-risk). Statistical significance was at a .05 P-value. Analyses were conducted by SPSS 21.00 version.

#### 3 RESULTS

#### 3.1 Socio-demographics and baseline clinical characteristics

CONSORT flowchart is in Figure 1. Fifty-eight participants were included (Table 2). Mean age was 25.71 years, 31 (67.20%) were males. Mean age in CBT was not significantly different than in the control group. Fifty-eight participants reported APS for intensity/ frequency, three (5.20%) had BLIPS and eight (13.80%) had familiarity/schizotypal personality disorder. The two groups were not significantly different for number of participants having BLIPs, belonging to the CAARMS vulnerability group. The two groups did not significantly differ for intensity and frequency of subclinical positive symptoms. The number of drop-outs in CBT (n = 3, 10.30%) was significantly lower than in control (n = 10, 34.50%) [ $\chi^2_{(1)}$  = 4.85, P < .05]. Reasons for drop-out are in Table 3.

#### **Treatment fidelity** 3.2

Cohen's kappa estimates for fidelity to the treatment protocol were all equal or higher than 0.70, suggesting satisfactory inter-rater agreement overall (Cohen, 1968).

#### 3.3 Effects on transition to psychosis

Respectively in the CBT and control groups, 1 (3.40%) and 5 (26.31%) participants at post-treatment and 3 (10.30%) and 8 (42.10%) participants at follow-up cumulatively made transition to psychosis. Kaplan-Meier curves showed a difference between individuals assigned to



**FIGURE 1** CONSORT flowchart of participants through the phases of the trial

CBT and those to control (CBT mean survival time = 445.46 days, 95% CI: 407.37-483.55; control condition survival time = 410.24, 95% CI: 350.39-470.09), despite this difference was at borderline

significance [Log rank test  $\chi 2_{(1)}$  = 3.66, *P* = .05]. All patients transitioned at post-treatment or follow-up met psychosis criteria on the PANSS.

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	Total group (n = 58)	CBT (n = 29)	Control condition (n = 29)	v <sup>2</sup> (df)/F(df)
	M (SD; range)/n (%)	M (SD; range)/n (%)	M (SD; range)/n (%)	χ (αι)// (αι)
Age (years)	25.71 (6; 16-35)	25.41 (6.12; 16-35)	26 (5.97; 16-35)	0.13(1, 56)
Female gender	19 (32.80)	10 (34.50)	9 (31)	0.78(1)
Marital status				O <sub>(1)</sub>
Single	54 (93.10)	27 (93.10)	27 (93.10)	
Married	4 (6.90)	2 (6.90)	2 (6.90)	
Employment status				3.23 <sub>(1)</sub>
Student	19 (32.80)	12 (41.40)	7 (24.10)	
Employed	12 (20.70)	7 (24.10)	5 (17.20)	
Unemployed	27 (46.60)	10 (34.50)	17 (58.60)	
Education				2.06(1)
Mid school licence	20 (34.50)	7 (24.10)	13 (44.80)	
High school licence	29 (50)	17 (58.60)	12 (41.40)	
Degree	9 (15.50)	5 (17.20)	4 (13.80)	
Any of non-psychotic axis I disorders	45 (77.60)	21 (72.40)	24 (82.80)	0.89(1)
Type of non-psychotic axis I disorders				
Anxiety disorders	25 (43)	13 (44.80)	15 (41.30)	
Depressive disorders	26 (44.80)	15 (41.70)	11 (37.90)	
OCD/related disorders	14 (24.10)	7 (24.10)	7 (24.10)	
Eating disorders	2 (3.40)	0	2 (6.90)	
Alcohol abuse	1 (1.70)	0	1 (3.40)	
Gambling	1 (1.70)	0	1 (3.40)	
Number of personality disorders	0.53 (0.65)	0.38 (0.56)	0.69 (0.71)	3.39 <sub>(1)</sub>
None of personality disorders	32 (55.20)	19 (65.50)	13 (44.80)	
One personality disorder	21 (36.20)	9 (31)	12 (41.40)	
More than one personality disorder	5 (8.60)	1 (3.40)	4 (13.80)	
Type of personality disorders				
Schizoid/Schizotypal	14 (24.10)	5 (17.20)	9 (31)	
Avoidant	6 (10.30)	4 (13.80)	2 (6.90)	
Dependent	5 (8.60)	2 (6.90)	3 (10.30)	
Borderline	4 (6.90)	1 (3.40)	3 (10.30)	
Obsessive compulsive	3 (5.20)	1 (3.40)	2 (6.90)	
Paranoid	1 (1.70)	0	1 (3.40)	
Cannabis use	13 (22.40)	5 (17.20)	8 (27.60)	0.89(1)
CAARMS groups				
APS intensity/frequency	58 (100)	29 (100)	29 (100)	O <sub>(1)</sub>
BLIPs	3 (5.20)	2 (6.90)	1 (3.40)	0.35(1)
Vulnerability group	8 (13.80)	3 (10.30)	5 (17.20)	0.58(1)
Antidepressants	32 (55.20)	17 (58.60)	15 (51.70)	0.27(1)
Anxiolytic benzodiazepines	10 (17.20)	3 (10.30)	7 (24.10)	1.61(1)

Abbreviations: APS, attenuated psychotic symptoms; BLIPs, brief limited intermittent psychotic symptoms; CAARMS, Comprehensive Assessment for At-Risk Mental States; OCD, obsessive-compulsive disorder.

# 3.4 | Outcomes on subclinical positive symptoms at post-treatment and follow-up

In the total group, at post-treatment 55% of participants achieved recovery on ARMS, while 45% still reported subclinical positive

symptoms. The number of participants recovered from ARMS was significantly higher in CBT (76.92%) than in control (10.52%) [ $\chi^2_{(1)}$  = 16.83, *P* < .001] (Table 4).

In the total group, 54.30% achieved recovery from ARMS, while 45.70% still reported subclinical positive symptoms at follow-up. The

TABLE 3 Participants who left the study before post-treatment with completed sessions and reasons for drop out

Participant	Assessment completed	Completed sessions	Reasons for stop attending sessions
20	Baseline	4	She said that felt better, returned to attending high school lessons and did not need continue treatment
23	Baseline	4	She said that attending sessions was unhelpful
29	Baseline	2	She said that she did not need a psychological treatment
21	Baseline	5	She said that did not need a psychological treatment, only needed medications
25	Baseline	3	She stopped coming, then was unable be contacted
28	Baseline	4	She stopped coming, then was unable be contacted
26	Baseline	11	She said that did not need any treatment
27	Baseline	2	He said that did not need a psychological treatment, only needed medications
24	Baseline	8	He said that the distance attending the centre was too long. He stopped coming, then was unable to be contacted
58	Baseline	7	His parents were able to bring him only sporadically, then they refused continuing course
56	Baseline	6	She said that sessions were too demanding
57	Baseline	4	She stopped coming, then was unable be contacted
22	Baseline	4	He moved to other places

number of participants recovered on ARMS was significantly higher in CBT (61.53%) than in control (15.80%) [ $\chi^2_{(1)}$  = 6.31, *P* < .05].

The results of linear mixed models showed significant group main effects on all the four subclinical psychotic symptoms, with participants assigned to the control group reporting higher Unusual Content of Thought at post-treatment (B = 1.60, t = 6.21, P < .001) and follow-up (B = 1.41, t = 5.12, P < .001), higher non-bizarre ideas at post-treatment (B = 1.55, t = 5.65, P < .001) and follow-up (B = 1.19, t = 4.18, P < .001), higher perceptual abnormalities at post-treatment (B = 1.39, t = 5.26, P < .001) and follow-up (B = 1.34, t = 5.30, P < .001), and higher disorganized speech at post-treatment (B = 0.81, t = 4.05, P < .001) and follow-up (B = 1.06, t = 4.89, P < .001) (Table 5).

Main effects of time were also found on all the subclinical positive symptoms at post-treatment (unusual content of thought: B = 2.16, t = 8.99, P < .001; non-bizarre ideas: B = 1.83, t = 7.12, P < .001; perceptual abnormalities; B = 1.74, t = 7.01, P < .001; disorganized speech: B = 0.98, t = 5.19, P < .001) and also at follow-up (unusual content of thought: B = 2.26, t = 9.09, P < .001; non-bizarre ideas: B = 1.73, t = 6.76, P < .001; perceptual abnormalities; B = 1.80, t = 7.86, P < .001; disorganized speech: B = 1.14, t = 5.82, P < .001).

In addition, time per group interaction effects emerged on all the subclinical positive symptoms at post-treatment and follow-up with participants assigned to the control condition reporting lower reductions on subclinical symptoms over time than those assigned to CBT, as shown in Table 5.

# 4 | DISCUSSION

As compared with previous trials (Addington et al., 2011; McGorry et al., 2013; Morrison et al., 2012; Stain et al., 2016), the present study was the first investigation assessing the effects of CBT for

ARMS on subclinical psychotic positive symptoms. Fifty-eight individuals were randomized to CBT or supportive intervention. All participants reported baseline APS, two subgroups of them also had BLIPS (5.20%) or familiarity/schizotypal personality (13.80%). This result was consistent with Stain et al. (2016), where 81% of the sample had APS, 7% BLIPS and 33% familiarity/schizotypal personality. On one hand, transition rate, which was 19%, resulted higher than in trials where it ranged from 5% to 16% (Addington et al., 2011; McGorry et al., 2013; Morrison et al., 2012: Stain et al., 2016: van der Gaag et al., 2012). On the other hand, transition rate was consistent with other trials (6%-20%; Bechdolf et al., 2012; 10%-21%; McGorry et al., 2013) and lower than in Morrison et al. (2012), where it was 22%. Differences related to methodological aspects across the trials might account for this inconsistency: Stain et al. (2016) and van der Gaag et al. (2012) included younger cohorts. In addition, in the present study, participants were referred by psychiatric professionals, while in van der Gaag et al. (2012) self-report screening of help-seeking youth was used, followed by identification of ARMS through the CAARMS.

In the present study, survival analyses indicated that the CBT protocol was associated with a reduced risk of transition to psychosis as compared with supportive intervention, although the difference was at a borderline significance level. This evidence confirmed previous data demonstrating that CBT is a quite effective strategy associated with small to medium effect sizes (Okuzawa et al., 2014). The fact that there was a difference at a borderline level in the transition risk between CBT and supportive intervention suggests that a routine psychological support intervention including empathetic listening may also be useful for young people with ARMS.

Overall, 55% and 54% of participants reported recovery on ARMS at post-treatment and follow-up, respectively. In the CBT group, the number of participants recovered on ARMS was significantly higher than in the control condition at post-treatment (76.92% vs 10.52%) and follow-up (61.53% vs 15.80%): CBT was superior than the control

	Baseline				Post-treatmen	īt			Follow-up			
	Unusual content of thought	Non- bizarre ideas	Perceptual abnormalities	Disorganized speech	Unusual content of thought	Non- bizarre ideas	Perceptual abnormalities	Disorganized speech	Unusual content of thought	Non- bizarre ideas	Perceptual abnormalities	Disorganized speech
Control group	3.10 (1.20)	3.59 (1.24)	2.76 (1.15)	2.86 (1.12)	2.58 (1.06)	3.29 (1.30)	2.38 (1.34)	2.46 (1.02)	2.33 (1.52)	2.95 (1.35)	2.14 (1.27)	2.43 (1.24)
CBT group	3.45 (1.12)	3.76 (1.09)	2.66 (1.34)	2.34 (1.31)	1.04 (1.18)	1.78 (1.34)	0.85 (1.23)	1.19 (1.24)	1.04 (1.17)	1.88 (1.30)	0.88 (1.16)	1.00 (1.11)
	Post-trea	atment					Follow	dn-/				
	Converte	irs (%)	Persistent AR	MS (%)	Remissions fror	m ARMS (%)	Conve	rters (%)	Persistent ARI	MS (%)	Remissions	from ARMS (%)
Control group	5 (26.319	(%	12 (63.15%)		2 (10.52%)		8 (42.1	(%0)	8 (42.10%)		3 (15.80%)	
CBT group	1 (3.84%)	•	5 (19.23%)		20 (76.92%)		3 (11.5	33%)	7 (26.92%)		16 (61.53%)	
Abbreviations: ARN	4S. at-risk mental	I states: CAA	RMS, Comprehen:	sive Assessment c	of At-Risk-Ment	al States: CB	T. cognitive beha	vioural therapy: C	l, confidence int	terval.		

TABLE 5 Linear mixed models of time x group effects on posttreatment and follow-up CAARMS scores

	Time $\times$ Treatment effects		
Post-treatment	t	df	P value
Unusual content of thought	-4.93	111	<.001
Non-bizarre ideas	-4.35	111	<.001
Perceptual abnormalities	-3.72	111	<.001
Disorganized speech	-2.71	111	<.001
	Time × Tre	atment effe	ects
Follow-up	$\frac{\text{Time} \times \text{Tre}}{t}$	atment effe	ects P value
<b>Follow-up</b> Unusual content of thought	$\frac{\text{Time} \times \text{Tre}}{t}$ -4.09	atment effe df 111	ects P value <.001
Follow-up Unusual content of thought Non-bizarre ideas	Time × Tre t -4.09 -3.37	atment effe df 111 111	ects P value <.001 <.001
Follow-up Unusual content of thought Non-bizarre ideas Perceptual abnormalities	Time × Tre           t           -4.09           -3.37           -3.85	atment effe df 111 111 111	ects P value <.001 <.001 <.001

Abbreviations: CAARMS, Comprehensive Assessment of At-Risk-Mental States; CBT, cognitive behavioural therapy.

condition in producing recovery from ARMS and therapeutic gains were stable after 14 months. The recovery rate from ARMS in the CBT group also appeared higher than the natural remission rate found at 2-year follow-up in a naturalistic study (Lee et al., 2014).

The strength of our study was the assessment of the effects CBT produced on the different types of subclinical positive symptoms. CBT appeared more effective at both post-treatment and follow-up than supportive intervention in reducing all the four types of subclinical positive symptoms including unusual content of thoughts, nonbizarre ideas, perceptual abnormalities and disorganized speech. The effects of CBT on perceptual abnormalities are particularly important for clinical practice, as in previous research perceptual abnormalities were the most distressing type of APS (Power, Polari, Yung, McGorry, & Nelson, 2016). In accordance with our hypotheses and with the CBT model of ARMS (van der Gaag, Nieman, & Van den Berg, 2013), this result suggests that CBT may add therapeutic benefits to supportive intervention because it contains specific therapeutic elements which target the maintenance factors of these subclinical positive symptoms (eg, cognitive restructuring and behavioural experiments aimed at testing catastrophic misinterpretations of psychotic-like experiences, at taking into account pros/cons of thoughts and verifying evidence for them).

It might be that CBT is effective on non-bizarre ideas by reducing specific cognitive biases associated with ARMS, transition to psychosis and the related depressive/anxious states, such as dichotomous thinking, arbitrary inference, jumping to conclusions, metacognitive processes of thought control and negative beliefs about self and others (Barcaccia et al., 2019; Cotter, Yung, Carney, & Drake, 2017; Cowan, McAdams, & Mittal, 2018; Pozza & Dèttore, 2017; Rausch et al., 2016). Reduction of avoidance promoted by behavioural activation might also drive increase in reality testing (Welsh, Kitchen, Ekers, Webster, & Tiffin, 2016).

Interestingly, the effects of CBT appeared superior than supportive intervention also on disorganized speech at post-treatment and

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follow-up. This finding suggests that the improvement produced by CBT on disorganized speech may be promoted by attentional processes and executive functions stimulated by CBT exercises such as identifying automatic thoughts, recording them and discovering alternative explanations. This may trigger a therapeutic process which goes on after the end of treatment. It might be that some specific CBT components, such as functional analysis exercises aimed at identifying negative automatic thoughts and naming the consequent emotions, can produce stable improvement in the perceived capacity of organizing speech in a functional manner (Pantelis, Wannan, Bartholomeusz, Allott, & McGorry, 2015).

Finally, some limitations and future directions should be highlighted. Future research should investigate whether changes in subclinical positive psychotic symptoms, and also changes in which ones of them, are associated with recovery from ARMS. Future studies should use samples with larger sizes and longer follow-up assessment. Indeed, a strong limitation was the low power of the statistical analysis which was not able to find a statistically significant difference in transition rates. Based on an expected 35% transition rate over 14 months, the required sample for an analysis with an alpha of .05% and 80% power should be  $2 \times 91$  for transition risk (primary outcome of the study). However, despite these numbers were not met and the analysis was underpowered, there still was an effect very close to statistical significance on the transition rate.

In addition, a dismantling design may allow investigating which therapeutic ingredients drive changes in specific subclinical psychotic symptoms. Since participants assigned to the control condition did not receive all the other therapeutic components included in CBT, this effect cannot be attributed securely only to the modules targeting distress related to psychotic experiences and cognitions (eg, cognitive restructuring). Finally, potential predictors of a better response to treatment may be assessed such as socio-demographic factors more strongly associated with an increased risk of psychosis (Brucato et al., 2017; Coluccia, Ferretti, Fagiolini, & Pozza, 2015).

# 5 | CONCLUSIONS

To sum up, the current study added knowledge on the potential therapeutic benefits of CBT for young individuals with ARMS. Since previous trials focused only on psychosis prevention, the current study was the first contribution investigating the effects of CBT on each type of subclinical psychotic symptoms. This form of psychotherapy seemed to be a tailored approach able to produce short- and long-term benefits on all the four types of subclinical positive symptoms including unusual content of thoughts, non-bizarre ideas, perceptual abnormalities and disorganized speech.

#### ACKNOWLEDGEMENTS

The authors thank the following researchers and practitioners for their contribution in some phases of the study: Dr. Andrea Cicogni; Dr. Andrea Tanini; Dr. Andrea Bencini; Dr. Cinzia Di Matteo; Dr.

Elisabetta Ruggieri; Dr. Riccardo Lo Parrino; Dr. Stefano Calamandrei. The study was not funded from any source in the public, commercial, or not-for-profit sectors.

#### **CONFLICT OF INTEREST**

The authors have no conflicts of interest to declare.

### AUTHOR CONTRIBUTIONS

Andrea Pozza designed the study, collected the data, conducted the literature searches, conducted the statistical analysis and wrote the first draft of the paper. Sandro Domenichetti designed the study, collected the data and wrote the first draft of the paper. Davide Dèttore designed the study, reviewed the first draft of the paper, supervised the clinicians, and checked the editing of the final version of the paper. All authors have approved the final manuscript.

#### DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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How to cite this article: Pozza A, Domenichetti S, Dèttore D. Cognitive behavioural therapy for help-seeking adolescents and young adults with at-risk-mental state: Effects on subclinical positive symptoms. *Early Intervention in Psychiatry*. 2020;1–12. hiips://doi.org/10.1111/eip.12974

# Assessing ADHD Through the Multi-Informant Approach: The Contribution of the Conners' 3 Scales

Journal of Attention Disorders 2019, Vol. 23(6) 641–650 © The Author(s) 2018 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/1087054718815581 journals.sagepub.com/home/jad

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#### Abstract

**Objective:** Symptoms of ADHD need to be present in at least two different settings to suggest a diagnosis, so multiinformant assessment approaches are usually adopted. The *Conners' Rating Scales* offer three versions, completed by parents (Conners 3-P), teachers (Conners 3-T), and youth (Conners 3-SR). Nonetheless, there is a lack of studies examining the psychometric properties of the Parent and Teacher versions and the relation between each version of the Conners 3 scales. **Method:** The present work examined the psychometric properties of the Parent and Teacher scales in terms of the structural validity and reliability of their Content scales in an Italian sample. Moreover, to support the need to administer all Conners 3 scales together and to exclude their potential redundancy, cross-informant agreement between parents, teachers, and children was assessed. **Results:** Results supported the Conners 3 scales as reliable and valid tools to assess ADHD and provided evidence for their non-redundancy. **Conclusion:** The non-redundancy of the Conners 3 may promote clinicians to adopt a multi-informant perspective (*J. of Att. Dis. 2019; Vol. 23(6) 641-650*)

#### **Keywords**

ADHD, Conners 3, multi-informant assessment, psychometric properties, dimensionality

# Introduction

ADHD is frequently diagnosed in childhood and adolescence, with a worldwide prevalence in school-aged children under 18 estimated to be 7.2% (Thomas, Sanders, Doust, Beller, & Glasziou, 2015). One of the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013) criteria for advancing a diagnosis of ADHD states that several symptoms need to be present in at least two different settings, such as at home and at school, and with both friends and relatives.

The *Conners' Rating Scales* (Conners, 1989, 1997, 2008) are used worldwide to support the diagnosis of ADHD and the most common co-occurring difficulties, such as disruptive disorders and learning disabilities in children and youth. In fact, as ADHD is often associated with other comorbid impairments, such as disruptive behavior, learning difficulties, and negative family and peer relationships (Czamara et al., 2013; Jensen & Steinhausen, 2015; Spencer, Biederman, & Mick, 2007), the third edition (Conners 3; Conners, 2008) also examines those aspects. The Conners 3 scales consist of three versions completed by parents (Conners 3–Parent; Conners 3-P), teachers (Conners 3–Self-Report; Conners 3–SR). To facilitate a comparison between the assessment of the three sources of information, the

Conners 3 scales were developed so that content alignment across them was enhanced, so they dispose of similar structures, with almost overlapping subscales.

Multi-informant assessment is strongly suggested in clinical practice, as it allows to both obtain a global, exhaustive evaluation of the child, and to detect contextual variations in mental health, thus, facilitating clinicians in forming an accurate judgment (De Los Reyes et al., 2015; Gizer et al., 2008; Hughes & Gullone, 2010; Hunsley & Mash, 2007; Power, Dombrowski, Watkins, Mautone, & Eagle, 2007). Collecting information from different points of view has significant implications for clinical practice. In fact, knowing the child's most relevant difficulties and in which context(s) they occur more strongly and more frequently is fundamental for intervention purposes and to support children's strengths (De Los Reves et al., 2015; Hawley & Weisz, 2003). For instance, if hyperactivity symptoms were particularly prevalent at home rather than at school, the intervention program should focus on strengthening parents' strategies. In line with this, the Conners

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3 scales' multi-informant nature represents one of their main strengths, as they make it possible to obtain information on how the child behaves both at home and school, and to merge those hetero-evaluations with a self-assessment that provides an insight into personal feelings and thoughts that others might not be aware of.

Given that the Conners 3 Rating Scales are widely used in both clinical and research contexts, the present study aimed at assessing the psychometric properties of the Italian version of the Conners 3 scales in their parent and teacher versions to test whether they represented a reliable and valid instrument to assess ADHD in children and youth. In fact, as the psychometric properties of the Conners 3-SR scale were already investigated before (see Izzo, Donati, & Primi, 2018), and that hetero-assessments make it possible to gather information that people filling a self-evaluation may be unaware of, this research examined the psychometric properties of the Conners 3-P and the Conners 3-T scales in terms of the dimensionality of these scales, their reliability, and cross-informant agreement.

In the original work (Conners, 2008), Content scales were empirically deduced by exploratory factor analyses (EFA), except for the Inattention scale, which was not supported because items belonging to this aspect cross-loaded with the Learning Problems factor. Consequently, this scale was theoretically defined based on the opinions of clinical experts-so the items were rationally selected-and confirmatory factor analyses (CFA) were conducted only on the other empirically found scales. Therefore, the composition of the Inattention scale and the dimensionality of the Content scales including the *Inattention* scale were not empirically tested (Conners, 2008). However, in a recent study examining the German version of the Conners 3 scales (Christiansen et al., 2016), CFAs were conducted on all Content scales, including the Inattention scale, with results revealing a good fit and supporting the *Inattention* scale with psychometric evidence. Moreover, empirical data from a recent Italian study (Izzo et al., 2018) confirmed this structure with the *Inattention* scale as a separate factor, though analyses were performed only for the Conners 3-SR scale. Thus, the first aim of the present work (Study 1) was to examine the dimensionality of the Conners 3-P and Conners 3-T scales to test whether the original structure could be confirmed and whether there is empirical support for the Inattention scale as a stand-alone factor. Moreover, we aimed at assessing the accuracy of the Content scales in terms of their internal consistency.

Furthermore, the relations between the Conners 3-P, Conners 3-T, and Conners 3-SR scales need to be assessed as well, to test the level of correspondence between different informants. In fact, although the multi-informant procedure is widely used, it is not unusual that informant discrepancies occur, that is, the report of an informant does not agree with that of another informant (Achenbach, 2006; Achenbach, McConaughy, & Howell, 1987; De Los Reyes et al., 2015; Goodman, De Los Reyes, & Bradshaw, 2010; Lapouse & Monk, 1958). However, discrepancies do not necessarily indicate poor validity of the examined instrument, because several factors may explain their occurrence, such as (a) belonging to different versus the same context of observation-that is, pairs of parents obtain greater correspondence than parent-teacher pairs; (b) the nature of the mental health concern, as levels of correspondence are greater when referring to externalizing rather than to internalizing problems; (c) the nature of the measurement method, because correspondence is greater when reports are on a dimensional scale than when they are on a categorical scale (Achenbach et al., 1987; De Los Reyes et al., 2015). Examining the relations between the different versions of the Conners 3 scales may help in identifying the extent to which each version contributes to the understanding and the description of the child profile. Thus, an additional study (Study 2) was conducted to assess the validity of the Conners 3 scales in terms of the cross-informant correlations between parents, teachers, and the children/youth themselves, expecting to find moderate correlations, in line with the original work (Conners, 2008).

In sum, Study 1 aimed at testing the psychometric properties of the Conners 3-P and Conners 3-T scales in terms of their dimensionality and reliability, whereas Study 2 examined the validity of the Conners 3 scales in terms of the cross-informant correlations between the parent, teacher, and self-report assessments.

# Study I

Although the Conners 3 is one of the most commonly used scales to help clinicians in assessing ADHD, it is important to further investigate its factorial structure. In fact, EFAs in the original work (Conners, 2008) did not distinguish between the Inattention and the Learning Problems scales, as items cross-loaded on the same factor. In line with that, EFAs in the German study were unable to separately extract factors for the Inattention, Learning Problems, and Executive Functioning scales, as items loaded on a broader factor-although CFAs supported them as stand-alone scales (Christiansen et al., 2016). Moreover, the Italian study performing CFAs on the Conners 3-SR scale found an extremely high correlation between the Inattention and the Learning Problems scales-though the model considering them as a unitary factor showed worse fit than the model that identified them as distinct scales (Izzo et al., 2018). Building on these findings, several models testing the structure of the Conners 3-P and Conners 3-T were tested in the present study. In detail, a solution that considered the Inattention, the Learning Problems, and the Executive Functioning scales as separate factors, and some models that combined them into broader factors were investigated. Furthermore, the reliability of the scales in terms of their internal consistency to examine their accuracy was assessed.

#### Method

*Participants.* Participants were 876 parents of 6- to 18-yearold non-clinical children and adolescents (mean age: 10.99, *SD*: 2.92; 49% male), attending primary (51%), middle (37%), and high schools (12%) in the North-Center (72%) and South (28%) of Italy. A total of 84% of the participating parents were mothers.

Furthermore, 832 teachers of 6- to 18-year-old non-clinical children and adolescents were recruited. However, many participants were excluded because of a high percentage of missing answers, so the final sample included 487 teachers of children and adolescents (mean age: 11.23, *SD*: 3.4; 50% male) attending primary (52%), middle (29%), and high schools (19%) in the North-Center (67%) and South (33%) of Italy. A total of 98% of the participating teachers were women.

Instruments. The Parent and Teacher Conners 3 Rating Scales (Italian version: Primi & Maschietto, 2017) include items aiming to measure youth's ADHD symptoms and their most frequent associated complications, that is, learning problems, defiance/aggression, and difficulties in social relationships. They can be administered to parents and teachers of 6- to 18-year-old children and adolescents. Although the parent and teacher scales are similar, the Content scales vary in number according to the specific version: The Conners 3-P Scale contains 6 Content scales (i.e., Inattention, Hyperactivity/Impulsivity, Learning Problems, Executive Functioning, Defiance/Aggression, and Peer Relations), with a total of 62 items. The Conners 3-T Scale consists of 5 Content scales (i.e., Inattention, Hyperactivity/Impulsivity, Learning Problems/ Executive Functioning, Defiance/Aggression, and Peer *Relations*), totaling 69 items. Items are rated on a Likerttype scale ranging from 0 (not true at all/never) to 3 (very much true/very frequently).

**Procedure.** A study protocol in accordance with the criteria of the Declaration of Helsinki was reviewed and approved by each head teacher and school board of different primary, middle, and high schools in North-Center and South Italy. Parents and teachers were given a short description of the study. Written informed consent was obtained from all participants, and their confidentiality was ensured. All participants completed their questionnaire through a self-administered procedure, though parents completed it at home, whereas teachers completed it in class, during schooltime. The time needed to complete the scales was approximately 20 min. Statistical analyses. First, a preliminary missing value analysis of data was performed. Cases were excluded when missing data exceeded the allowable number of omitted responses as specified by the original manual (Conners, 2008). Analyses revealed that, for the Conners 3-P Scale, all cases presented an acceptable number of missing answers, whereas for the Conners 3-T Scale, 345 protocols needed to be excluded. When missing data were acceptable, values of omitted answers were estimated through the application of a formula calculating a prorated score, as described in the original manual (Conners, 2008).<sup>1</sup>

To examine the dimensionality of the Conners 3-P and Conners 3-T scales, CFAs were conducted on the Content scales. In line with the original work (Conners, 2008), items belonging to the same factor that showed high intercorrelations were combined into parcels, and those resulting combined items were used as observed variables. Parcels were then loaded onto their respective scales, and the scales correlated with each other. Adequate fit for the model was defined according to the Comparative Fit Index (CFI; Bentler, 1990), and the Steiger-Lind Root Mean Square Error of Approximation Index (RMSEA; Steiger & Lind, 1980); in details, in line with the original manual (Conners, 2008), adequacy of the model was defined as CFI values equal to .90 or greater, and RMSEA values of .10 or below.

To assess reliability of the Conners 3-P and T scales, internal consistency of the Content scales using Cronbach's alphas was obtained.

# Results

#### CFA

*Conners 3-P Scale.* As a first step, the six-factor structure of the Conners 3-P was tested. Goodness-of-fit indicators suggested that it had adequate fit to the data (Table 1). Each item loaded strongly and significantly on its hypothesized factor, and the correlations between the five factors were all significant, ranging from .26 to .94.

Nonetheless, as the correlations between the *Inattention* scale and both the *Executive Functioning* and the *Learning Problems* scales were high (i.e., equal to .94 and to .91, respectively), a five-factor model considering *Inattention* and *Executive Functioning* as a unique factor, and a five-factor model considering *Inattention* and *Learning Problems* as a unique factor were tested. However, in both cases, the results showed a poorer fit than the original six-factor model (Table 1).

As a final step, as the correlation between the *Learning Problems* and the *Executive Functioning* scales in the sixfactor model was high (i.e., equal to .86), a four-factor model that merged the *Inattention*, the *Learning Problems*, and the *Executive Functioning* scales into a unique factor was tested. Nonetheless, results showed a poorer overall fit (Table 1), so the original six-factor model was empirically

Scale	Model	$\chi^2$ (df)	$\chi^2/df$	CFI	RMSEA (Confidence Interval)
Conners 3-P	Six-factor Model	1,090.90 (284)	3.84	.93	.06 (.0506)
	Five-factor Model (IN $+$ EF)	1,143.55 (289)	3.96	.92	.06 (.0606)
	Five-factor Model ( $IN + LP$ )	1,221.70 (289)	4.23	.92	.06 (.0606)
	Four-factor Model ( $IN + EF + LP$ )	1,282.23 (293)	4.38	.91	.06 (.0607)
Conners 3-T	Five-factor Model	1,489.07 (220)	6.77	.90	.10 (.1011)
	Five-factor Model with covariance errors	1,147.49 (216)	5.31	.93	.09 (.0809)
	Four-factor Model (IN + LE)	1,610.62 (224)	7.19	.90	.11 (.1112)

Table 1. Goodness-of-Fit Statistics for the Confirmatory Factor Analysis Models for the Conners 3 Scales.

Note.  $\chi^2$  = chi squared; df = degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; IN = Inattention; EF = Executive Functioning; LP = Learning Problems; LE = Learning Problems/Executive Functioning; Conners 3-P = Conners 3-Parent scale; Conners 3-T = Conners 3-Teacher scale.



**Figure 1.** Confirmatory Factor Analysis for Conners 3-Parent scale—final model. Note. IN = Inattention; HY = Hyperactivity/Impulsivity; LP = Learning Problems; EF = Executive Functioning; AG = Defiance/Aggression; PR = Peer Relations.

supported as it showed a better fit to the data than the other proposed solutions (Figure 1).

*Conners 3-T Scale.* Using CFA performed on the Conners 3-T scale, a five-factor model in line with the original structure was tested. Since goodness-of-fit indicators of the model were not adequate (Table 1), Modification Indices (M.I.) were examined. They suggested the addition of four covariance

errors between parcels 5 and 6 of the *Hyperactivity/Impul*sivity factor, between parcels 2 and 3 of the *Learning Problems/Executive Functioning* factor, between parcels 1 and 2 of the *Defiance/Aggression* factor, and between parcels 2 and 3 of the *Peer Relations* scale. These links were theoretically justified, given that (a) the two parcels of the *Hyperactivity/ Impulsivity* factor examined verbal hyperactivity (namely, talking too much, blurting out answers, and interrupting



**Figure 2.** Confirmatory Factor Analysis for Conners 3-Teacher scale—final model. *Note.* IN = Inattention; HY = Hyperactivity/Impulsivity; LEARN = Learning Problems/ Executive Functioning; AG = Defiance/Aggression; PR = Peer Relations.

others); (b) the two parcels of the *Learning Problems/Executive Functioning* factor dealt with difficulties in executive functions, such as forgetting or not following instructions; (c) the two parcels of the *Defiance/Aggression* factor both referred to harming others or other people's belongings; and (d) the two parcels of the *Peer Relations* factor pertained to poor social skills and being isolated. The modified model showed a better fit than the first model (Table 1). Each parcel loaded strongly and significantly on its hypothesized factor and the correlations between the five factors were all significant (p < .001), ranging from .46 to .97.

Because the correlation between the *Inattention* and the *Learning Problems/Executive Functioning* scales was .97, a four-factor model that combined the *Inattention* and the *Learning Problems/Executive Functioning* scales into a single factor was tested. However, results showed a poorer overall fit (Table 1), so the original five-factor model with the four covariance errors was empirically supported (Figure 2).

#### Reliability

Conners 3-P Scale. Concerning reliability, in line with the original study (Conners, 2008), we aimed to measure

**Table 2.** Cronbach's Alpha Values for the Conners 3-Parentand Teacher Content Scales.

Scale	Conners 3-Parent	Conners 3-Teacher
Inattention	.90	.96
Hyperactivity/Impulsivity	.89	.96
Learning Problems	.84	_
Executive Functioning	.83	_
Learning Problems/Executive Functioning	_	.96
Defiance/Aggression	.74	.94
Peer Relations	.71	.88

the internal consistency of the Content scales. Cronbach's alphas for the Conners 3-P scale showed an acceptable internal consistency with alpha's values ranging from .71 to .90 (Table 2).

*Conners 3-T Scale.* Referring to Cronbach's alphas for the Conners 3-T scale, the Content scales showed acceptable to high levels of reliability, ranging from .88 to .96 (Table 2).

# Discussion

Despite the widespread use of the Conners 3 scales, only one study (Christiansen et al., 2016) examined the psychometric properties of the Parent and Teacher scales to test whether the original structure (Conners, 2008) could be confirmed. Moreover, in the original work aiming to develop the Conners 3 scales, EFAs did not support the *Inattention* scale, as the items belonging to this sphere cross-loaded with the *Learning Problems* factor (Conners, 2008). Therefore, the *Inattention* scale was only rationally defined, and CFAs did not include it. The present study has made several contributions to the analyses of the psychometric properties of the Conners 3-P and Conners 3-T scales. First, when examining the dimensionality of the Content scales to test for the presence of the original structure, a six-factor model for the Conners 3-P scale and a fivefactor model for the Conners 3-T scale were identified, thus, providing empirical evidence for the *Inattention* scale.

Furthermore, as correlations between the Inattention scale and both the Learning Problems and Executive Functioning scales were extremely high for the Conners 3-P scale, thus, suggesting a potential overlap between them in line with previous studies (Christiansen et al., 2016; Conners, 2008; Izzo et al., 2018), a five-factor model merging Inattention and Learning Problems scales, and a fivefactor model merging Inattention and Executive Functioning scales were tested. In addition, as the correlations between the Learning Problems and Executive Functioning scales were also extremely high, a four-factor model merging those two scales with the Inattention scale was tested. However, results showed a poorer fit than the six-factor solution, so this study not only confirmed the originally proposed six-factor model (Conners, 2008), thus, supporting its generalizability to a different cultural context, but it also provided psychometric, empirical support to the Inattention scale. The same results were found for the Conners 3-T scale, because the five-factor structure in line with the original one showed a better fit than a four-factor solution that combined the Inattention and the Learning Problems/Executive Functioning scales into a single factor. Finally, Cronbach's alphas for the Content scales of both the Conners 3-P and the Conners 3-T scales were high, thus, supporting their reliability.

# Study 2

The multi-informant assessment, which is one of the main strengths of the Conners 3 scales, is strongly suggested to obtain a global, more precise assessment of the child's impairments. However, it is important to examine the amount and specificity of information provided by each version of the scale about the assessed child, to establish the extent to which each version contributes to the understanding and the description of the child's profile. In fact, if accordance between different informants' assessments was particularly high, this could suggest redundancy between the different points of view, so clinicians may opt to administer only one version of the scales. In contrast, extremely low correlations may raise doubts regarding the validity of the scales. To answer these questions, the second study aimed at measuring the validity of the Conners 3 scales in terms of cross-informant correspondence between the different sources of information, so the correlation coefficients among the three versions of the Conners 3 scales were computed. We expected to find moderate correlations, which are not as high as to suggest redundancy in conducting all three assessments.

# Method

*Participants.* A sample of 293 8- to 18-year-old non-clinical children and adolescents (mean age: 11.82, *SD*: 2.42; 52% was male) was recruited. They attended primary (47%), middle (43%), and high schools (10%) in the North-Center (77%) and South (23%) of Italy. Moreover, their parents and teachers were recruited, resulting in a total of 879 participants (293 children, 293 parents, and 293 teachers). Thus, for each child, we collected all three versions of the Conners 3 scales.

Instruments. Along with the previously described Conners 3-P and Conners 3-T scales, the Italian version of the Conners 3-SR scale (Primi & Maschietto, 2017) was administered. It includes 56 items that compose the five Content scales, which assess the core symptoms of ADHD and their associated impairments in children and youth. The Content scales are the Inattention scale, the Hyperactivity/Impulsivity scale, the Learning Problems scale, which examines school difficulties, the Defiance/Aggression scale, assessing physical and/or verbal aggressiveness toward others, and the Family Relations scale, which evaluates negative family interactions. The symptoms are rated on a Likerttype scale with severity ratings from 0 (not true at all/ never) to 3 (very much true/very frequently). A recent study (Izzo et al., 2018) found that the scale showed good psychometric properties. Cronbach alphas for this sample were .86 for the Inattention scale, .83 for the Hyperactivity/ Impulsivity scale, .77 for the Learning Problems scale, .81 for the Defiance/Aggression scale, and .71 for the Family Relations scale.

**Procedure.** A study protocol similar to that of Study 1 was implemented. However, parents were also asked to provide their informed consent to allow their children to participate in the research. Written informed consent was obtained for all participants, and their confidentiality was ensured. All participants completed the questionnaire through a self-administered procedure, though parents completed them at home,

Scale	Conners 3-P M (SD)	Conners 3-T M (SD)	Conners 3-SR M (SD)
Inattention	7.17 (5.79)	7.64 (7.79)	7.95 (5.95)
Hyperactivity/Impulsivity	7.18 (6.67)	6.27 (9.77)	11.11 (7.17)
Learning Problems	4.45 (4.16)		5.30 (4.20)
Executive Functioning	6.62 (4.85)	_	_
Learning Problems/Executive Functioning		11.38 (10.67)	_
Defiance/Aggression	3.00 (3.58)	3.18 (6.00)	3.33 (4.31)
Peer Relations	1.98 (2.49)	3.28 (4.22)	
Family Relations	—	—	4.42 (3.45)

Table 3. Means and Standard Deviations for Each Conners 3 Content Scale.

Note. P = parent; T = teacher; SR = self-report.

whereas students and teachers completed them in class, during schooltime. The time needed for parents and teachers was approximately 20 min, whereas students completed both the Conners 3-SR and the *Gambling Behavior Scale for Adolescents* (GBS-A) scales in approximately 45 min.

Statistical analyses. First, means and standard deviations for each Conners 3 Content scale were calculated separately for each version—parent, teacher, and self-report—to measure differences in assessments from different points of view. Moreover, to assess cross-informant correspondence, correlation coefficients (Pearson's r) were calculated between each pair of informants: parent and teacher ratings, parent and self-report ratings, and teacher and self-report ratings.

# Results

Means and standard deviations for each Conners 3 Content scale in the parent, teacher, and self-report versions are reported in Table 3. As the results show, self-reported mean scores were higher on every Content scale when comparing them with hetero-evaluations from both parents and teachers. Furthermore, when comparing parents' and teachers' assessments, educators reported higher scores than parents on the scale evaluating negative peer relations, whereas there were no manifest differences on the other Content scales.

Regarding multi-informant correspondence, the correlations between the three informants were found to be all significant and moderate in size, indicating that there was a good deal of consistency between different informants' ratings of the same youth across the Conners 3 scales. The correlations were not high enough, however, to suggest redundancy. In detail, the mean parent to teacher correlation was .37 (ranging from .32 to .43), the mean parent to selfreport correlation was .39 (ranging from .30 to .45), and the mean teacher to self-report correlation was .34 (ranging from .30 to .41; Table 4).

Table 4.	Conners 3	Across-Informant	Correlations.
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Scale	Parent to Teacher	Parent to Self-Report	Teacher to Self-Report
Inattention	.39***	.43***	.30***
Hyperactivity/Impulsivity	.36***	.36***	.31***
Learning Problems <sup>a</sup>	.43***	.45***	.41***
Executive Functioning <sup>b</sup>	.32***	_	
Defiance/Aggression	.37***	.30***	.35***
Peer Relations	.32***	—	—

\*\*\*\*p < .001.

<sup>a</sup>Correlation between the Conners 3–Teacher (T) *Learning Problems/ Executive Functioning* scale and the Conners 3–Parent (P) and Conners 3–Self-Report *Learning Problems* scale.

<sup>b</sup>Correlation between the Conners 3-T *Learning Problems/Executive Functioning* scale and the Conners 3-P *Executive Functioning* scale.

### Discussion

One of the main strengths of the Conners 3 scales is their multi-informant assessment, which allows a gathering of information from different points of view, thus, obtaining a more detailed profile of the youth's impairments. In fact, the different sources of information assess the child from different perspectives—that is, the parent provides a profile based on how the child behaves at home, the teacher describes the student according to what can be observed in class, and the children respond on the basis of their personal perceptions and insights.

The Conners 3-P, T, and SR scales present similar structures with similar item content, so multi-informant concordance in scores is expected to be found. Nonetheless, previous meta-analyses (Achenbach et al., 1987; De Los Reyes et al., 2015) found that multi-informant correspondence tended to be low. Study 2 aimed at measuring the correlation coefficients among the three versions of the Conners 3 scales in our Italian sample. In line with the original work (Conners, 2008), correlations between all sources of information—parent to teacher, parent to youth, and teacher to youth—were moderate, though not high enough
results (Achenbach et al., 1987; De Los Reyes et al., 2015), which found that, rather than indicating poor psychometric quality of the instrument, low to moderate levels of agreement between informants could be due to several factors: (a) the nature of the mental health concern, as there were greater levels of correspondence when referring to externalizing problems (with correlations between informants around .36), than in the case of internalizing difficulties (with rs around .28); (b) the nature of the measurement method, because correspondence was greater when reports were on a dimensional scale than when they were on a categorical scale; and (c) different observational contexts, because correspondence tended to be greater between pairs of informants belonging to the same context, such as pairs of parents or pairs of teachers, rather than between pairs of informants belonging to different contexts, such as parent and teacher. Considering that (a) the Conners 3 scales aim at assessing externalizing, directly observable concerns such as ADHD, (b) ratings are on a 4-point Likert-type scale, and (c) to facilitate the comparison between the assessment of the three sources of information, the scales have very similar structures, subscales, item content, and item formulation, it was not surprising that moderate crossinformant correspondence was found.

It is also noteworthy that children and adolescents rated themselves as more problematic on every Content scale when comparing their scores with the evaluations from both parents and teachers. This finding is in line with previous studies and is not limited to ADHD (e.g., Begovac, Rudan, Skočić, Filipović, & Szirovicza, 2004; Grigorenko, Geiser, Slobodskaya, & Francis, 2010; van der Ende & Verhulst, 2005). Moreover, educators reported higher scores than parents on the scale evaluating negative peer relations, whereas there were not differences on the other Content scales. Possible explanations for these results may include the fact that parents and teachers may be less aware of their sons/students' problems than children/adolescents themselves. In line with this, parents may be less aware of the child's social relationships than teachers, as educators may have more time to observe the student's interactions with peers. Otherwise, children and adolescents may be too critical of themselves, thus, reporting more difficulties than parents and teachers. Overall, teachers and children may be more objective than parents in reporting their difficulties, as parents may be susceptible to biases in social desirability and may tend to describe the child as less problematic. These findings may confirm the importance of collecting information from all three sources of information. However, it is important to remember that a global clinical evaluation should also include observations and interviews, which may shed light on discrepancies among the three versions of the Conners 3 scales.

The Conners' Rating Scales, which are currently in their third edition, are among the most commonly used measures to assess ADHD. The third edition (Conners, 2008) includes three versions, completed by parents (Conners 3-P), teachers (Conners 3-T), and youth themselves (Conners 3-SR). While the Conners 3-SR version was validated for the Italian context elsewhere (see Izzo et al., 2018), the Italian version of the parent and teacher scales had not yet been validated. Because one of the most important strengths of the Conners 3 scales is its multi-informant nature, and the psychometric properties of the self-report form have already been tested, the present work aimed at examining the measurement properties of the Conners 3-P and the Conners 3-T scales—so that clinicians may select instruments with proven reliability and validity.

The present study has made several original contributions to the analyses of the psychometric properties of the Conners 3-P and T scales, and regarding the usefulness of the multi-informant version of the Conners 3 scales. First, CFAs for both the Conners 3-P and the Conners 3-T scales revealed that, even when compared with alternative structural solutions, the original six-factor model for the Conners 3-P, and the original five-factor model for the Conners 3-T, were detected. These results are noteworthy, as they provided empirical evidence and psychometric support for the Inattention scale, which in the EFAs of the original work (Conners, 2008) could not be distinguished from the Learning Problems scale. Furthermore, reliability of each factor of both the Conners 3-P and the Conners 3-T scales in terms of their internal consistency was assessed, showing high Cronbach's alpha values.

Moreover, the current study found that, though being lower than in the original work (Conners, 2008), correspondence between the three informants-parents, teachers, and youthwas moderate, thus, indicating that, though examining similar constructs, the three versions were not redundant, as they provided information from different standpoints. The modest multi-informant correspondence—which is in line with previous studies (see Achenbach et al., 1987; De Los Reyes et al., 2015)—may reflect the fact that the assessed behaviors and symptoms tend to be contextual-specific or to show variations among different contexts. Thus, discrepancies among different Conners 3 versions represent precious information, as each informant provided data that complemented those of other informants, rather than being overlapping and redundant, thus promoting the adoption of a multi-informant perspective to obtain a comprehensive assessment.

Some limitations should be considered for future studies. First, this study focused on the general population rather than on a clinical sample, so generalization of results to the clinical population should be made with caution, and future research should recruit clinical samples so as to repeat these analyses. Second, future studies may examine correlations between similar informant types, such as parent-parent or teacher-teacher. Eventually, different methods of evaluation such as observations and clinical interviews should be integrated.

Despite the above-mentioned limitations, the current findings have important practical implications in the clinical field. First, clinicians can now be confident that all versions of the Conners 3 scales—the parent, the teacher, and the self-report versions—are valid and reliable measures. Furthermore, the three versions of the Conners 3 scales were not redundant when examining cross-informant agreement. Therefore, the lack of redundancy strongly supports the multi-informant nature of the Conners 3 scales and advocates their administration. Consequently, clinicians aiming to use the Conners 3 scales should collect information from all three sources of information—parent, teacher, and the youth themselves—to take full advantage of the benefits that multi-informant instruments offer by obtaining complementary information.

#### **Declaration of Conflicting Interests**

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

#### Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

#### Notes

$$(Obtained rawscore for scale) \times$$
1. Prorated score = 
$$\frac{(Total number of items on scale)}{Total number of items}$$
on scale with responses

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# Strategy Selection in ADHD Characteristics Children: A Study in Arithmetic

Journal of Attention Disorders 2019, Vol. 23(1) 87–98 © The Author(s) 2012 Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/1087054712438766 journals.sagepub.com/home/jad

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#### Abstract

**Objective:** It has been argued that ADHD characteristics children have difficulties in selecting the best strategy when they accomplish cognitive tasks. The detrimental influence of these poor strategy skills may be crucial for several aspects of academic achievement such as mathematical learning. **Method:** Fourth- and fifth-grade children with ADHD symptoms and matched controls were asked to select the better of two rounding strategies in a computational estimation task (i.e., finding the best estimate of two-digit addition problems). **Results:** (a) Both control and ADHD children correctly executed a selected strategy, (b) ADHD children selected the best strategy less often than controls, (c) ADHD took more time to estimate sums of two-digit addition problems and provided poorer estimates, and (d) different factors predicted best strategy selections in each group. **Conclusion:** These findings have important implications for further understanding the sources of differences in cognitive performance between ADHD and control children.(*J. of Att. Dis. 2019; 23(1) 87-98*)

#### **Keywords**

ADHD, strategy selection, arithmetic, computational estimation

ADHD is a neurobehavioral developmental disorder characterized by a persistent pattern of inattention and/or hyperactivity, as well as poor impulse control (American Psychiatric Association [APA], 1994). Meta-analytical studies have reported that the worldwide prevalence of ADHD is about 5.5% in children (Polanczyk, Lima, de Horta, Biederman, & Rohde, 2007) and 4.4% in adults (Kessler et al., 2006; U.S. sample).

The main theoretical explanation for ADHD symptomatology has been referred to executive function (EF) deficits with important weakness in planning, working memory, response inhibition, and vigilance (Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005). Along with EF deficits, ADHD participants have difficulties in many general cognitive abilities such as memory, visuo-motor competencies, behavioral control, and social skills (Crawford, Kaplan, & Dewey, 2006; Seidman, Biederman, Monuteaux, Doyle, & Faraone, 2001). Castellanos and Tannock (2002) suggested that these deficits can be related to three main quantitative indices of disease risk (endophenotypes): a reduced delay gradient due to an impairment in rewarding circuitry, a strong intertrial and intraindividual variability may be related to deficits in temporal processing, and deficits in working memory.

ADHD is often coupled to academic difficulties or learning disabilities (LD; e.g., Barry, 2002; Faraone, Biederman, Monuteaux, Doyle, & Seidman, 2001; Mayes, Calhoun, & Crowell, 2000). The frequency of LD in children with ADHD has been estimated to vary from 15% to 44% for reading and from 31% to 60% for mathematics (Mayes & Calhoun, 2006). Most research about the comorbidity between ADHD and LD refers to reading disability (e.g., dyslexia). In contrast, mathematical disorders (MD) associated with ADHD have been much less often investigated despite their high association (Capano, Minden, Chen, Schachar, & Ickowicz, 2008). Research has shown that ADHD children often have arithmetic difficulties, are more rigid in strategy use, and have poor attentional control (Lucangeli & Cabrele, 2006). The most severe difficulties seem present when arithmetical reasoning and executive processes are required (e.g., Marzocchi, Lucangeli, De Meo, Fini, & Cornoldi, 2002), but difficulties may also concern basic number processing and calculation. For example, Zentall, Smith, Lee, and Wieczorek (1994) found that students with ADHD were slower and less accurate in number

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Francesco Sella, Department of Developmental Psychology and Socialization, University of Padova, Via Venezia 12/2, 35131 Padova, Italy. Email: francescosella@yahoo.it recognition and also in typing numbers. Kaufmann and Nuerk (2008) found that ADHD children, without LD and with a similar performance as controls in complex arithmetic, were nevertheless poorer in basic arithmetic tasks requiring attentional control, such as magnitude comparison (i.e., indicating which of two numbers is larger) or transcoding tasks (i.e., writing down in Arabic format a number like "32" orally displayed).

Some of ADHD deficits in accomplishing cognitive tasks and in academic achievement are due to their poor ability in selecting the best strategies to maximize their performance or achievement. Indeed, a strategy can be defined as "a procedure or a set of procedures for achieving a higher level goal or task" (Lemaire & Reder, 1999, p. 365). Differences in strategic aspects between ADHD and control children's performance is plausible given previous findings showing that ADHD children have poorer strategic behaviors compared with control children (e.g., Cornoldi, Barbieri, Gaiani, & Zocchi, 1999; Sergeant, Geurts, & Oosterlaan, 2002). In particular, it has been found that ADHD children tend to adopt more superficial strategies, to repeat the same strategy across trials (O'Neill & Douglas, 1991, 1996), and to have less knowledge of optimal strategies (Hamlett, Pellegrini, & Conners, 1987). These difficulties seem to remain even when the best strategy to accomplish a task is directly suggested to ADHD children (Kofman, Larson, & Mostofsky, 2008). Nevertheless, Cornoldi et al. (1999) found that when sixth- to eighthgrade ADHD children were informed and assisted in the use of the appropriate memory strategy, ADHD children performed as well as controls. Instead, when they were not informed about appropriate strategies, ADHD had poorer memory performance. In line with these results, a recent study confirmed the effectiveness of cognitive strategy instructions in improving mathematical computation in ADHD children (Iseman & Naglieri, 2011).

One aspect of mathematical performance that has not been investigated in great detail in ADHD children concerns strategies. Children's mathematical proficiency is known to crucially depend on strategic aspects of performance. Most proficient children use more and/or most efficient strategies, select the best available strategies on individual problems, and execute strategies most efficiently (see Siegler, 2007, for an overview).

In this article, we report a study that asks whether ADHD children are as good as control children at selecting the best strategy on individual items when they accomplish cognitive tasks. We ran the empirical study in the domain of arithmetic, but the results generalize to other cognitive domains (Campbell, 2005). As children use several strategies to accomplish cognitive tasks and as one crucial aspect of cognitive performance is children's skill at selecting the best strategy on each item, we asked whether differences in cognitive performance between ADHD and control children lie in their skills at selecting the best strategy on each problem. Investigating ADHD's skills at selecting the best strategy to solve arithmetic problems was expected to bring two sets of contributions. First, it was aimed at increasing our understanding of sources of differences in mathematical performance between ADHD and control children when ADHD children do not suffer from inefficient mathematics, domainspecific processes (e.g., insufficient knowledge of basic arithmetic facts). More generally, the present strategy approach was expected to highlight how ADHD children accomplish cognitive tasks and why they obtain poorer cognitive performance despite being skilled in a given cognitive domain. Second, it was hoped to further document the role of domain-general processes such as sustained or focused attention, shifting, or inhibition on mathematical performance. A number of previous studies have shown that children with mathematical difficulties tend to engage in fewer attending behaviors during mathematics instruction (Bryan, 1974; Hecht & Greenfield, 2001; McKinney & Speece, 1986). Also, previous works showed that children with poor working-memory capacities or with poor focused attention tend to have poorer mathematical performance (e.g., Barrouillet & Lépine, 2005; Geary, Hoard, Byrd-Craven, Nugent, & Numtee, 2007; Hitch & McAuley, 1991; Kail & Hall, 1999; LeFevre, DeStefano, Coleman, & Shanahan, 2005). Finally, data collected with neuropsychological tests of EFs suggest that EFs influence children's mathematical performance and strategies (e.g., Bull, Johnston, & Roy, 1999; Bull & Scerif, 2001; Geary, Brown, & Samaranayake, 1991; Lemaire & Lecacheur, 2011; McKenzie, Bull, & Gray, 2003). Finding that ADHD children who are known to have EF problems (e.g., Barkley, 1997; Castellanos, Sonuga-Barke, Milham, & Tannock, 2006; Holmes et al., 2010; Martinussen, Hayden, Hogg-Johnson, & Tannock, 2005; Nigg, 2001) also have strategy selection problems would further suggest that one of the crucial roles of attention in children's mathematical proficiency consists in how able they are to select the best strategy on each problem.

The present study compared ADHD and control children on strategic aspects of arithmetic performance. We tested one specific arithmetic activity, namely, computational estimation, as previous studies revealed that it is a good activity in which strategy differences across populations are unambiguous and easy to document. In computational estimation tasks, participants are asked to provide the best approximate sums (or products) to problems like 36 + 78 (or to problems like  $36 \times 78$ ). Previous research showed that children of different ages use several types of strategies. Also, like in other domains, children's performance is influenced by the type of strategies they use and the type of problems they solve (Baroody, 1989; Case & Sowder, 1990; Dowker, 1997; Dowker, Flood, Griffiths, Harriss, & Hook, 1996; LeFevre, Greenham, & Waheed, 1993; Lemaire & Lecacheur, 2002; Lemaire, Lecacheur, & Farioli, 2000; Levine, 1982; Reys, Rybolt, Bestgen, & Wyatt, 1982; Sowder & Markovits, 1990). The hypothesis under test was that an important source of differences in arithmetic performance between ADHD and control children concerns strategic aspects of this performance. More specifically, we tested group differences in strategy use asking whether ADHD and control children differ in strategy preferences and in best strategy selection. In other words, we tested the hypothesis that ADHD children would be less able than control children to select the best strategy on each problem. We made sure that both ADHD and control children knew the available strategies so as to control for potential differences in strategy repertoires. We tested younger children (fourth and fifth graders) to test the possibility that strategic differences exist very early in school-age children. Moreover, we also determined whether ADHD and control children base their best strategy selections on the same problem features.

# Method

## Participants

Participants were selected from state schools in Veneto region, North Italy, on the basis of the "SDAI" Rating Scale (ADHD Rating Scale for Teachers [Scala per i Disturbi di Attenzione/Iperattività per Insegnanti]; Cornoldi, Gardinale, Masi, & Pettenò, 1996). The SDAI Scale requires the teacher to rate the child frequency/intensity (4-point scale ranging from 0 = no problem to 3 = severe problemof the nine symptoms of inattention and the nine symptoms for hyperactivity/impulsivity reported in the *Diagnostic* and Statistical Manual of Mental Disorders (4th ed.; DSM-IV; APA, 1994). The SDAI interrater reliability is .80 for the Inattention subscale and .74 for the Hyperactivity-Impulsivity subscale. The test-retest reliability is .83 and .81, for Inattention and Hyperactivity-Impulsivity, respectively (Marzocchi, Re, & Cornoldi, 2010). For each subscale, the cutoff is at 13.5 points, that is, 1.5 SD more than the standardized mean score. All the children included in the ADHD characteristic group obtained a score above the cutoff in at least one scale (Inattention or Hyperactivity-Impulsivity). Moreover, we administered the "COM" Scale ("Comorbidity Scale"; Marzocchi et al., 2010) to assess the comorbidity in ADHD. The questionnaire has thirty 4-point Likert-type scale (ranging from 0 = no problem to 3 =severe problems) items: five items for general cognitive and learning difficulties, one item for Tourette syndrome, four items for conduct disorder, five items for oppositional defiant disorder, five items for autistic behaviors, four items for depression, and six items for anxiety. The scale shows good psychometric properties such as an interrater reliability of .97. On the basis of the COM Rating Scale, all children scored less than 2 in general cognitive and learning difficulties, oppositional and aggressive behaviors, anxiety prob-

Table 1. Characteristics of ADHD and Control Participants.

	ADHD	Control		
Characteristics	M (SD)	M (SD)	t(36)	
Age (months)	123 (7.7)	122 (7.7)	0.502	
SDAI inattention	15.26 (6.86)	1.42 (1.83)	8.49**	
SDAI hyperactivity	13.53 (8.11)	1.16 (1.21)	6.57**	
WISC-III Informa- tion subtest	7.79 (2.69)	7.21 (3.27)	-0.595	
Fourth-grade AC-MT written calculation	5.56 (1.66)	5.3 (2.26)	0.277	
Fifth-grade AC-MT written calculation	7.2 (0.78)	6.44 (1.94)	1.13	

Note. SDAI = ADHD Rating Scale for Teachers [Scala per i Disturbi di Attenzione/Iperattività per Insegnanti]; WISC-III = Wechsler Intelligence Scale for Children-III.

\*\*p < .01

lems, and depressive behaviors. Among those items assessing learning difficulties, one specifically measures mathematical learning. Thus, the teacher reported that no child had a lower mathematical learning or achievement. The children in both groups did not present any other severe psychological problems, nor any physical or sensory deficits or a disability certification. ADHD characteristics children were not under medication.

The final sample included 19 children (14 boys, 5 girls; 9 fourth graders, 10 fifth graders) with ADHD characteristics (7 inattentive subtype, 6 hyperactive-impulsive subtype, 6 combined subtype). The ADHD characteristics (hereafter ADHD group for simplicity) group was compared with a control group. Children of the control group were 14 boys and 5 girls: in all, 10 of these control children were in fourth grade and nine were in fifth grade. The ADHD and control groups were matched for gender, age, written calculation skills assessed with a standardized test (AC-MT written calculation scores; Cornoldi, Lucangeli, & Bellina, 2002), and general knowledge (paper- and -pencil version of the Information subtest of Wechsler Intelligence Scale for Children-III [WISC-III]; Wechsler, 1991). The written calculation test was composed of eight problems: two addition, two subtraction, two multiplication, and two division problems. We chose to match children on the basis of this task because it involves a wide range of mathematical knowledge: number knowledge, mental strategies and procedures of calculation, and knowledge of arithmetic facts. Similarly, the Information subtest of the WISC-III was used as a control measure for general knowledge and IQ given the high correlation between the subtest and the Full Scale IQ (r = .62 for 10 years of age and r = .65 for 11 years of age). As expected, only levels of inattention and hyperactivity were significantly different between the two groups (Table 1).

# Stimuli

Children were asked to select the best strategy to find estimates to two-digit addition problems like 36 + 78. On each problem, children could choose rounding-down (i.e., rounding both operands down to the closest smaller decades, like doing 40 + 60 to solve 42 + 67) or rounding-up strategies (i.e., rounding both operands up to the closest larger decades, like doing 50 + 70 to solve 42 + 67), as these strategies are known and spontaneously used by children as young as 7 years (e.g., LeFevre et al., 1993; Lemaire, Lecacheur, & Farioli, 2000; Lemaire & Lecacheur, 2002, 2011). The stimuli for the main computational estimation task were 100 two-digit addition problems (e.g., 54 + 29). Two types of problems were tested, so-called homogeneous problems (i.e., problems with unit digits of both operands either smaller or larger than 5 like in 43 + 62 or in 37 + 59) or heterogeneous problems (i.e., problems with unit digit of one operand smaller than 5 and unit digit of the other operand larger than 5 like in 43 + 68), as previous studies in computational estimation showed that size of unit digits influences children's strategies and performance. Mixedrounding strategy (i.e., rounding one operand down and the other up to the closest decades) was not allowed to increase difficulty of strategy selection, thereby maximizing group differences in mean percentage use of the best strategy. Indeed, we wanted to avoid that children systematically choose the rounding-down strategy on homogeneous, small-unit problems (e.g.,  $31 \times 82$ ), the rounding-up strategy on homogeneous, large-unit problems (e.g.,  $27 \times 68$ ), and the mixed-rounding strategy on heterogeneous problems (e.g.,  $28 \times 74$ ), something that children as young as 7 years are able to do.

Homogeneous and heterogeneous problems were matched on three important factors, the side of the larger operand, mean correct sums, and mean percentage deviations. The larger of the two operands was on the left position (e.g., 67 + 26) in half the problems and on the right position (e.g., 18 + 73) in the other problems. Moreover, mean correct sums were 68 for both types of problems (ranges were 44-86 for homogeneous problems and 42-82 for heterogeneous problems). Finally, for each homogeneous and heterogeneous problem estimated with roundingdown and rounding-up strategies, percentage deviations were calculated with the following formula: ([estimate sum correct sum]/correct sum)  $\times$  100. For example, percentage deviations were 10.3% and 15.4% on 41 + 37 when using rounding-down and rounding-up strategy, respectively, and were 16.7% and 11.1% on 48 + 24 when using roundingdown and rounding-up strategy, respectively. Mean percentage deviations between correct sums and estimates for

homogeneous problems were 15.0% (range = 4.1%-31.8%) and 15.2% (range = 3.9%-30.4%) when using roundingdown and rounding-up strategies, respectively. Similarly, mean percentage deviations between correct sums and estimates for heterogeneous problems were 15.2% (range = 9.1%-30.2%) and 15.1% (range = 9.8-25.0%) when using rounding-down and rounding-up strategies, respectively. Matching these percentage deviations was necessary because having one strategy with mean percentage deviations smaller on average than those of the other strategy might artifactually lead participants to use the former strategy most often. When one strategy was the best on a given problem, the estimate provided by that strategy was closer to the correct product by 10.1% on average (range = 3.9%-19.1%) compared with the estimate provided by the other strategy. The rounding-down strategy yielded the best sum (i.e., sum that was closest from correct sum) for half the problems and the rounding-up strategy yielded the most accurate sum for the other problems.

Finally, based on previous research in arithmetic (e.g., see Campbell, 2005, or Geary, 1994, for overviews in adults or children), problems were selected with the following constraints: (a) No operand had 0 or 5 as unit digits, (b) digits were not repeated in the same unit or decade positions across operands (like 64 + 24), (c) no digits were repeated within operands (e.g., 66 + 31), and (d) no reverse orders of operands were used (e.g., 47 + 32 was used, 32 + 47 was not).

# Procedure

Before encountering the experimental problems, participants were told that they were going to do computational estimation. Computational estimation was explained as giving an approximate answer to an arithmetic problem that is as close as possible to the correct answer without actually calculating the correct answer. An example was worked out with participants who were told, "For example, if I have to estimate 28 + 41, I can do 20 + 40 and give 60 as an approximate solution to the problem. I can also do 30 + 50, or do anything else that yields an approximate answer." Then, all participants were told,

You are going to see two sets of 50 two-digit addition problems each, with a break in-between. Your task is to tell me an approximate sum for each problem. To estimate the sums, you can use either rounding-up or rounding-down strategy, and no other strategies. Rounding-down means that you round each operand down to the closest smaller decades, like when you do  $20 \times 40$  to estimate  $26 \times 42$ . Rounding-up strategy means that you round each operand up to the closest larger decades, for example when you do  $30 \times 50$  to estimate  $26 \times 42$ . For each problem, I want you to try to find the best strategy that will give you the most exact sum. The most exact sum is the one that is the closest from the exact sum. [This was illustrated with a couple of examples.] However, be careful. Because I do not want you to give me the exact sum but an approximate sum, you will not have the time to calculate the exact sums, as your estimates should be stated very quickly.

Instructions also emphasized that participants should do only the initial rounding up or down and should do nothing more (i.e., adding or subtracting small amounts after calculating the sum of rounded operands). Before the experimental trials, participants were given 10 training problems that were similar to (but different from) experimental problems to familiarize themselves with the apparatus, procedure, and task. All individuals had no difficulties with either rounding-down or rounding-up strategies.

At the beginning of the practice trials, some participants wanted to use mixed-rounding strategy (i.e., rounding one operand down to the closest smaller decade and rounding the other operand up to the closest larger decade). After a few practice problems, all participants understood that this strategy was not allowed. At the end of this training, children had no difficulties with the instruction on trying to select the best strategy on each problem.

The experimental problems were presented in 48-point Arial font (black color) in the center of a 17-in. computer screen controlled by Notebook with a 1.6 GHz processor. Each trial began with a black fixation cross in the center of the screen waiting for the child to be ready. When the experimenter pressed the spacebar, the two + two-digit addition problems were displayed horizontally. The symbol and numbers were separated by spaces equal to the width of one character. Timing of each trial began when the problem appeared on the screen and ended when the experimenter pressed the spacebar of the computer keyboard, the latter event occurring as soon as possible after the participant's responses. Children were asked to calculate out loud so that the experimenter could note which strategy was used on each problem. The experiment was controlled by E-Prime software.

The order of presentation of problems was sequential for each participant. Each participant was permitted a 5- to 10-min rest between two blocks of 50 problems each. The computational estimation task was accomplished in between 30 to 60 min, depending on participants' age.

# Results

Data analyses had three goals. First, we analyzed group differences in computational estimation performance for the purpose of comparing ADHD and control children skills at finding best estimates of two-digit addition problems and speed at achieving this end. The hypothesis that the two groups differ in performance predicts that ADHD children should provide less accurate estimates and should take more time. The second goal was to analyze group differences in strategy use. To achieve this end, we first compared strategy preferences in each group of children (i.e., Do children differ in mean percentage use of the roundingdown strategy?). Second, we tested group difference in best strategy selection. We expected that ADHD children would select the best strategy less often than control children. This was justified by the fact that ADHD's attention problems might not enable them to analyze problem features as fully as control children. Such problem features are crucial to selecting the best strategy on each problem, as the larger the sum of unit digits in a problem, the more likely that the best strategy is the rounding-up strategy. Finally, we examined the bases on which children selected strategies on individual problems so as to know whether the two groups used the same problem features during strategy selection.

Results are reported in three main parts. Group differences in computational estimation performance are examined in the first part, and differences in strategy use are analyzed in the second part. The third part focuses on the determiners of best strategy selections. In all results, unless otherwise noted, differences are significant to at least p < .05.

# Group Differences in Performance<sup>1</sup>

To highlight the differences between ADHD and control children, we analyzed accuracy and speed of responses. Mean percentage deviations between estimates and correct sums were analyzed to determine whether the two groups differed in the accuracy of estimates they provided. Following previous works on computational estimation (e.g., LeFevre et al., 1993; Lemaire, Arnaud, & Lecacheur, 2004), the quality of estimates was assessed by calculating mean percentage deviations between estimates and correct sums. We calculated each participant's percentage of deviation between estimates and correct sums with the following formula: ([(Participant's response - Correct sum)/Correct sum]\*100) To illustrate, suppose a participant gave 80 as an estimate for 43 + 56, that participant would be 19.2% ([(80-99)/99] × 100) away from the correct product. Mean solution times and percentage deviations (see Table 2) were analyzed with a mixed-design ANOVA, 2 (group: control, ADHD children) × 2 (problem type: homogeneous, heterogeneous problems), with group as a between-participant factor.

The main effect of the problem was significant on mean percentage deviations, F(1, 36) = 51.72, *Mean square of error* (MSe) = 4.24, p < .001,  $\eta_p^2 = .590$ . Indeed, children provided better estimates when solving homogeneous problems (11%) than when solving heterogeneous problems (14%). Moreover, the main effect of group was significant, F(1, 36) = 9.64, MSe = 5.83, p = .004,  $\eta_p^2 = .211$ , as control children (12%) provided better estimates than ADHD children (14%). The Group × Problem interaction was marginally significant, F(1, 36) = 3.61,

Problem type	Percentage use of rounding down	Percentage use of the best strategy	Solution times	Percentage deviations
Control children				
Homogenous	52.8	84.7	5,374	9.9
Heterogeneous	46.3	66.4	5,972	14.2
М	49.6	75.6	5,673	12.0
ADHD children				
Homogenous	57.3	68.3	6,737	12.5
Heterogeneous	57.5	51.9	6,770	15.0
M	57.4	60. I	6,753	13.8

**Table 2.** Mean Percentage Use of Rounding Down and of theBest Strategy on Each Problem, Mean Solution Times (ms),Percentage Deviations, and Percentage Errors.

MSe = 4.24, p = .07,  $\eta_p^2 = .091$ . Although both groups of children provided better estimates on heterogeneous than on homogeneous problems, the heterogeneous–homogeneous difference was larger in control children, 4.3%, t(18) = 8.64, p < .001, than in ADHD children, 2.5%, t(18) = 3.11, p = .006.

Regarding solution times, the only effect that came out significant in analyses was the Group × Problem interaction effect, F(1, 36) = 6.36, MSe = 238,480, p = .016,  $\eta_p^2 = .15$ . Control children were faster when solving homogeneous problems as compared with when solving heterogeneous problems (5,374 ms vs. 5,972 ms), t(18) = -4.34, p < .001. ADHD children took an equal amount of time to estimate homogeneous and heterogeneous problems (6,737 ms vs. 6,770 ms; t < 1).

Finally, we rerun these analyses on performance restricted to problems where children used the best strategy to more stringently test group differences in strategy execution. Analyses of mean percentage deviations on those problems for which children chose the best strategy revealed a main effect of problem, F(1, 36) = 1601.83, MSe =0.254, p < .001,  $\eta_{p}^{2} = .978$ , but no main effect of group or Problem  $\times$  Group<sup>*r*</sup> interaction (*F*s < 1). Mean percentage deviations were the same in control children (10.0%) and in ADHD children (10.1%). Corresponding analyses on solution times showed a significant main effect of problem,  $F(1, 36) = 4.68, MSe = 342,294, p = .037, \eta_n^{\bar{2}} = .115.$ Although control children were faster (5,603<sup>r</sup>ms) than were children with ADHD (6,713 ms), effects of Group, F(1, 36) = 3.32, MSe = 342,294, p = .08, and Problem × Group interaction (F < 1) were not significant.

# Group Differences in Strategy Use

Analyses of strategy use had two goals. First, we determined whether individuals accomplished this task with only one strategy or with both strategies and compared

**Table 3.** Distributions of strategy use across participants and items.

	0%-25%	26%-50%	51%-75%	76%-100%
	Participar	nt-based ana	lyses	
Control children	5.3	68.3	21.1	5.3
ADHD children	5.3	33.3	45.5	15.9
	ltem-b	ased analyse	es	
Control children	27	29	13	31
ADHD children	I	42	37	20

Note. Each entry in the participant-based analyses represents the percentage of participants using the rounding-down strategy on less than 26%, between 26% and 50%, between 51% and 75%, and more than 75% of problems. For example, 68.3% of control children used the roundingdown strategy on between 26% and 50% of problems. Each entry in the problem-based analyses represents the percentage of items solved with the rounding-down strategy by less than 26% of participants, between 26% and 50% of participants, between 51% and 75%, and by more than 75% of participants. For example, 42% of problems were solved with the rounding-down strategy by between 26% and 50% of ADHD children.

strategy use in each group on homogeneous and heterogeneous problems. Second, we examined group differences in selecting the best strategy on each problem.

As can be seen in Table 3, all individuals, but one ADHD child and one control child, used both the rounding-down and the rounding-up strategies. There were only one ADHD child and one control child who could be considered single-strategy users (i.e., participants who used one of the two strategies on more than 95% of problems).

Mean percentage use of the rounding-down strategy and mean percentage use of the best strategy (see Table 2) were analyzed with 2 (group: control, ADHD children) × 2 (problem type: homogeneous, heterogeneous), with group as a between-participant factor. Children used rounding down on 54% of trials, and used it more often on homogeneous problems than on heterogeneous problems (55% vs. 52%), F(1, 36) = 4.88, MSe = 189.74, p = .034,  $\eta_p^2 = .12$ . Moreover, as the Group × Problem Type interaction showed, F(1, 36) = 5.55, MSe = 38.86, p = .024,  $\eta_p^2 = .13$ , ADHD children used rounding down equally often on homogeneous and heterogeneous problems (57%, t < 1), whereas control children used it more often on homogeneous problems than on heterogeneous problems (53% vs. 46%), t(18) = -2.65, p = .016.

Analyses of mean percentage use of the best strategy on each problem showed main effects of group, F(1, 36) =10.86, MSe = 418.8, p = .002,  $\eta_p^2 = .23$ , and of problem type, F(1, 36) = 29.75, MSe = 192.65, p < .001,  $\eta_p^2 = .45$ . Control children (76%) selected the best strategy on each problem more often than did ADHD children (60%), and both groups selected the best strategy more often while solving homogeneous problems (77%) than while solving heterogeneous problems (59%). We also run a discriminant analysis to check group assignment (grouping variable: ADHD, control) with mean percentage use of best strategy as an independent variable. The percentage use of best strategy was a significant predictor,  $\lambda = .768$ ,  $\chi(1) = 9.36$ , p = .002. In all, 6 out of 19 (31%) ADHD children were better categorized as obtaining a performance similar to the control group and 6 out of 19 control children a performance more similar to the ADHD group. Moreover, the newly obtained categorization significantly correlated with the SDAI Inattention subscale,  $r_{\rm pb}(36) = .41$ , p = .009, but not with the Hyperactivity subscale,  $r_{\rm gb}(36) = .26$ , p = .11. This result suggests that performance in strategy selection is mainly related to attentional resources, which are differently available in controls and ADHD characteristics children.

# Group Differences in the Determiners of Best Strategy Selection

The goals of these analyses were to (a) examine correlations between mean percentage use of the best strategy on each problem and problem features in control and ADHD children and (b) determine which problem feature is the best predictor of mean percentage use of the best strategy and whether this predictor is the same in each group of children.

First, problem-based correlations in each group were calculated between mean percentages of the best strategy on each problem and the following problem features: (a) side of the larger operand (Left = 1; Right = 0), (b) sum of unit digits (e.g., 9 for 37 + 42), (c) relative strategy efficacy: mean percentage deviations between correct sums and estimates with rounding up – mean percentage deviations between correct sums and estimates with rounding down (e.g., 2.5% for 37 + 42), and (d) correct sums (e.g., 79 for 37 + 42). The correlation matrix is presented in Table 4.

In control children, mean percentage use of the best strategy correlated only with relative strategy accuracy, r(98) = .54, p < .001, such that children selected the best strategy more and more often as difference in relative strategy accuracy increased. In ADHD children, mean percentage use of the best strategy correlated with relative strategy accuracy, r(98) = .38, p < .001, and with sum of unit digits, r(98) = .37, p < .001. ADHD children selected the best strategy more and more often as difference in relative strategy accuracy increased and more and more often as the sum of unit digits decreased.

These results were confirmed in stepwise regression analyses conducted separately in each group to determine which problem feature best predicts the mean percentages of use of the best strategy on each problem. Results showed that the best and unique predictor of control children's use of the best strategy was relative strategy efficacy ( $R^2 = .29$ ). In ADHD children, the best predictor was also relative strategy efficacy, although it predicted smaller amount of **Table 4.** Correlation Matrix for Problem Features and Percentage of Best Strategy Selection Separated for the Two Groups.

Group	Variable	I	2	3	4
Control children	I) Percentage of the best strategy selection	_			
	2) Side of the larger operand	.063	—		
	3) Sum of unit digits	092	.003		
	4) Relative strategy efficacy	.536**	109	004	—
	5) Correct sums	008	009	.054	225*
ADHD children	<ol> <li>Percentage of the best strategy selection</li> </ol>	—			
	2) Side of the larger operand	.056	—		
	3) Sum of unit digits	366**	.003		
	4) Relative strategy efficacy	.376**	109	004	—
	5) Correct sums	.088	009	.054	225*

\*p < .05. \*\*p < .01.

variance as compared with control children ( $R^2 = 14$ ). Sum of unit digits accounted for 13% additional unique variance in ADHD children's percentage use of the best strategy.

Finally, as shown in Figure 1, there was a significant correlation between children's use of the best strategy on each problem and mean solution times in control children, r(98) =-.47, p < .001, but not in ADHD children, r(98) = -.05, p = .649.

# General Discussion

This study on ADHD strategy selection used a strategy assessment method that allowed the identification of which strategy children chose among two available strategies on each problem. It rests on the idea that a better understanding of ADHD's cognitive performance will be gained by investigating strategic aspects of children's performance. The main results of the present arithmetic problem-solving experiment showed that ADHD children selected the best strategy on each problem less often than control children and that they based their strategy choices on different factors, despite comparable levels of math proficiency. Although children of our ADHD sample did not undergo a formal diagnosis of ADHD, performance on the selection of the best strategy validly discriminated between control and ADHD characteristics children. Moreover, this performance-based categorization significantly correlated with teacher's report of inattentive behaviors suggesting the dimensional nature of the ADHD symptomatology, which can vary along a continuum between normal condition and disorder. These find-

strategy and mean solution times on each problem.

ings have important implications for understanding the sources of differences in cognitive performance between control and ADHD children and for investigating strategic aspects of ADHD's cognitive performance.

Previous research has found differences between control and ADHD children's arithmetic performance (e.g., Lucangeli & Cabrele, 2006). As ADHD children's difficulties in mathematics are often correlated with general learning or mathematics difficulties, it is hard to isolate component processes specifically affected in ADHD children. By testing a group of ADHD children who had no specific math difficulties, we were able to observe that ADHD children were less able than controls to select the best strategy on each problem. These less-efficient strategy selections led ADHD children to provide poorer estimates than control children. This cannot be due to lower levels of calculation skills, because ADHD and control children obtained comparable performance on problems for which they had selected the best strategy. When performance was compared across all trials (i.e., including problems for which the best strategy was used and problems for which the best strategy was not used), ADHD children obtained poorer performance than did control children. Thus, poorer strategy selection is one source of the lower level of arithmetic performance in ADHD children.

The present findings on differences between ADHD and control children in strategy selection are consistent with previous findings showing that ADHD children are less likely to use efficient strategies when they are not guided to do so (Cornoldi et al., 1999; Hamlett et al., 1987; O'Neill & Douglas, 1991, 1996). This suggests that poor strategy selection may hold across several cognitive domains and may be a general feature of ADHD children's cognition. Future research testing other cognitive domains, where strategic aspects have already been documented in children (e.g., reasoning, decision making, language processing, attention; see Siegler, 1996, for an overview), will determine how general difficulties in best strategy selection are in ADHD children.

Why did ADHD children select the best strategy less often than control children? One possibility that the present data rule out concerns differences between ADHD and control children's systematicity of best strategy selection. ADHD children could have made poorer strategy selections because they were not systematic in their strategy selections, chose more or less randomly, or had selected a strategy with some rules for all problems or series of problems (e.g., using rounding down in the first block of problems and rounding up in the second block) before starting the experiment. On the contrary, both control and ADHD children selected strategies on a problem-by-problem basis and were relatively systematic in their strategy choices. Consistent with this, stepwise regression analyses predicting mean percentage use of the best strategy revealed that both groups of children differed on the type of predictors but not on the amounts of variance accounted for.

Two hypotheses can be proposed to explain why ADHD children selected the best strategy less often than control children. First, ADHD children have poorer memory associations between problems and strategies. Computational models of strategy selection (e.g., Lovett & Anderson's, 1996, The Adaptive Control of Thought - Rational (ACT-R) model; Lovett & Schunn's, 1999, Represent the task, Construct a set of action strategies consistent with the task representation, Choose from among those strategies according to their success rates, and Learn new success rates for the strategies based on experience (RCCL; pronounced "ReCyCLe") model; Payne, Bettman, & Johnson's, 1993, adaptive decision maker model; Rieskamp & Otto's, 2006, Strategy Selection Learning (SSL) model; and Siegler & Araya's, 2005, Strategy Choice and Discovery Simulation  $(SCADS)^2$  model) all assume that each problem is associated in memory with several strategies. They also assume that each problem is more strongly associated with one (usually the best) strategy that is most often selected. In



other words, to solve a given problem, computational models assume that all available strategies in the repertoire become active, and the most efficient strategy is selected. They also share the assumption that all strategies have utilities in the sense of being associated to speed, accuracy, and cognitive effort or resources required for execution. These utilities vary with experience and influence strategy selection. In this context, ADHD children would be poorer at strategy selection because they have weaker associations between a given problem and the best strategy to solve it. In the present context of computational estimation, this would mean that ADHD children would have weaker associations between small-unit problems (e.g., 42 + 73) and roundingdown strategy and between large-unit problems (e.g., 67 + 48) and rounding-up strategy. The fact that, in contrast to control children, the percentage use of the best strategy did not vary with the type of problems in ADHD children is consistent with this possibility. That different sets of variables predicted ADHD and control children's best strategy selection is also consistent with this hypothesis of poorer problem-best strategy associations in ADHD children. Poorer problem-best strategy associations would not enable ADHD children to systematically activate the best strategy while encoding arithmetic problems with sufficient strength. In turn, this would lead them to most often choose the alternative rounding-down strategy even when the rounding-up strategy was the best on individual problems. As argued elsewhere by several researchers (e.g., LeFevre et al., 1993; Lemaire & Lecacheur, 2002), rounding down is easier to execute than rounding up more or less independently of problem-strategy associations. Indeed, as compared with rounding up, when they use rounding down, participants do not need to encode units, do not have to calculate differences between unit digits and the closest larger decades, do not need to execute it with decade digits stored in working memory as decade digits are displayed on the computer screen, and add smaller numbers. Note that using roundingdown strategy was negatively correlated with mean percentage use of the best strategy, r(36) = -.37, p < .05, as children using the best strategy less often were those children who used the easier, rounding-down strategy most often. By testing children's knowledge of which strategy is the best on each problem, without having to execute strategies (i.e., asking them to only select strategies on each problem), like Lemaire et al. (2004) did, future studies might more directly examine the role of problems-strategies associations on differences in best strategy selection between ADHD and control children.

The second, nonexclusive, possibility underlying ADHD children's poorer strategy selection is less-efficient EF. Previous research reported impaired EFs in ADHD children (e.g., Barkley, 1997; Castellanos et al., 2006; Martinussen et al., 2005; Nigg, 2001; Sergeant et al., 2002). Moreover, recent findings showed that EFs influence strategy selections

and mediate age-related differences in mean percentage use of the best strategy on each problem (Hodzik & Lemaire, 2011; Lemaire & Lecacheur, 2011). Impairment of EFs may affect strategy selection via a number of mechanisms, two of which could be strategy flexibility and attention during problem encoding. Lower levels of strategy flexibility might lead ADHD children to be poorer at selecting the best strategy on each problem if they use the same (easier) strategy more often than controls (which they did in this experiment) and/or if they repeat the same strategy across consecutive trials. As preliminary data, in the present experiment, we calculated mean percentage strategy repetitions (i.e., each problem was coded 1 if the participant repeated the same strategy on this problem as on the previous problem and 0 otherwise, excluding the first problem). ADHD children tended to repeat the same strategy across consecutive problems more often than control children (64% vs. 54%), t(36) = 1.82, p = .07. Another way for impaired EFs to influence strategy selection in ADHD is via poor problem feature encoding due to inattention during problem encoding. Inattention during problem encoding can lead ADHD to not (or to poorly) encode crucial problem features that guide the selection of the best strategy on each problem. For example, ADHD children might not process deeply enough size of unit digits while encoding operands. For a small-unit problem like 62 + 36, they might not process unit digits deeply enough (e.g., and note that the sum of unit digits is smaller than 10) so as to select the best, rounding-down strategy. This is important as adequately encoding distinctive problem characteristics is crucial to best strategy selections.

In conclusion, this work illustrates the usefulness of a strategy approach to further our understanding of sources of differences in cognitive performance between ADHD and control children. By finding that ADHD children were poorer than control children at selecting the best strategy on each problem, that each group based their strategy choices on different problem features, that both groups of children had comparable performance when they use the best strategy, and that ADHD had poorer performance because of poorer strategy selection, the present study points to the need to investigate in detail how ADHD children accomplish cognitive tasks (i.e., what strategy repertoire do they use in different cognitive tasks). These findings also point to the need to investigate other strategic aspects of cognitive performance (i.e., strategy execution and strategy selection) if we want to precisely describe and explain in mechanistic terms differences in cognitive performance between ADHD and control children.

# Limitations

This study found that performance-based categorization in best strategy selection significantly correlated with teacher's report of inattentive behaviors. Despite this evidence, the present lack of a formal clinical diagnosis for our ADHD group limits the full generalization of our findings to the ADHD clinical population. Indeed, it is possible that some of our ADHD children present a less severe symptomatology than formally diagnosed ADHD children. Thus, we cannot exclude that diagnosed ADHD children may show a different pattern of performance in the computational estimation task. The present findings suggest that formally diagnosed ADHD children may experience even greater difficulties in best strategy selection, a prediction that future research may test. The present findings also suggest potential interindividual differences among ADHD children, with higher level of ADHD leading to poorer strategy selections than less severe ADHD. Therefore, future research including a more formal diagnostic procedure with a larger sample might reveal interesting differences between ADHD subtypes. Different ADHD subtypes, correlated with different cognitive profiles, including different levels of efficiency of EFs, may be associated with varying levels of proficiency in best strategy selection. Future research could also directly test this hypothesis of the mediating role of poorer EFs in the differences between control and ADHD children's strategy selection. As previous works found that individuals with ADHD have impairments in EFs like inhibition (e.g., Nigg, 2001; Pennington & Ozonoff, 1996), shifting (e.g., Oades & Christiansen, 2008; van Mourik, Oosterlaan, & Sergeant, 2005), and sustained attention or working memory (Pasini, Paloscia, Alessandrelli, Porfirio, & Curatolo, 2007; Solanto et al., 2007), three functions presumably involved in best strategy selection, future works might determine which specific EFs are crucial to explain ADHD children's poorer strategy selection.

Finally, it would be of interest to determine whether ADHD is associated with poorer strategy selection in cognitive domains other than arithmetic problem solving. Indeed, in many cognitive domains, children's performance is heavily determined by the type of strategy they choose, how they execute strategies, and their skills at selecting the best strategy on each item (see Siegler, 2007, for an overview). Poorer strategy selection in ADHD may be found in many cognitive domains and may correlate across cognitive domains, a series of predictions that future research will test.

# **Declaration of Conflicting Interests**

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

# Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

#### Notes

1. All analyses reported here were run with the time factor (i.e., first vs. second halves of the experiment) as a within-

participant factor. However, the same outcomes were found, and the time factor did not come out significant either as a main factor or in any interactions.

2. Means the next version after SCADS.

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# Prenatal maternal stress and risk of neurodevelopmental disorders in the offspring: a systematic review and meta-analysis

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Received: 6 March 2019 / Accepted: 24 June 2019 / Published online: 20 July 2019 © Springer-Verlag GmbH Germany, part of Springer Nature 2019

# Abstract

**Purpose** Exposure to prenatal stress has been reported to affect the risk of adverse neurodevelopmental outcomes in the offspring; however, there is currently no clear consensus. The aim of this systematic review and meta-analysis was to examine the existing literature on the association between prenatal stress and autism spectrum disorder (ASD) and attention-deficit hyperactivity disorder (ADHD) in the offspring.

**Methods** Based on a registered protocol, we searched several electronic databases for articles in accordance with a detailed search strategy. We performed this study following the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA).

**Results** Prenatal stress was significantly associated with an increased risk of both ASD (pooled OR 1.64 [95% CI 1.15–2.34];  $I^2 = 90\%$ ; 15 articles) and ADHD (pooled OR 1.72 [95% CI 1.27–2.34];  $I^2 = 85\%$ ; 12 articles).

**Conclusions** This study suggests that prenatal stress may be associated with ASD and ADHD; however, several limitations in the reviewed literature should be noted including significant heterogeneity and there is a need for carefully controlled future studies in this area.

**Keywords** Autism spectrum disorder  $\cdot$  Attention-deficit/hyperactivity disorder  $\cdot$  Prenatal maternal stress  $\cdot$  Pregnancy  $\cdot$  Mental health

Gerard W. O'Keeffe and Ali S. Khashan contributed equally.

**Electronic supplementary material** The online version of this article (https://doi.org/10.1007/s00127-019-01745-3) contains supplementary material, which is available to authorized users.

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# Introduction

Prenatal maternal stress is a low or negative state of wellbeing in pregnancy [1]. "Stress" in this context includes negative life events, anxiety and depressive symptoms. Feelings of stress, anxiety and depression are distinct though highly correlated constructs, all belonging to the domain of negative emotions. The prevalence of depression, anxiety, and stress in pregnancy has been estimated at 12%, 28% and 31%, respectively [2]. These have been suggested to influence neurobehavioural outcomes in exposed offspring [3, 4].

Autism spectrum disorder (ASD) and attention-deficit/ hyperactivity disorder (ADHD) are two of the most common neurodevelopmental disorders. ASD has a prevalence of 1.7% [5] and is characterised by social deficits, impaired communication, and stereotyped and repetitive behaviours [6, 7]. ADHD has a prevalence of 5.3% that is characterised by inattention, hyperactivity and impulsivity behaviour [8]. While genetics is crucial in their aetiology [9, 10], a population-based Swedish study has estimated the environmental variance for ASD at 17% [11]. In addition, ADHD heritability has been reported at 70–80%, suggesting that environmental exposures may also play a role [12, 13].

There is a growing literature examining the association between prenatal maternal stress and risk of ASD and ADHD in the offspring [14–16]. For example, large population-based studies have reported significant associations between prenatal exposure to bereavement and increased risk of ASD [15, 17] and ADHD [18]. Others have reported that antenatal depressive symptoms were related to an increased risk of ADHD [19]. Moreover, some studies have also attempted to understand the influence of gestational age of exposure [20, 21]. For example, two population-based Danish studies reported an increased risk of ASD and ADHD in children following maternal exposure to bereavement in the third trimester [15, 18]. Therefore, evaluating the timing of the prenatal stressor is important, because trimesterspecific associations may increase the probability of a causal association [22]. However, there are inconsistencies in the literature, with some studies finding no association between prenatal maternal stress and ASD and ADHD risk [23, 24]. Moreover for those studies that have reported an association, there is no clear consensus on the critical gestational period [17, 25, 26].

Therefore, the aim of this systematic review and metaanalysis was to examine the association between prenatal maternal stress and ASD or ADHD risk in the offspring using available data from the published literature.

# Methods

# Protocol and search strategy

The study protocol was registered on PROSPERO (CDR42018084222) and subsequently published [27]. The prenatal stress exposure was defined as a psychological or environmental stress such as stressful life events, maternal bereavement, anxiety or depressive symptoms, traumatic events and natural disasters. The outcome measures are ASD or ADHD that could be, for example, based on medical records or parent reporting. In accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) [28], a systematic literature search in PubMed, PsycINFO, Web of Science, EMBASE and SCOPUS was conducted by the first author (NM) from inception until March 24th, 2018.

Observational studies (cohort studies and case-control studies) evaluating the association between prenatal maternal stress and the risk of ASD or ADHD at any time before or during pregnancy or in any particular trimester were considered for inclusion. Cross-sectional study design was included in the search strategy for completeness and to ensure all relevant cohort studies are identified. The principles of the Boolean logic (AND, OR, or NOT) were used to combine search terms related to the exposure (prenatal stress) and the outcomes (ASD and ADHD) and using Medical Subject Headings as follows: (Prenatal OR Antenatal OR Pregnant) AND (Stress) OR (Distress) OR (Anxiety) OR (Bereavement) AND (Offspring OR Child) AND (Autism spectrum disorder) OR (Attention-deficit/hyperactivity disorder). The detailed search strategy is presented in the supplementary Appendix 1. The literature search was not limited to humans although only human studies were included in the review and there was no language restriction. The authors hand checked the bibliographies of the included studies for further potentially eligible studies.

#### **Study selection**

Two investigators (NM and GWOK) independently screened the titles and abstracts for all articles to identify potentially eligible studies. Titles and abstracts obtained from each database were stored and managed in Endnote Reference Manager X8© and duplicates were excluded using the Endnote function "remove duplicates". The two investigators independently examined the full texts of potentially relevant articles.

### Data extraction

Two investigators (NM and FB) extracted data using a standardised data extraction form. Extracted data included author, year of publication, study design, study outcome, exposure (exposure type, timing and duration), offspring gender, data sources, sample size, definition of the outcome used, exclusion criteria, crude and adjusted estimates (if reported, including the RR, OR, HR and 95% CI). Authors of three studies [29–31] were contacted for further data, with a reply obtained only from one [31].

# **Bias and quality assessment**

Included studies were critically appraised by two investigators independently (NM and KMS) using the Cochrane collaboration's tool for observational studies [32], which considers six domains: selection bias, exposure, outcome measurement, statistical analysis, study attrition and confounding. Each study was classified as having a high, moderate, low, minimal or not reported risk of bias for each domain. Then, each study was rated as having high, moderate or low risk of bias, according to the total of the six domains. For example, those with all six domains rated as minimal or low were classified as low-risk bias studies.

Disagreements regarding study eligibility, data extraction or risk of bias assessment were resolved by discussion with another investigator (ASK).

### **Statistical analysis**

All statistical analyses were performed using Review Manager software (Cochrane Collaboration Software, RevMan 5.3). Random-effects models using the generic inverse variance method were performed to calculate the pooled odds ratio (OR) estimates and 95% CIs of the association between prenatal stress and the risk of ASD and ADHD. The analyses were performed for ASD and ADHD separately including all the eligible studies identified in the systematic review. The crude and adjusted pooled estimates were displayed using forest plots. The adjusted pooled estimates were based on the adjusted estimates as defined in each included study. Furthermore, a sensitivity analysis was performed including studies that reported both crude and adjusted estimates. Statistical heterogeneity was assessed using the  $I^2$  statistic and the alpha of 0.05 for statistical significance, according to the Cochrane Handbook for Systematic Reviews threshold recommendations [32].

The following a priori subgroup analyses were performed when relevant data were available: [1] for timing of stress exposure (e.g. first trimester vs second trimester vs. third trimester); [2] according to gender (male vs female); [3] according to different types of stress (objective vs subjective stress); [4] according to study design (cohort vs case–control); and [5] according to the study quality (minimal/low vs moderate/ high).

Another subgroup analysis considering only the studies that investigated the association between antenatal depressive or anxiety feelings and the risk of ASD and ADHD was performed as post hoc analysis.

The likelihood of publication bias was examined using a funnel plot of the pooled OR and standard error (SE). The Egger test was performed to obtain the p value of the asymmetry of the funnel plot using the comprehensive meta-analysis. Publication bias was examined when ten or more studies were included in the meta-analysis. Moreover, the trim and fill method, with the aim of identifying potentially missing studies and correct for funnel plot asymmetry arising from publication bias, was performed as a post hoc analysis.

# **Ethical considerations**

This systematic review and meta-analysis does not contain any studies with human participants or animals performed by any of the authors and as such ethical approval was not required.

# Results

# Search results and study characteristics

The systematic literature search produced 511 unique results on prenatal stress and ASD after removing the duplicates, of which 22 studies were considered potentially relevant and the full text was obtained (Fig. 1a). Following reviewing the full text of the 22 articles, nine were excluded because they did not meet the inclusion criteria (reasons for exclusion are reported in Fig. 1a), resulting in 13 eligible studies. After reviewing the reference lists of eligible studies, we obtained two further studies [33, 34]; therefore, a total of 15 studies were included (Fig. 1a). A similar approach resulted in 12 eligible articles on ADHD (Fig. 1b). Were unable to obtain the full text of a Chinese study although we sent the corresponding author two emails [35]. The hand search of the reference lists of eligible studies did not yield additional studies. The characteristics of the included studies for ASD and ADHD are reported in Table S1 and Table S2 in the supplementary file. The oldest study was published in 1990 [36] and the most recent studies in 2016 [19, 33, 37]. For ASD, we found 11 case-control studies and 4 cohort studies, while for ADHD we found 7 case-control studies and 5 cohort studies.

### **Results of the meta-analyses**

#### **ASD: primary analysis**

15 studies [15, 17, 19, 23, 25, 26, 33, 34, 36–42] reported the OR, HR or RR with 95% CI or the raw data that enabled the calculation of the OR. One study [23] used two cohorts from Sweden and England and we considered them as two separate studies for the purposes of the meta-analysis. Moreover, for another study [26] we included two estimates: we used the less exposed group as a reference group, when comparing it with the higher exposed (Kinney 2008a) and moderate exposed (Kinney 2008b) groups. The overall meta-analysis was based on 17 estimates suggesting a significant association between prenatal stress and ASD (crude OR 1.65 [95% CI 1.31–2.09];  $I^2 = 86\%$ ). The meta-analysis including the studies that reported adjusted estimates [15, 17, 23, 25, 34, 39-41] (nine estimates) showed a similar result (OR 1.64  $[95\% \text{ CI } 1.15-2.34]; I^2 = 90\%$ ). When the meta-analysis was restricted to adjusted estimates, a statistically significant OR (OR 3.59 [95% CI 2.02–6.38],  $I^2 = 65\%$ ) was returned for case-control studies [34, 39-41], but there was no evidence of an association in the cohort studies (OR 1.06 [95% CI 0.91-1.24],  $I^2 = 43\%$  [15, 17, 23, 25]. The test for subgroup differences between cohort and case-control studies was statistically significant (p = 0.001;  $I^2 = 93.7\%$ ).

In an analysis that included the nine studies which reported both the crude and the adjusted estimates, the results were largely unchanged (Figure S1 in the supplementary). However, three studies [34, 39, 41] made an adjustment for unclear or limited number of potential confounders (socio-economic factors, such as family income [39]; living close to an industry, age and sex of the child, previous



Fig. 1 Flowchart of the included studies for ASD (a) and ADHD (b)

childhood infection [41]; paternal age at delivery, gender and birth year [34]), and the exclusion of those studies from the adjusted model resulted in a lower OR (OR 1.12 [95% CI 0.93–1.34]) (Fig. 2).

#### **ADHD: primary analysis**

Twelve studies [15, 16, 18, 19, 29, 30, 33, 43–47] evaluating the association between prenatal stress and the risk of ADHD were included in the meta-analysis. One study [44] reported two separate estimates for the inattentive (ADHD-I) and the combined (ADHD-C) ADHD subtypes that are reported separately in the meta-analysis. The crude meta-analysis was based on 12 estimates and indicated that prenatal stress was significantly associated with ADHD (OR 2.69 [95% CI 1.85–3.91];  $I^2 = 80\%$ ). The meta-analysis including the adjusted estimates [15, 18, 29, 30, 44–46] (eight estimates) showed lower but still statistically significant association (OR 1.72 [95% CI 1.27–2.34]; Fig. 3). The results were similar for case–control studies [19, 33, 43, 44, 46, 47] (OR 2.70 [95% CI (2.04–3.58],  $I^2 = 17\%$ ) and cohort studies [15, 18, 30, 45] (OR 2.47 [95% CI 1.33–4.60],  $I^2 = 84\%$ ).

The adjusted results from four cohort studies [15, 18, 30, 45] (OR 2.00 [95% CI 1.12–3.59],  $I^2 = 82\%$ ) and four case–control studies [29, 44, 46] (OR 1.96 [95% CI (0.95–4.04],  $I^2 = 84\%$ ) were similar. When considering only the studies which reported both the crude and the adjusted

estimates, the results were similar (Figure S2). Although several studies reported adjusted estimates on prenatal stress and ADHD, the majority adjusted for 1–3 potential confounders such as child gender [46], child age, sex and socio-economic status [45], anxiety before birth [30], preterm delivery and intensive care [44]. After excluding these studies [29, 30, 44–46], only two studies [15, 18] remained in the adjusted meta-analysis (OR 1.37 [95% CI 0.99–1.91],  $I^2 = 54\%$ ).

#### Additional pre-specified subgroup analyses on ASD

Subgroup analyses were conducted on adjusted estimates and are presented in Table 1.

The type of stress subgroup analysis resulted in a significant association for the subjective stress subgroup [34, 39–41] but not for objective stress subgroup [15, 17, 23, 25]. It should be noted, however, that all the studies which used subjective measures of stress were case–control studies.

Moreover, a post hoc meta-analysis of three case–control studies [34, 39, 41], which investigated the association between prenatal depressive symptoms and ASD, found an almost fivefold increased odds of ASD. We found a significant association between prenatal stress and ASD in studies where ASD was based on ICD or DSM codes [15, 17, 23, 34, 41]; studies using rating scales [25, 39, 40] resulted in a larger but statistically non-significant association. Only



**b** Flow chart of the search process for ADHD studies

#### Forest plot with the crude estimates





Fig. 2 Forest plot for crude and adjusted estimates stratified by study design-ASD

two studies [15, 17] performed separate analyses for each trimester of pregnancy resulting in a significant association between stress in the third trimester and ASD. Five studies [15, 17, 23, 25, 34] (six estimates) were considered having low risk of bias showing no association between prenatal stress and ASD, while three studies [39–41] were considered having moderate risk of bias resulting in a threefold increased odds of ASD. Only two studies [15, 17] assessed the effect of stress in boys and girls separately and reported

no evidence for sex-specific associations. Subgroup analysis was not performed because only one study reported the data.

## Additional pre-specified subgroup analyses on ADHD

Subgroup analyses were performed on adjusted estimates and are presented in Table 2.

The subgroup analyses based on the type of stressor showed a statistically significant association for subjective

				Odds Ratio	Odds Ratio	
Study or Subgroup	log[Odds Ratio]	SE	Weight	IV, Random, 95% Cl	IV, Random, 95% Cl	
Class, 2014	0.1398	0.0816	12.3%	1.15 [0.98, 1.35]	-	
Grizienko, 2012	1.839	0.7487	4.3%	6.29 [1.45, 27.29]	——•——	
Kim, 2009	1.2837	0.4549	7.3%	3.61 [1.48, 8.80]		
Lì, 2010	0.5128	0.2186	10.8%	1.67 [1.09, 2.56]		
Martini, 2010	1.5476	0.3873	8.3%	4.70 [2.20, 10.04]	<b>_</b>	
Motlagh, 2010	1.4422	0.5715	5.9%	4.23 [1.38, 12.97]		
Oerlemans, 2016	0.9594	0.2517	10.3%	2.61 [1.59, 4.27]		
Park, 2014a	0.7467	0.3009	9.6%	2.11 [1.17, 3.81]		
Park, 2014b	0.5933	0.2682	10.1%	1.81 [1.07, 3.06]		
Rodriguez, 2005	2.23	0.8823	3.4%	9.30 [1.65, 52.42]		
Sasaluxnanon, 2005	1.5019	0.326	9.2%	4.49 [2.37, 8.51]		
Say, 2016	1.0152	0.3649	8.6%	2.76 [1.35, 5.64]	_ <b></b>	
Total (95% CI)			100.0%	2.69 [1.85, 3.92]	•	
Heterogeneity: Tau² = 0 Test for overall effect: Z	).29; Chi² = 54.61, i := 5.18 (P ≤ 0.0000	df=11 (F 01)	° < 0.0000	01); l² = 80%	0.01 0.1 1 10 Not stressed Stressed	100

#### Forest plot with the crude estimates

#### Forest plot with the adjusted estimates



Fig. 3 Forest plot for crude and adjusted estimates stratified by study design-ADHD

stress measures and increased but not statistically significant odds of ADHD in relation to objective stress. Three studies assessed the odds of ADHD based on maternal report [30, 45, 46] (i.e. structured interview) and resulted in a statistically significant association, while studies using a clinical record [15, 18, 29, 44] based on the diagnostic and statistical manual of mental disorders (DSM) or the International Classification of Diseases (ICD) showed a non-significant association. Only two studies performed separate analyses for each trimester of pregnancy [15, 18]. The two studies revealed a non-significant association between stress and ADHD in all the periods considered, without differences between the four periods. Two studies [15, 18] were considered as having low risk of bias resulting in a non-significant association between prenatal stress and ADHD and five studies [29, 30, 44–46] (six estimates) were considered as having moderate risk of bias resulting in more than twofold increased odds of ADHD. Only two studies [15, 18] assessed the effect of stress in boys and girls separately but subgroup analysis on gender differences was not performed because one of them did not report the data.

# **Publication bias**

The presence of asymmetry in the funnel plot of the adjusted results (figure S3A and S3B) was established with the Egger's test for both ASD and ADHD (p for publication bias = 0.046 and p = 0.0003, respectively). We used the 'trim and fill' method to correct for funnel plot asymmetry arising from publication bias. In the ADHD meta-analysis, four missing studies were suggested (Figure S4), leading to a significantly lower pooled OR [from 1.72 (1.27, 2.34) to 1.22 (0.91–1.62)]. In ASD meta-analysis, the trim and fill method did not suggest missing studies.

# Heterogeneity and quality assessment

High heterogeneity for both ASD ( $I^2 = 90\%$ ) and ADHD ( $I^2 = 85\%$ ) was found in the adjusted estimates. The high

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Study characteristics	Number of esti- mates (articles)	Sample size (exposed)	Outcomes	Pooled OR (95% CI)	<i>I</i> <sup>2</sup> %	Test for subgroup differences— <i>p</i> value
Overall unadjusted	n = 17 (15)	2,668,609 (150,964)	15,130	1.65 (1.31-2.09)*	86%	_
Overall adjusted	n = 9 (8)	2,346,200 (45,884)	14,266	1.64 (1.15–2.34)*	90%	_
Design						0.0001
Cohort	n = 5 (4)	2,344,483 (45,424)	13,763	1.06 (0.91–1.24)	43%	
Case-control	n = 4 (4)	1717 (336)	460	3.59 (2.02-6.38)*	65%	
Type of Stress						0.0001
Objective	n = 5 (4)	23,44,483 (45,424)	13,763	1.06 (0.91–1.24)	43%	
Subjective	n = 4 (4)	1717 (336)	460	3.59 (2.02-6.38)*	65%	
ASD definition						0.58
Rating scale	n = 3 (3)	56,039 (1512)	787	1.85 (0.63-5.41)	89%	
DSM or ICD	n = 6(5)	2,290,161 (44,372)	13,479	1.34 (1.01–1.80)*	85%	
Time of exposure						0.49
Before pregnancy	n = 4 (4)	2,333,329 (21,510)	451	1.12 (0.85–1.48)	53%	
1st trimester	n = 2 (2)	2,230,853 (10,823)	30	1.18 (0.82–1.70)	0%	
2nd trimester	n = 2 (2)	2,230,853 (11,972)	31	1.08 (0.76–1.54)	0%	
3rd trimester	n = 2 (2)	2,230,853 (11,488)	49	1.48 (1.12–1.97)*	0%	
Study quality						0.002
High quality	n = 6(5)	2,344,673 (45,812)	14,180	1.15 (0.91–1.46)	76%	
Moderate quality	n = 3 (3)	1527 (241)	422	3.22 (1.77-5.87)*	74%	

 Table 1
 Subgroup analyses of the impact of prenatal stress on ASD

\**p*<0.05

 Table 2
 Subgroup analyses of the impact of prenatal stress on ADHD

Study characteristics	Number of esti- mates (articles)	Sample size (exposed)	Outcomes	Pooled OR (95% CI)	<i>I</i> <sup>2</sup> %	Test for subgroup differences— <i>p</i> value
Overall unadjusted	n = 12 (11)	1,760,174 (36,843)	25,677	2.69 (1.85-3.92)*	80	_
Overall adjusted	n = 8 (7)	1,758,906 (27,172)	25,215	1.72 (1.27-2.34)*	85	_
Design						0.96
Cohort	n = 4 (4)	1,756,944 (26,821)	24,956	2.00 (1.12-3.59)*	82	
Case-control	n = 4(3)	1242 (351)	259	1.96 (0.95-4.04)	84	
Type of Stress						0.50
Objective	n = 3 (3)	1,574,278 (26,758)	24,643	1.77 (0.94–3,33)	81	
Subjective	n = 5 (4)	4628 (414)	572	2.44 (1.23-4.85)*	86	
ADHD definition						0.0001
Rating scale	n = 3(3)	3830 (141)	417	4.36 (2.52–7.54)*	0	
DSM or ICD	n = 5 (4)	1,755,076 (27,151)	24,798	1.25 (0.99–1.58)	78	
Time of exposure						0.34
Before pregnancy	n = 2 (2)	1,754,056	117	1.11 (0.69–1.70)	81	
1st trimester	n = 2 (2)	1,754,056	36	0.89 (0.64–1.23)	0	
2nd trimester	n = 2 (2)	1,754,056	49	1.26 (0.76-2.11)	32	
3rd trimester	n = 2 (2)	1,754,056	75	1.76 (0.81–3.083)	68	
Study quality						0.09
High quality	n = 2 (2)	1,754,056 (26,719)	24,591	1.27 (0.90-1.79)	57	
Low quality	n = 6(5)	4850 (453)	624	2.47 (1.24–4.92)*	87	

\*p < 0.05

heterogeneity was not explained in the subgroup analyses. All studies were evaluated using a bias classification tool suitable for observational studies. Based on this tool, most studies were considered high in overall bias (Appendix 2) due mostly to inadequate adjustment for confounding, small sample size or inadequate assessment of exposure (for example, retrospective studies up to 5–12 years after pregnancy).

# Discussion

The overall findings of the meta-analysis showed an association between prenatal stress exposure and an increased risk of both ASD and ADHD; however, it is important to interpret this result with caution. Specifically, the adjusted pooled results show 64% increased odds of ASD in children exposed to prenatal stress. However, it is important to note the results of the subgroup analyses which revealed that the association was significant only in case-control studies and studies using subjective measures of stress and studies that were rated low to moderate quality. Importantly, for cohort studies using objective measures of stress which were rated as high quality, pooled estimates did not support an association between prenatal stress and risk of ASD. Moreover, studies that were rated high quality, and studies using ICD or DSM ADHD diagnosis did not support an association between prenatal stress exposure and increased risk of ADHD. The significant heterogeneity for both ASD and ADHD meta-analyses adds further doubt about the likelihood of a causal association. It is, however, worth noting that the pooled results from the two largest cohort studies to date on prenatal stress and ASD (studies of high quality) [15, 17] suggested an association between bereavement in the third trimester and 48% increased risk of ASD. Similarly, there was an indication of an increased risk of ADHD in relation to prenatal stress in the third trimester, although not statistically significant.

# Mechanisms

Our third trimester association is interesting given other findings showing exposure to third trimester prenatal maternal psychosocial stress was associated with the greatest increased risk of asthma and allergy in the offspring [48]. Similarly, third trimester exposure to prenatal stress has been linked with a range of other adverse outcomes in exposed offspring [49, 50]. Recent data have shown that maternal immune activation in women at risk of high stress and inflammation is associated with neonatal functional brain connectivity and offspring behaviour [51], suggesting a potential inflammatory involvement. However, there is a need for further study to identify the biological basis of this association and whether the third trimester effect reflects a trimester-specific effect or cumulative stress exposure throughout pregnancy.

# **Strengths and limitations**

The strengths of the current study included the use of a preprepared, registered and published protocol following the PRISMA guidelines throughout the systematic review stages and the meta-analysis [28]. The review process involved comprehensive searching of five databases with no language restriction, supplemented by hand searching the bibliographies of the eligible studies. We also contacted authors for additional information when necessary. The comprehensive search strategy was evidenced in the fact that hand searching the reference lists resulted in only two more studies being found.

This review revealed serious limitations in the literature on prenatal stress and ASD and ADHD. Half of the studies reporting adjusted results were case-control studies, which may be subject to recall bias, therefore, exaggerating the association between prenatal stress and ASD and ADHD. The majority of the studies did not adjust for key potential confounders such as family history of mental illness, maternal and paternal age, and socio-economic status. Even though several studies reported adjusted estimates, in most cases the adjustment was inadequate and limited to few potential confounders. The association between prenatal stress and neurodevelopmental outcomes may be sex specific and we were not able to explore this hypothesis due to the lack of available data [52, 53]. Five studies on ASD and six on ADHD included less than 100 cases, which may have led to exaggerated associations. Several studies were case-control, with a small sample size, using subjective measures of stress likely leading to recall bias and exaggerated associations [54]. Only two studies examined the trimester-specific association and this did not allow us to make robust conclusions on the trimester-specific hypothesis in relation to prenatal stress and neurodevelopmental outcomes.

In addition, the methods used to assess neurodevelopmental outcome may have influenced the pooled estimates. A comprehensive assessment conducted by an experienced clinician is the diagnostic gold standard [55, 56]. However, while diagnostic criteria for ASD are based on the extensive empirical research and have good validity and reliability, the data on ADHD validity are far less clear. Problematic aspects include lack of physical or psychological markers, high comorbidity rates or inconsistent clustering of symptoms, and particularly difficulty in differentiating normal symptoms from pathological ones [57]. Moreover, children who have not formed strong attachments with their primary caregiver(s) may exhibit coercive behaviour that functions in a self-protective manner when faced with disoriented/disorienting parental behaviours [58, 59]. In these instances, parental self-reports of

child hyperactivity may pathologise a behaviour that would not manifest in more secure and/or predictable parent-child relationships.

The assessment of prenatal maternal stress in the reviewed studies is an additional limitation. The definition of stress used in the introduction of this article (as "stress, anxiety and depression") is unavoidably wide and generic, but is in line with the majority of the studies examined. In effect, stress is a complex but not well-defined concept [60] that can be assessed in different ways: detecting somatic responses, assessing life events, or assessing participant-perceived stress. Despite this it has been noted that focusing on a single psychological construct, such as stress, anxiety or depression during pregnancy, overestimates its importance within what can be considered a spectrum of prenatal maternal distress [60]. Thus, a broader, multi-component approach, which can include different measurements, is appropriate in this context. While some pregnancy-specific tools have been associated with better obstetric outcomes [61, 62], several reviewed studies assessed stress exposure using unspecific self-report questionnaires, asking simple and generic questions on prenatal risk factors. Only nine studies [15–19, 23, 25, 38, 43] used validated psychometric tools or considered bereavement or natural disasters, which have been established as stressors in the existing literature [63, 64]. Variability in conceptualisation and measurement of stress introduces uncertainty about the observed effects on ASD and ADHD. Furthermore, there is often incongruence between self-report measures and biomarkers of stress, thus limiting inferences that can be made about potential psychobiological mechanisms of effect in those studies which only included maternal self-report; self-report is also subject to recall bias, potentially exaggerating the association between prenatal stress and ASD and ADHD. Finally, most of the data were derived from mother's answers to self-reports questionnaires, and only in one study [45] both parents were included as sources of information or, in a second one, the marriagerelated risk factors were explored [29].

Considering these limitations, we cannot yet draw definitive conclusions about whether exposure to prenatal stress increases the risk of ASD or ADHD in the offspring based on the available evidence. However, if well-designed future studies confirm any such association, the results would be of crucial importance to design specific psychological interventions during pregnancy aimed at reducing stress, anxiety and depression with the view to ultimately reducing the risks of adverse neurodevelopmental outcomes in children.

# Conclusion

This systematic review and meta-analysis suggest that prenatal stress exposure may be related to an increased risk of ASD and ADHD in the offspring, especially in the third trimester of pregnancy; however, we identified substantial limitations in the literature that makes difficult to draw robust conclusions. The focus of future research should be on conducting robust and well-designed longitudinal epidemiological studies addressing the limitations in the current literature.

Acknowledgements This publication has emanated from research conducted with the financial support of the Science Foundation Ireland (SFI) in the form of a research centre grant to the Irish Centre for Fetal and Neonatal Translational Research under the grant number INFANT-12/RC/2272.

## **Compliance with ethical standards**

**Conflict of interest** On behalf of all authors, the corresponding authors state that there is no conflict of interest.

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# Psicoterapia a indirizzo cognitivo-comportamentale

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Una nuova importante rubrica presentata nell'Editoriale di questo mese (pag. 143). Da un caso clinico alla conoscenza di un modello strutturato di Psicoterapia, che ha una letteratura ampia e molto solida. Ha l'obiettivo di aiutare i bambini-adolescenti a riconoscere i propri pensieri e comportamenti che non funzionano per acquisire nuove abilità e strategie per superare determinate difficoltà.

# CASO CLINICO

Dario è un adolescente di 13 anni affetto da disturbo da deficit di attenzione/iperattività (ADHD), che, nel corso della propria carriera scolastica, ha collezionato una serie di insuccessi tali da averlo condotto a strutturare alcune distorsioni cognitive rispetto alle proprie capacità: "non riuscirò mai a fare quello che gli altri si aspettano da me", "in ogni caso sono destinato a fallire un'altra volta". Tali pensieri disfunzionali hanno contribuito a rinforzare nel ragazzo la tendenza all'evitamento di qualsiasi attività che prevedesse il conseguimento di un determinato risultato o che implicasse un confronto con i pari, suscitandogli conseguenti emozioni negative quali paura, rabbia, vergogna e ansia. Nonostante sia un ragazzo molto intelligente, di recente ha deciso di non frequentare più la scuola, appare scoraggiato e demoralizzato e scarsamente progettuale per il suo futuro. Considerato il quadro clinico, in associazione alla terapia farmacologica con metilfenidato, il ragazzo è stato indirizzato dal proprio neuropsichiatra infantile a un trattamento di piscoterapia individuale di tipo cognitivo-comportamentale.

Il lavoro di piscoterapia, anche sulla base delle richieste del ragazzo, è stato strutturato inizialmente per fornire informazioni sulla natura del disturbo e consentire a Dario di acquisire mag-

#### **COGNITIVE BEHAVIOURAL THERAPY** (Medico e Bambino 2020;39:177-178)

#### Key words

Cognitive behavioural therapy, CBT, Child and adolescent Psychiatry

#### Summary

Cognitive behavioural therapy is widely used in child and adolescent psychiatry to treat numerous psychiatric disorders. Some focal aspects of this model are illustrated through the description of a clinical case and aim to facilitate communication between paediatricians and infantile neuropsychiatrists/psychologists for a correct and prompt identification of the disorder.

gior consapevolezza rispetto alle proprie difficoltà. Successivamente, anche attraverso l'uso di un apposito diario, il ragazzo ha imparato a mettere in correlazione pensieri ed emozioni sottostanti, soffermandosi sugli antecedenti. Con l'aiuto del suo terapeuta. Dario ha gradualmente imparato a mettere in discussione i propri pensieri disfunzionali e a riconoscere che fossero conseguenza biù della sua tendenza all'evitamento che delle proprie incapacità personali. Progressivamente, ha imparato a generare concettualizzazioni più funzionali al proprio benessere, riconoscendosi i propri punti di forza. In seguito sono state discusse e "cucite su misura" strategie utili per una migliore gestione del tempo con riduzione della tendenza alla procrastinazione, anche ai fini di un graduale rientro in ambito scolastico che, con la collaborazione degli insegnanti, è stato gestito inizialmente con un orario ridotto e interrogazioni programmate, per poi consentire al ragazzo di allinearsi al resto della classe ottenendo un miglior profitto e una discreta impennata della sua autostima.

# PSICOTERAPIA A INDIRIZZO COGNITIVO-COMPORTAMENTALE

È un modello strutturato di Psicoterapia, finalizzato ad aiutare i soggetti a riconoscere i propri pensieri e *pattern* di comportamento disfunzionali e ad acquisire nuove abilità e strategie per raggiungere i propri obiettivi, migliorare la propria autostima e fronteggiare adeguatamente le difficoltà affettive e relazionali<sup>1</sup>.

Il modello cognitivo-comportamentale è piuttosto diffuso nel trattamento della maggior parte dei disturbi psichiatrici in età evolutiva (ADHD, ansia, depressione) che frequentemente esitano in una storia di fallimenti e frustrazioni sia nella vita familiare che scolastica<sup>2</sup>. Generalmente il trattamento si articola in un ciclo di sedute (in media intorno alle 12-24 settimane) che include una fase preliminare di psico-educazione seguita da sessioni più specifiche mirate al miglioramento delle capacità di pianificazione e organizzazione personale, alla gestione della frustrazione e della rabbia, riduzione dello stress e implementazione delle abilità di comunicazione.

Attraverso questo approccio i piccoli pazienti vengono aiutati a correlare eventi, pensieri ed emozioni sottostanti e a identificare i pensieri negativi per poi modificarli attraverso tecniche di ristrutturazione cognitiva e di supporto motivazionale. I ragazzi vengono inoltre incoraggiati a trovare strategie di compenso che consentano loro di migliorare le proprie performance e i propri risultati nei diversi contesti ambientali. Il lavoro di Psicoterapia è inoltre finalizzato a consentire di apprendere e consolidare nuove competenze che implicano la gestione dell'emotività e dell'impulsività attraverso tecniche sia comportamentali che di ristrutturazione cognitiva3.

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# **SPUNTI IN PEDIATRIA SULLE**



raccolta di spunti e riflessioni in ambito pediatrico internazionale dal 1991 ai giorni nostri

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Le lettere sono sempre gradite, e vengono sempre pubblicate. Si prega solo una ragionevole concisione, cercando di non superare le 3000 battute. Qualche taglio editoriale e qualche intervento di editing che non alteri il senso della lettera saranno, a volte, inevitabili.

# Appunti di Neuropsichiatria

Ho letto l'editoriale sugli Appunti di Neuropsichiatria (*Medico e bambino* 2020; 39(3):143). Concordo: c'è un grande bisogno di intendersi meglio, di condividere il glossario, di meglio conoscere e comprendere termini e strumenti, tempi e modi, della Neuropsichiatria infantile. Mi permetto però di dire che forse cominciare con critiche e accuse non è il modo migliore. Leggere di "neuropsichiatri egocentricamente arroccati", "operare asettico", "bisogno di maggiore disponibilità e piacere all'interazione".... Concordo: le vostre sono parole dure. Non so che neuropsichiatri avete incontrato e mi spiace molto perché questi incontri, come d'altra parte queste parole, amareggiano, indeboliscono il rispetto e la fiducia reciproci e inibiscono la spinta alla collaborazione. E parole dure, pronunciate da voci autorevoli e lette dalla gran parte dei pediatri italiani, rischiano di essere generalizzate e di aumentare le già reali distanze. Se l'obiettivo è avvicinarci così di certo non ci aiutiamo.

Nessuno nega che la disciplina abbia le

sue fragilità e che i neuropsichiatri infantili abbiano, anche loro, le loro carenze, Non voglio trovare giustificazioni né scomodare meccanismi di difesa, ma una lettura così parziale rischia di dare messaggi profondamente errati, soprattutto a specializzandi e neospecialisti: non si possono trascurare, o almeno non citare, la carenza di risorse, la limitata consapevolezza delle istituzioni, la complessità delle diagnosi e delle cure, la vastità della domanda, la frequente inadeguatezza delle richieste (non solo delle famiglie...), la pluralità delle risposte; e ancora, soprattutto: la specificità degli strumenti e degli approcci, oltre che dei contenuti, degli argomenti che nel percorso di studi di un medico non vengono nemmeno in teoria affrontati, visto che a Medicina Neuropsichiatria infantile non si insegna, se non con moduli striminziti che probabilmente a poco servono se non a dare l'idea, o un rischioso imprinting, di una disciplina marginale o di un problema collaterale.

Nessuno di noi fatica a immaginare le difficoltà del pediatra, in ambulatorio, davanti alla mamma disperata che non sa più come gestire il suo bambino di 3 anni con ritardo del linguaggio (perché: "è in lista per la Logopedia ma sono già passati 6 mesi e non mi hanno ancora chiamata"), alla mamma che dice che la scuola continua a dire che il bambino in classe ne combina di tutti i colori "mentre con noi a casa è così bravo", al papà preoccupato perché sua figlia si è tagliata, la mamma l'ha scoperto ma con lei non ne hanno parlato e adesso non sanno cosa fare. Ma è ben diverso essere in prima linea ed essere referenti, credo sia ridefinendo ruoli e competenze che possiamo migliorare la gestione, non confondendoli. E per fare questo, siamo d'accordo, occorre conoscersi e parlarsi meglio (non necessariamente di più).

Credo ci sia bisogno di chiarire di cosa si occupa la Neuropsichiatria infantile, cosa c'è "nell'aria".

Non so se i problemi neuropsichiatrici siano realmente aumentati. Per alcuni (vedi disturbo dello spettro autistico) è sicuramente aumentata la capacità di diagnosi e la precocità del riconoscimento e allora i pazienti sembrano di più. Ma è vero anche che si conoscono tante più malattie, rare, e si conoscono meglio le complessità di altre patologie, meno rare e ben antiche, come l'epilessia. In quale misura invece è aumentata la richiesta alla Neuropsichiatria infantile di occuparsi di problemi che non sono neuropsichiatrici ma per esempio psicosociali o addirittura solo problemi mal gestiti, mal posti, o mal intesi? Che sottraggono tempo e risorse, e forse anche disponibilità, piacere, di condividere...

Succede: alla Neuropsichiatria infantile

è facile assegnare tutto quello che è un problema, tutto quello che è scomodo, tutto quello che non ha una soluzione, immediata e gratificante. Spesso, molto spesso, la Neuropsichiatria infantile non ha risposte istantanee né dirimenti e quando le ha troppo spesso non sono bianco o nero; troppo spesso, per gli altri specialisti ma soprattutto per i pediatri, il neuropsichiatra infantile risponde "non so", "per adesso non lo possiamo sapere", "dobbiamo aspettare"; forse dando troppo per scontato, è vero, che un altro medico, anche se non neuropsichiatra, comprenda che ci sono patologie che non si possono diagnosticare al primo sintomo, che l'osservazione ha un significato e un'utilità, che non tutte le diagnosi passano per l'agire, che contempli la diagnosi aperta, tolleri l'attesa, accetti l'indeterminatezza e la non onnipotenza

E allora mi permetto di suggerire che forse è proprio da qui che dovrebbero iniziare gli appunti di Neuropsichiatria infantile: dobbiamo capirci meglio sul significato di queste risposte. Ai neuropsichiatri il compito, il dovere, di spiegarsi, certo, ma ai pediatri l'obbligo di trovare la disponibilità, migliorare la capacità, di aspettare e ascoltare. E allora ben vengano gli appunti di Neuropsichiatria infantile.

Sarebbe bello se si potesse trasmettere attraverso questo spazio non solo materiale (contenuti, nozioni) ma anche, e soprattutto, quello che caratterizza di più la Neuropsichiatria infantile e che la rende così, tanto ricca e preziosa quanto difficile da comprendere, financo nebulosa o indisponente: il modo di approcciare il problema, la rivisitazione dell'anamnesi, la ricerca del significato, la critica della diagnosi, la messa in discussione, la gestione della condotta di attesa. Perché questi aspetti sono così importanti? Perché lo facciamo e come? Perché e quando non ci capiamo? Sono aspetti che non è facile trasmettere in un fugace incontro in corridoio o al telefono e che non tutti hanno la fortuna, come me, di poter condividere in riunioni della Clinica come quelle che si fanno il mercoledì al "Burlo Garofolo" al terzo piano, tra pediatri e "neuri", e da cui in questi anni ho imparato così tanto. Aspetti che richiedono uno spazio e un tempo dedicati che potrebbero proprio essere quelli più dilatati e riflessivi della rubrica di una rivista. Sarebbe bello che i lettori trovassero anche questo negli appunti: scambio, approfondimento, critica, e strumenti per affrontarli

Credo ci saranno molti colleghi desiderosi di dare il loro contributo e di accogliere una proposta che forse non è solo un intento ragionevole e ben comprensibile, ma anche una sfida avvincente. Come sappiamo, la Neuropsichiatria infantile si declina in tanti modi e in tante realtà diverse. Sarebbe bello che alla rubrica potessero contribuire neuropsichiatri infantili, più e meno esperti, di tutta Italia, dal territorio come dall'ospedale. Perché la Neuropsichiatria infantile è vasta, ha le sue fragilità ma ha anche le sue ricchezze. Lo stanno capendo nel resto d'Europa, dove la Neuropsichiatria infantile non esiste ma tanto la Neurologia pediatrica quanto la Pedopsichiatria esprimono interesse, curiosità e ammirazione per il neuropsichiatra infantile italiano, per quello che la sua formazione rappresenta e sa esprimere. Lo fanno addirittura i cugini d'Oltralpe da un ambito come quello epilettologico, dove sono stati maestri, e pur avendo a disposizione una Pedopsichiatria di cui lo sono altrettanto. Per una volta che possiamo essere avanti, mi viene da dire: restiamoci! Con un saluto fiducioso.

Caterina Zanus

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#### Cara Caterina,

grazie per averci scritto. E per l'intensità e la passione del tuo contributo. Non possiamo che ripeterlo. Da entrambe le parti, Pediatria e Neuropsichiatria, c'è bisogno di acquisire e agire una maggiore consapevolezza: dell'epidemiologia dei problemi, della loro gravità e dell'urgenza che questi pongono, del differente ruolo che spetta (spetta!) a ognuno di noi, qualsiasi siano le postazioni da cui agiamo, qualsiasi siano le risorse disponibili.

Lo abbiamo scritto e tu stessa lo ripeti: c'è bisogno che i pediatri non rimangano dei grezzi sempliciotti che equiparano il problema del disagio mentale, psicologico o anche sociale (... sì, anche sociale perché, ce lo insegni tu, non si può separare la mente dal contesto: e quindi anche il sociale, ciò che il contesto è e produce, fa, o dovrebbe fare, parte della Neuropsichiatria) a un "non" problema ("non ha niente"). O che, peggio ancora, nella soluzione di questi casi, si ritengano debitori solo di una delega ad altri, magari pretendendo una diagnosi e una terapia senza incertezze e in tempi brevi come farebbero per una "sana" malattia organica. Ma c'è bisogno anche che delle maggiori difficoltà e della maggiore complessità dei problemi che spetta ai neuropsichiatri affrontare come referenti, i neuropsichiatri stessi non si facciano scudo per contenere il necessario slancio, per giustificare una minore disponibilità a condividere oltre che la gestione del caso anche le frustrazioni e l'urgenza di soluzioni che questo imporrebbe. Nel nostro stile, nello stile della rivista, lo abbiamo detto chiaramente, e chiaramente lo ripetiamo: consapevoli che queste critiche non si addicono a tan-

# Lettere

ti pediatri né a tanti neuropsichiatri. Ma addolcire la realtà, arrotondare gli spigoli del problema sarebbe il punto di partenza per non affrontarlo. Certamente, come tu stessa dici, speriamo che tramite la rubrica, ma anche semplicemente tramite le pagine di Medico e Bambino, ai tanti contributi di neuropsichiatri che già ci sono stati (editoriali, commenti, articoli) se ne aggiungano ora altri. Magari proprio sugli spunti di discussione che tu stessa metti in campo.

Alessandro Ventura, Federico Marchetti

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