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Brain Imagery Diagnostics of AD/HD?

“Convergent evidence suggests that children with ADHD had abnormal small-world properties in both functional and structural brain networks characterized by higher local clustering and lower global integrity, suggesting a disorder-related shift of network topology toward regular configurations. Moreover, ADHD children showed the redistribution of regional nodes and connectivity involving the default-mode, attention, and sensorimotor systems. Importantly, these ADHD-associated alterations significantly correlated with behavior disturbances (e.g., inattention and hyperactivity/impulsivity symptoms) and exhibited differential patterns between clinical subtypes. Together, these connectome-based studies highlight brain network dysfunction in ADHD, thus opening up a new window into our understanding of the pathophysiological mechanisms of this disorder. These works might also have important implications on the development of imaging-based biomarkers for clinical diagnosis and treatment evaluation in ADHD.”

Cao, M., et al. (April 2014). Imaging Functional and Structural Brain Connectomics in Attention-Deficit/Hyperactivity Disorder. Molecular Neurobiology. DOI: 10.1007/s12035-014-8685-x.

Neurological Overlap of AD/HD and ASD

“ADHD and ASD boys had significantly reduced activation relative to controls in bilateral striato–thalamic regions, left dorsolateral prefrontal cortex (DLPFC) and superior parietal cortex. Both groups also displayed significantly increased precuneus activation relative to controls. Precuneus was negatively correlated with the DLPFC activation, and progressively more deactivated with increasing attention load in controls, but not patients, suggesting problems with deactivation of a task-related default mode network in both disorders. However, left DLPFC underactivation was significantly more pronounced in ADHD relative to ASD boys, which furthermore was associated with sustained performance measures that were only impaired in ADHD patients...”

Neurological Overlap of AD/HD and ASD

“ASD boys, on the other hand, had disorder-specific enhanced cerebellar activation relative to both ADHD and control boys, presumably reflecting compensation. The findings show that ADHD and ASD boys have both shared and disorder-specific abnormalities in brain function during sustained attention. Shared deficits were in fronto–striato–parietal activation and default mode suppression. Differences were a more severe DLPFC dysfunction in ADHD and a disorder-specific fronto–striato–cerebellar dysregulation in ASD” (p. 236).

Christakou, A., et al. (January 31, 2014). Disorder-specific functional abnormalities during sustained attention in youth with Attention Deficit Hyperactivity Disorder (ADHD) and with Autism. Molecular Psychiatry, 18(2) 236-244. DOI: [10.1038/mp.2011.185](https://doi.org/10.1038/mp.2011.185).

Brain Imagery Diagnostics of AD/HD?

“Relative to healthy control subjects, patients with ADHD showed impaired executive function ($P < .05$), along with the following: lower ALFF (Amplitude of low-frequency fluctuation, sic) in the left orbitofrontal cortex ($P = .004$) and the left ventral superior frontal gyrus ($P = .003$); higher ALFF in the left globus pallidus ($P = .004$), the right globus pallidus ($P = .002$), and the right dorsal superior frontal gyrus ($P = .025$); lower long-range FC (seed-based functional connectivity, sic) in the frontoparietal and frontocerebellar networks; and higher FC in the frontostriatal circuit that correlated across subjects with ADHD with the degree of executive dysfunction ($P < .05$).

These findings of focal spontaneous hyper- and hypofunction, together with altered brain connectivity in the large-scale resting-state networks, which correlates with executive dysfunction, point to a connectivity-based pathophysiologic process in ADHD.”

Li, F., et al. (April 30, 2014). Intrinsic Brain Abnormalities in Attention Deficit Hyperactivity Disorder: A Resting-State Functional MR Imaging Study. Neuroradiology, DOI: <http://dx.doi.org/10.1148/radiol.14131622>.

Brain Imagery Diagnostics of AD/HD

“Our results show that ELM (electric learning machine) has better computational efficiency and is more robust as sample size changes than is SVM (superior vector machine) for ADHD classification. The most pronounced differences between ADHD and healthy subjects were observed in the frontal lobe, temporal lobe, occipital lobe and insular.

Our ELM-based algorithm for ADHD diagnosis performs considerably better than the traditional SVM (algorithm. This result suggests that ELM may be used for the clinical diagnosis of ADHD and the investigation of different brain diseases.”

ELM predicted AD/HD 90.18% of the time correctly.

Peng X., Lin P., Zhang T., and Wang J. (2013). Extreme Learning Machine-Based Classification of ADHD Using Brain Structural MRI Data. PLoS ONE, 8(11): e79476. DOI:10.1371/journal.pone.0079476.

Sluggish Cognitive Tempo

Recent empirical evidence shows SCT symptoms consisting of sluggish/sleepy and daydreamy behaviors to be distinct from *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms. SCT is associated with psychosocial functioning in children and adolescents, including internalizing symptoms, social withdrawal, and, possibly, academic impairment. The recent findings reviewed suggest that SCT is an important construct for pediatric psychologists to be aware of and may also be directly useful for the research and practice of pediatric psychology.

Becker, S.P. (2014). Does Emotion Dysregulation Mediate the Association Between Sluggish Cognitive Tempo and College Students' Social Impairment? Journal of Attention Disorders. DOI: 1087054714527794v1-1087054714527794.

Sluggish Cognitive Tempo

“We evaluated the latent structure and validity of an expanded pool of Sluggish Cognitive Tempo (SCT) items. An experimental rating scale with 44 candidate SCT items was administered to parents and teachers of 165 children in grades 2–5 (ages 7–11) recruited for a randomized clinical trial of a psychosocial intervention for Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type. Exploratory factor analyses (EFA) were used to extract items with high loadings (>0.59) on primary factors of SCT and low cross-loadings (0.30 or lower) on other SCT factors and on the Inattention factor of ADHD. Items were required to meet these criteria for both informants. This procedure reduced the pool to 15 items. Generally, items representing slowness and low initiative failed these criteria. SCT factors (termed Daydreaming, Working Memory Problems, and Sleepy/Tired) showed good convergent and discriminant validity in EFA and in a confirmatory model with ADHD factors...”

Sluggish Cognitive Tempo

“...Simultaneous regressions of impairment and comorbidity on SCT and ADHD factors found that Daydreams was associated with global impairment, and Sleepy/Tired was associated with organizational problems and depression ratings, across both informants. for teachers, Daydreams also predicted ODD (inversely); Sleepy/Tired also predicted poor academic behavior, low social skills, and problem social behavior; and Working Memory Problems predicted organizational problems and anxiety. When depression, rather than ADHD, was included among the predictors, the only SCT-related associations rendered insignificant were the teacher-reported associations of Daydreams with ODD; Working Memory Problems with anxiety, and Sleepy/Tired with poor social skills. SCT appears to be meaningfully associated with impairment, even when controlling for depression. Common behaviors resembling Working Memory problems may represent a previously undescribed factor of SCT.”

Reference

McBurnnett, K. et al. (November, 2013). Structure and Validity of Sluggish Cognitive Tempo Using an Expanded Item Pool in Children with Attention-Deficit/Hyperactivity Disorder. Journal of Abnormal Child Psychology. DOI: DOI 10.1007/s10802-013-9801-5.

Sluggish Cognitive Tempo

“Objective: Studies demonstrate an association between sluggish cognitive tempo (SCT) and social impairment, although no studies have tested possible mechanisms of this association. This study aimed to (a) examine SCT in relation to college students’ social functioning; (b) test if SCT is significantly associated with emotion dysregulation beyond depressive, anxious, and ADHD symptoms; and (c) test if emotion dysregulation mediates the association between SCT symptoms and social impairment. Method: College students ($N = 158$) completed measures of psychopathology symptoms, emotion dysregulation, and social functioning...”

Sluggish Cognitive Tempo

“.... Results: Participants with elevated SCT (12%) had higher ADHD, depressive, and anxious symptoms in addition to poorer emotion regulation and social adjustment than participants without elevated SCT. Above and beyond other psychopathologies, SCT was significantly associated with social impairment but not general interpersonal functioning. SCT was also associated with emotion dysregulation, even after accounting for the expectedly strong association between depression and emotion dysregulation. Further analyses supported emotion dysregulation as a mediator of the association between SCT and social impairment. Conclusion: These findings are important for theoretical models of SCT and underscore the need for additional, longitudinal research.”

Reference

Flannery, A.J et al. (April 1, 2014). Does Emotion Dysregulation Mediate the Association Between Sluggish Cognitive Tempo and College Students' Social Impairment? Journal of Attention Disorders. DOI: 10.1177/1087054714527794.

Sluggish Cognitive Tempo

“This study examined the validity of the sluggish cognitive tempo (SCT) symptom dimension in children. Ten symptom domains were used to define SCT (i.e., (1) daydreams; (2) attention fluctuates; (3) absent-minded; (4) loses train of thought; (5) easily confused; (6) seems drowsy; (7) thinking is slow; (8) slow-moving; (9) low initiative; and (10) easily bored, needs stimulation). Teacher ratings of 366 children (ages 5 to 13 with 56 % girls) along with parent ratings of 703 children (ages 5 to 13 with 55 % girls) indicated that SCT symptom domains one to eight showed convergent validity (i.e., substantial loadings on the SCT factor) and discriminant validity with the [ADHD-IN](#) dimension (i.e., higher loadings on the SCT factor than the [ADHD-IN](#) factor)...”

Sluggish Cognitive Tempo

“...Higher scores on this eight-symptom measure of SCT predicted lower levels of academic and social competence even after controlling for [ADHD-IN](#) and [ADHD-HI](#). In addition, higher SCT scores still predicted higher anxiety/depression scores after controlling for [ADHD-IN](#) and [ADHD-HI](#). Higher SCT scores also predicted *lower* [ADHD-HI](#) scores after controlling for [ADHD-IN](#) and anxiety/depression while higher [ADHD-IN](#) and anxiety/depression scores predicted *higher* [ADHD-HI](#) scores after controlling for SCT and anxiety/depression or [ADHD-IN](#). SCT also showed a unique *negative* relationship with [ODD](#) while [ADHD-IN](#) and anxiety/depression showed unique *positive* relationships with [ODD](#). This new measure of the SCT dimension was meaningfully independent from the [ADHD-IN](#) and anxiety/depression dimensions and suggests that such an SCT dimension may signify a distinct presentation of [ADHD](#) or a different (if highly comorbid) disorder altogether” (p. 7).

Reference

SoYean, L. et al (January, 2014). Validity of the Sluggish Cognitive Tempo Symptom Dimension in Children: Sluggish Cognitive Tempo and ADHD-Inattention as Distinct Symptom Dimensions. Journal of Abnormal Child Psychology. 42(1), 7-19.

Sluggish Cognitive Tempo

“This study examined separate inattentive, hyperactive, and impulsive dimensions of attention-deficit/hyperactivity disorder (ADHD), as well as sluggish cognitive tempo (SCT) symptoms, in relation to college students' sleep functioning. Participants were 288 college students (ages 17-24; 65 % female; 90 % non-Hispanic White; 12 % self-reported having an ADHD diagnoses) who completed measures of ADHD/SCT symptoms and sleep functioning. Participants reported obtaining an average of 6.8 h of sleep per night (only 26 % reported obtaining ≥ 8 h of sleep) and having a sleep onset latency of 25 min. 63 % were classified as "poor sleepers," and poor sleepers had higher rates of ADHD and SCT symptoms than "good sleepers". Path analysis controlling for ADHD status and psychiatric medication use was used to determine associations between psychopathology and sleep functioning domains...”

Sluggish Cognitive Tempo

“...Above and beyond covariates and other psychopathologies, hyperactivity (but not impulsivity) was significantly associated with poorer sleep quality, longer sleep latency, shorter sleep duration, and more use of sleep medications. SCT symptoms (but not inattention) were significantly associated with poorer sleep quality and increased nighttime sleep disturbance (e.g., having bad dreams, waking up in the middle of the night, feeling too cold or too hot). Both inattention and SCT were associated with greater daytime dysfunction. Regression analyses demonstrated that hyperactivity predicted sleep quality above and beyond the influence of daytime dysfunction, and inattention and SCT predicted daytime dysfunction above and beyond sleep quality. Further studies are needed to examine the interrelations of nighttime sleep functioning, ADHD/SCT, and daytime dysfunction, as well to elucidate mechanisms contributing to related functional impairments”.

Reference

Becker, S.P. et al. (February 11, 2014). Attention-Deficit/Hyperactivity Disorder Dimensions and Sluggish Cognitive Tempo Symptoms in Relation to College Students' Sleep Functioning. Child Psychiatry and Human Development. DOI: 10.1007/s10578-014-0436-8.

Sleep & AD/HD

“Many adults with attention-deficit/hyperactivity disorder (ADHD) complain about difficulty falling asleep and are only able to sleep late. As a result, the duration of the sleep period is often short, leading to difficulty getting up on time in the morning. They often have this late sleep pattern from childhood” (p. 1).

Kooij, J.J. et al (May, 2014). The Circadian Rhythm in Attention-Deficit/Hyperactivity Disorder and Health. The ADHD Report, 22(3), 1-6

Sleep & AD/HD

“ Many children with ADHD have difficulty going to sleep, suffer from interrupted sleep, restlessnes during sleep, and decreased sleep efficiency...Children with ADHD have more sleep-disordered breathing increased nocturnal activity, insomnia, and disturbances of sleep stages...They have more bedtime resistance, difficulties getting up in the morning, and sleepiness during the day...A 73% prevalence of delayed sleep has been found in children with AD/HD” (p. 2).

Kooij, J.J. et al (May, 2014). The Circadian Rhythm in Attention-Deficit/Hyperactivity Disorder and Health. The ADHD Report, 22(3), 1-6

Sleep and AD/HD

“In adults with ADHD, the prevalence is as high as 80%...and more than 60% chronic daytime fatigue...Based on clinical experience, many adults with ADHD and chronic late sleep sleep too little, often not more than 5 or 6 hours per night. Most adults with ADHD and chronic sleep problems report having had these problems since childhood” (p. 2).

Kooij, J.J. et al (May, 2014). The Circadian Rhythm in Attention-Deficit/Hyperactivity Disorder and Health. The ADHD Report, 22(3), 1-6

Sleep and AD/HD

“It is clear from this review...that both children and adults with ADHD are at risk of having more sleeping difficulties and problems with diurnal and circadian rhythms than is the case for typical people” (p. 10).

Barkley, R.A. (May, 2014). Sleep Problems and ADHD-An Overview. The ADHD Report, 23(3), 6-11.

AD/HD is a Neurodevelopmental Disorder

“Readers who follow the literature on ADHD know that it is a neurodevelopmental disorder because of the wealth of neuroimaging studies, both structural and functional, that have revealed significant delays in various brain regions, especially in the prefrontal cortex, anterior cingulate, basal ganglia, and cerebellum, among others” (p. 14).

Barkley, R.A. (May, 2014). More Research Findings. The ADHD Report, 22(3), 14.

Developmental Coordination Disorder

“The study of children with Developmental Coordination Disorder (DCD) has emerged as a vibrant line of inquiry over the last three decades. DCD is defined as a neurodevelopmental condition characterized by poor motor proficiency that interferes with a child’s activities of daily living (sometimes also known as dyspraxia). Common symptoms include marked delays in achieving motor milestones and clumsiness, typically associated with poor balance, coordination, and especially handwriting skills. The condition occurs in 5% to 6% of American school-aged children, implying that most school classes have at least one affected child. The outcomes associated with DCD often extend beyond the motor domain to include secondary mental health, emotional, and behavioral issues, with reports on higher anxiety and depression, poor social communication, being bullied, lower global self-esteem, and less participation in typical childhood activities. Because of those consequences, early diagnosis, treatment, and educational support are important.”

Reference

Cacola, P. (2014). Movement Difficulties Affect Children's Learning: An Overview of Developmental Coordination Disorder (DCD). Learning Disabilities: A Multidisciplinary Journal, 20(2). From website: <http://js.sagamorepub.com/ldmj/article/view/5279>.

Adult Reading Disability, Education, & Income

This study examined the impact of childhood reading disability (RD) on adult educational attainment and income. Participants' ($N = 1,344$) RD was assessed at age 7, and adult educational attainment and income were assessed in midlife using categorical variables. Participants with RD at age 7 were 74% (95% CI: 0.18, 0.37) less likely to attain a higher level of education and 56% (95% CI: 0.32, 0.61) less likely to attain a higher level of income as an adult than participants with average or above reading achievement at age 7. Attained education was found to mediate the relationship between RD and attained income.

McLaughlin, M.J. et al. (July/August, 2014). Reading Disability and Adult Attained Education and Income: Evidence From a 30-Year Longitudinal Study of a Population-Based Sample. Journal of Learning Disabilities, 47(4), 374-386. DOI: 10.1177/0022219412458323.

Autism Spectrum Disorder, Anxiety and Cognitive Behavioral Therapy

“The frequent co-occurrence of anxiety disorders and autism spectrum disorders (ASD) in youth has spurred study of intervention practices for this population. As anxiety disorders in the absence of ASD are effectively treated using cognitive-behavioral therapy (CBT) protocols, an initial step in evaluating treatments for comorbid youth has necessarily centered on adaptation of CBT. One primary limitation of this research, to date, is that interventions for adolescents with anxiety disorders and ASD have not been systematically tested. In this study, 20 adolescents (90% male) with ASD and a comorbid anxiety disorder, between ages 11 and 14 years ($M = 12.2$ years, $SD = 1.11$ years), participated in an open trial of modified CBT targeting anxiety with ASD. Findings demonstrated significant reductions in anxiety severity, as assessed by clinician and parent ratings, from baseline to post-treatment. In addition, reductions in parent-rated externalizing symptoms were observed. Gains were maintained at a 1-month follow-up.”

Reference

Ehrenreich-May, J. et al. (May 12, 2014). An Open Trial of Cognitive-Behavioral Therapy for Anxiety Disorders in Adolescents With Autism Spectrum Disorders. Focus on Autism and Other Developmental Disabilities. DOI: 10.1177/1088357614533381.

ASD, Generalized Anxiety Disorder & Oxytocin

“The three different mechanisms reviewed here are not mutually exclusive. For example, decreased anxiety could lead to increased sensitivity for social salience, and vice versa. Together, anxiety and social reward sensitivity influence attribution of social salience. They might, in a given context, either promote or impede social behavior. We hypothesize that the mechanism by which OXT affects social behavior depends upon these two systems...Subsequently, the environment provides feedback to the OXT system about the resulting social behavior, influencing anxiety and reward sensitivity. This synergy in turn determines the salience of social cues in a particular context. In people with autism spectrum conditions (ASC) or GSAD (Generalized Anxiety Disorder) this system might be disturbed, resulting in social interaction deficits” (p. 2).

Bethlehem, R.A.I. et al. (February 17, 2014). The Oxytocin Paradox. Frontiers in Behavioral Science, 8(48), 1-5. DOI: 10.3389/fnbeh.2014.00048.

Oxytocin and Autism

“In conclusion, over recent years it has become clear that the effects of OXT administration on human social behavior are not best framed in absolute terms such as pro- or antisocial. We aim to shift the focus to underlying core processes such as anxiety and reward sensitivity. When applied to studied contexts, the modulation of OXT on these core processes can lead to different behavioral outcomes dependent on person and situation, especially since reward processing and anxiety in specific contexts differs from person to person” (p. 3).

Bethlehem, R.A.I. et al. (February 17, 2014). The Oxytocin Paradox. Frontiers in Behavioral Science, 8(48), 1-5.
DOI: 10.3389/fnbeh.2014.00048.

Difference in Cause of ASD in Males and Female?

“In conclusion, we have identified sex-specific proteomic changes in sera from adults with AS (Asperger Syndrome). Females showed changes in proteins mainly associated with lipid transport and metabolism, including FAI, and males showed changes predominantly in inflammation pathways. Further exploration is warranted into the mechanisms by which these sexually dimorphic molecular phenotypes in AS arise. This may lead to deeper insights into the well-established sex differences in the clinical manifestation and brain structure and course of ASC. This may have implications for the development of novel targeted treatment approaches for improved outcomes, and for understanding sex-linked aetiological factors in autism”.

Reference

Steeb, H. et al. (2014). Serum proteomic analysis identifies sex-specific differences in lipid metabolism and inflammation profiles in adults diagnosed with Asperger Syndrome. Molecular Autism. From website: <http://www.molecularautism.com/content/5/1/4>.