

**Πρόγραμμα Μεταπτυχιακών Σπουδών Εξειδίκευσης του Τμήματος Ελληνικής
Φιλολογίας του Δημοκριτείου Πανεπιστημίου Θράκης**

σε συνεργασία με το

**ΕΚΕΦΕ Δημόκριτος-Ινστιτούτο Πληροφορικής και Επικοινωνιών με τίτλο :
«Εξειδίκευση στις Τ.Π.Ε και Ειδική Αγωγή-Ψυχοπαιδαγωγική της ένταξης»**

ΔΕΠΥ: ΑΙΤΙΟΠΑΘΟΓΕΝΕΙΑ ΚΑΙ ΣΥΝΝΟΣΗΡΟΤΗΤΑ

ADHD: PATHOPHYSIOLOGY AND COMORBIDITY

της

Χατζηδημητρίου Δέσποινας

Μεταπτυχιακή διατριβή που υποβάλλεται
στην τριμελή επιτροπή για την απόκτηση του μεταπτυχιακού τίτλου του
Προγράμματος Μεταπτυχιακών Σπουδών Εξειδίκευσης του Τ.Ε.Φ-Δ.Π.Θ. σε
συνεργασία με το Ε.Κ.Ε.Φ.Ε. Δημόκριτος –Ινστιτούτο Πληροφορικής και
Επικοινωνιών με τίτλο: «Εξειδίκευση στις Τ.Π.Ε. και Ειδική Αγωγή –
Ψυχοπαιδαγωγική της ένταξης»

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Περίληψη

Η ΔΕΠΥ αποτελεί μια συχνή νευροαναπτυξιακή διαταραχή της παιδικής ηλικίας, η οποία στην πλειονότητα των περιπτώσεων επιμένει στην ενήλικη ζωή και συχνά συνοδεύεται από ποικίλες διαταραχές. Μέχρι και σήμερα δεν υπάρχουν αντικειμενικοί βιοδείκτες για την αξιόπιστη διάγνωση της διαταραχής. Η συστηματική διερεύνηση της αιτιοπαθογένειας και της συννοσηρότητας της ΔΕΠΥ μπορεί να αμβλύνει τις δυσκολίες στη διαγνωστική αξιολόγηση της διαταραχής και να ενισχύσει την αξιοπιστία της. Σκοπός της παρούσας εργασίας είναι η παρουσίαση της πρόσφατης βιβλιογραφίας που αφορά στην αιτιοπαθογένεια και στη συννοσηρότητα της ΔΕΠΥ. Η μεθοδολογία της έρευνας αφορά στην αναζήτηση των πρόσφατων βιβλιογραφικών αναφορών στο PubMed, σχετικά με την παθοφυσιολογία της διαταραχής και τα χαρακτηριστικά της συννοσηρότητας. Στην εργασία εξετάζονται τα νευροαπεικονιστικά δεδομένα, τα νευροδιαβιβαστικά συστήματα, οι μεταβολές των μιτοχονδρίων, οι γενετικοί και περιβαλλοντικοί παράγοντες που σχετίζονται με τη ΔΕΠΥ. Επίσης, περιγράφεται η συννοσηρότητα της ΔΕΠΥ και ορισμένων νευροαναπτυξιακών διαταραχών, της διαταραχής χρήσης ουσιών και της παχυσαρκίας. Συμπερασματικά, προκύπτει πως η εκδήλωση της ΔΕΠΥ μπορεί να οφείλεται στην αλληλεπίδραση των παραγόντων, που σχετίζονται με την αιτιοπαθογένειά της. Τα ευρήματα αυτά όμως είναι ασαφή και απαιτείται η συστηματική ανάλυση των παραγόντων της ΔΕΠΥ. Σε ορισμένες περιπτώσεις συννόσησης παρατηρείται απουσία ευρημάτων σχετικά με τους γενετικούς παράγοντες ή τα νευροαπεικονιστικά δεδομένα ή μικρό δείγμα μελετών και για το λόγο αυτό κρίνεται αναγκαία η περαιτέρω διερεύνηση των παραγόντων της συννοσηρότητας, που θα συνδράμει τόσο στην εγκυρότητα της διαφορικής διάγνωσης όσο και στην αποτελεσματικότητα των θεραπευτικών παρεμβάσεων.

Λέξεις κλειδιά: γονίδια, μιτοχόνδρια, επιγενετική, νευροαπεικόνιση, νευροδιαβίβαση, παχυσαρκία, Tourette, δυσλεξία, εναντιωματική προκλητική διαταραχή, διαταραχή διαγωγής, φάσμα αυτισμού, ιδεοψυχαναγκαστική διαταραχή, διπολική διαταραχή, αναπτυξιακή διαταραχή κινητικής συναρμογής, χρήση ουσιών

Βιβλιογραφία

- Abramovitch, A., Dar, R., Mittelman, A., & Wilhelm, S. (2015). Comorbidity Between Attention Deficit/Hyperactivity Disorder and Obsessive-Compulsive Disorder Across the Lifespan: A Systematic and Critical Review. *Harvard Review of Psychiatry*, 23(4), 245–262. <https://doi.org/10.1097/HRP.0000000000000050>
- Al-Mubarak, B. R., Omar, A., Baz, B., Al-Abdulaziz, B., Magrashi, A. I., Al-Yemni, E., Jabaan, A., Monies, D., Abouelhoda, M., Abebe, D., Ghaziuddin, M., & Al-Tassan, N. A. (2020). Whole exome sequencing in ADHD trios from single and multi-incident families implicates new candidate genes and highlights polygenic transmission. *European Journal of Human Genetics*, 28(8), 1098–1110. <https://doi.org/10.1038/s41431-020-0619-7>
- Albrecht, B., Uebel-von Sandersleben, H., Gevensleben, H., & Rothenberger, A. (2015). Pathophysiology of ADHD and associated problems-starting points for NF interventions? *Frontiers in Human Neuroscience*, 9, 359. <https://doi.org/10.3389/fnhum.2015.00359>
- Aoki, Y., Yoncheva, Y. N., Chen, B., Nath, T., Sharp, D., Lazar, M., Velasco, P., Milham, M. P., & Di Martino, A. (2017). Association of White Matter Structure With Autism Spectrum Disorder and Attention-Deficit/Hyperactivity Disorder. *JAMA Psychiatry*, 74(11), 1120–1128. <https://doi.org/10.1001/jamapsychiatry.2017.2573>
- Banaschewski, T., Becker, K., Döpfner, M., Holtmann, M., Rösler, M., & Romanos, M. (2017). Attention-Deficit/Hyperactivity Disorder. *Deutsches Aerzteblatt Online*, 114(9), 149–159. <https://doi.org/10.3238/arztebl.2017.0149>
- Banerjee, E., & Nandagopal, K. (2015). Does serotonin deficit mediate susceptibility to ADHD? *Neurochemistry International*, 82, 52–68. <https://doi.org/10.1016/j.neuint.2015.02.001>
- Banik, A., Kandilya, D., Ramya, S., Stünkel, W., Chong, Y. S., & Dheen, S. T. (2017). Maternal Factors that Induce Epigenetic Changes Contribute to Neurological
-

- Disorders in Offspring. *Genes*, 8(6), 150. <https://doi.org/10.3390/genes8060150>
- Bannister, A. J., & Kouzarides, T. (2011). Regulation of chromatin by histone modifications. *Cell Research*, 21(3), 381–395. <https://doi.org/10.1038/cr.2011.22>
- Barros, M. E., Rawlings, D. E., & Woods, D. R. (1985). Cloning and expression of the *Thiobacillus ferrooxidans* glutamine synthetase gene in *Escherichia coli*. *Journal of Bacteriology*, 164(3), 1386–1389. <https://doi.org/10.1128/JB.164.3.1386-1389.1985>
- Berson, A., Nativio, R., Berger, S. L., & Bonini, N. M. (2018). Epigenetic Regulation in Neurodegenerative Diseases. *Trends in Neurosciences*, 41(9), 587–598. <https://doi.org/10.1016/j.tins.2018.05.005>
- Bollmann, S., Ghisleni, C., Poil, S.-S., Martin, E., Ball, J., Eich-Höchli, D., Edden, R. A. E., Klaver, P., Michels, L., Brandeis, D., & O’Gorman, R. L. (2015). Developmental changes in gamma-aminobutyric acid levels in attention-deficit/hyperactivity disorder. *Translational Psychiatry*, 5(6), e589. <https://doi.org/10.1038/tp.2015.79>
- Bouziane, C., Caan, M. W. A., Tamminga, H. G. H., Schranke, A., Bottelier, M. A., de Ruiter, M. B., Kooij, S. J. J., & Reneman, L. (2018). ADHD and maturation of brain white matter: A DTI study in medication naive children and adults. *NeuroImage. Clinical*, 17, 53–59. <https://doi.org/10.1016/j.nicl.2017.09.026>
- Brem, S., Grünblatt, E., Drechsler, R., Riederer, P., & Walitza, S. (2014). The neurobiological link between OCD and ADHD. *Attention Deficit and Hyperactivity Disorders*, 6(3), 175–202. <https://doi.org/10.1007/s12402-014-0146-x>
- Carpentier, P.-J., & Levin, F. R. (2017). Pharmacological Treatment of ADHD in Addicted Patients: What Does the Literature Tell Us? *Harvard Review of Psychiatry*, 25(2), 50–64. <https://doi.org/10.1097/HRP.0000000000000122>
- Cashin, A. G., & McAuley, J. H. (2020). Clinimetrics: Physiotherapy Evidence Database

- (PEDro) Scale. *Journal of Physiotherapy*, 66(1), 59.
<https://doi.org/10.1016/j.jphys.2019.08.005>
- Çelebi, F., Koyuncu, A., Ertekin, E., Alyanak, B., & Tükel, R. (2020). The Features of Comorbidity of Childhood ADHD in Patients With Obsessive Compulsive Disorder. *Journal of Attention Disorders*, 24(7), 973–980.
<https://doi.org/10.1177/1087054716669228>
- Chaim, T. M., Zhang, T., Zanetti, M. V., da Silva, M. A., Louzã, M. R., Doshi, J., Serpa, M. H., Duran, F. L. S., Caetano, S. C., Davatzikos, C., & Busatto, G. F. (2014). Multimodal magnetic resonance imaging study of treatment-naïve adults with attention-deficit/hyperactivity disorder. *PloS One*, 9(10), e110199.
<https://doi.org/10.1371/journal.pone.0110199>
- Chang, S., Zhang, W., Gao, L., & Wang, J. (2012). Prioritization of candidate genes for attention deficit hyperactivity disorder by computational analysis of multiple data sources. *Protein and Cell*, 3(7), 526–534. <https://doi.org/10.1007/s13238-012-2931-7>
- Chang, X., Liu, Y., Mentch, F., Glessner, J., Qu, H., Nguyen, K., Sleiman, P. M. A., & Hakonarson, H. (2020). Mitochondrial DNA haplogroups and risk of attention deficit and hyperactivity disorder in European Americans. *Translational Psychiatry*, 10(1), 1–6. <https://doi.org/10.1038/s41398-020-01064-1>
- Chao, T.-K., Hu, J., & Pringsheim, T. (2014). Prenatal risk factors for Tourette Syndrome: a systematic review. *BMC Pregnancy and Childbirth*, 14(1), 53.
<https://doi.org/10.1186/1471-2393-14-53>
- Cichoń, L., Janas-Kozik, M., Siwiec, A., & Rybakowski, J. K. (2020). Clinical picture and treatment of bipolar affective disorder in children and adolescents. *Psychiatria Polska*, 54(1), 35–50. <https://doi.org/10.12740/PP/OnlineFirst/92740>
- Clark, B., & Bélanger, S. A. (2018). ADHD in children and youth: Part 3-Assessment and treatment with comorbid ASD, ID, or prematurity. *Paediatrics & Child Health*, 23(7), 485–490. <https://doi.org/10.1093/pch/pxy111>

- Corbet Burcher, G., Liang, H., Lancaster, R., Cross, J. H., Tisdall, M., Varadkar, S., Spoudeas, H. A., Caredda, E., Bennett, S., & Heyman, I. (2019). Neuropsychiatric profile of paediatric hypothalamic hamartoma: systematic review and case series. *Developmental Medicine & Child Neurology*, 61(12), 1377–1385. <https://doi.org/10.1111/dmcn.14241>
- Corominas, J., Klein, M., Zayats, T., Rivero, O., Ziegler, G. C., Pauper, M., Neveling, K., Poelmans, G., Jansch, C., Svirin, E., Geissler, J., Weber, H., Reif, A., Arias Vasquez, A., Galesloot, T. E., Kiemeny, L. A. L. M., Buitelaar, J. K., Ramos-Quiroga, J. A., Cormand, B., ... Lesch, K. P. (2020). Identification of ADHD risk genes in extended pedigrees by combining linkage analysis and whole-exome sequencing. *Molecular Psychiatry*, 25(9), 2047–2057. <https://doi.org/10.1038/s41380-018-0210-6>
- Cortese, S., & Tessari, L. (2017). Attention-Deficit/Hyperactivity Disorder (ADHD) and Obesity: Update 2016. *Current Psychiatry Reports*, 19(1), 4. <https://doi.org/10.1007/s11920-017-0754-1>
- Craig, F., Margari, F., Legrottaglie, A. R., Palumbi, R., de Giambattista, C., & Margari, L. (2016). A review of executive function deficits in autism spectrum disorder and attention-deficit/hyperactivity disorder. *Neuropsychiatric Disease and Treatment*, 12, 1191–1202. <https://doi.org/10.2147/NDT.S104620>
- Cravedi, E., Deniau, E., Giannitelli, M., Xavier, J., Hartmann, A., & Cohen, D. (2017). Tourette syndrome and other neurodevelopmental disorders: a comprehensive review. *Child and Adolescent Psychiatry and Mental Health*, 11(1), 59. <https://doi.org/10.1186/s13034-017-0196-x>
- Cunningham, A. C., Delport, S., Cumines, W., Busse, M., Linden, D. E. J., Hall, J., Owen, M. J., & van den Bree, M. B. M. (2018). Developmental coordination disorder, psychopathology and IQ in 22q11.2 deletion syndrome. *The British Journal of Psychiatry : The Journal of Mental Science*, 212(1), 27–33. <https://doi.org/10.1192/bjp.2017.6>
- Douglas, P. K., Gutman, B., Anderson, A., Larios, C., Lawrence, K. E., Narr, K.,

- Sengupta, B., Cooray, G., Douglas, D. B., Thompson, P. M., McGough, J. J., & Bookheimer, S. Y. (2018). Hemispheric brain asymmetry differences in youths with attention-deficit/hyperactivity disorder. *NeuroImage. Clinical*, 18, 744–752. <https://doi.org/10.1016/j.nicl.2018.02.020>
- Dreber, H., Reynisdottir, S., Angelin, B., & Hemmingsson, E. (2015). Who is the Treatment-Seeking Young Adult with Severe Obesity: A Comprehensive Characterization with Emphasis on Mental Health. *PloS One*, 10(12), e0145273. <https://doi.org/10.1371/journal.pone.0145273>
- Drechsler, R., Brem, S., Brandeis, D., Grünblatt, E., Berger, G., & Walitza, S. (2020). ADHD: Current Concepts and Treatments in Children and Adolescents. *Neuropediatrics*, 51(05), 315–335. <https://doi.org/10.1055/s-0040-1701658>
- Dunn, G. A., Nigg, J. T., & Sullivan, E. L. (2019). Neuroinflammation as a risk factor for attention deficit hyperactivity disorder. *Pharmacology, Biochemistry, and Behavior*, 182, 22–34. <https://doi.org/10.1016/j.pbb.2019.05.005>
- Edden, R. A. E., Crocetti, D., Zhu, H., Gilbert, D. L., & Mostofsky, S. H. (2012). Reduced GABA concentration in attention-deficit/hyperactivity disorder. *Archives of General Psychiatry*, 69(7), 750–753. <https://doi.org/10.1001/archgenpsychiatry.2011.2280>
- Eme, R. (2013). Male adolescent substance use disorder and attention-deficit hyperactivity disorder: a review of the literature. *ISRN Addiction*, 2013, 815096. <https://doi.org/10.1155/2013/815096>
- Ende, G., Cackowski, S., Van Eijk, J., Sack, M., Demirakca, T., Kleindienst, N., Bohus, M., Sobanski, E., Krause-Utz, A., & Schmahl, C. (2016). Impulsivity and Aggression in Female BPD and ADHD Patients: Association with ACC Glutamate and GABA Concentrations. *Neuropsychopharmacology : Official Publication of the American College of Neuropsychopharmacology*, 41(2), 410–418. <https://doi.org/10.1038/npp.2015.153>
- Eskander, N. (2020). The Psychosocial Outcome of Conduct and Oppositional Defiant

- Disorder in Children With Attention Deficit Hyperactivity Disorder. *Cureus*, 12(8), e9521. <https://doi.org/10.7759/cureus.9521>
- Faraone, S. V., & Larsson, H. (2019). Genetics of attention deficit hyperactivity disorder. *Molecular Psychiatry*, 24(4), 562–575. <https://doi.org/10.1038/s41380-018-0070-0>
- Fielenbach, S., Donkers, F. C. L., Spreen, M., Visser, H. A., & Bogaerts, S. (2017). Neurofeedback Training for Psychiatric Disorders Associated with Criminal Offending: A Review. *Frontiers in Psychiatry*, 8, 313. <https://doi.org/10.3389/fpsy.2017.00313>
- Fitzgerald, E., Boardman, J. P., & Drake, A. J. (2018). Preterm Birth and the Risk of Neurodevelopmental Disorders - Is There a Role for Epigenetic Dysregulation? *Current Genomics*, 19(7), 507–521. <https://doi.org/10.2174/1389202919666171229144807>
- Forehand, R., Parent, J., Sonuga-Barke, E., Peisch, V. D., Long, N., & Abikoff, H. B. (2016). Which Type of Parent Training Works Best for Preschoolers with Comorbid ADHD and ODD? A Secondary Analysis of a Randomized Controlled Trial Comparing Generic and Specialized Programs. *Journal of Abnormal Child Psychology*, 44(8), 1503–1513. <https://doi.org/10.1007/s10802-016-0138-8>
- Frías, Á., Palma, C., & Farriols, N. (2015). Comorbidity in pediatric bipolar disorder: prevalence, clinical impact, etiology and treatment. *Journal of Affective Disorders*, 174, 378–389. <https://doi.org/10.1016/j.jad.2014.12.008>
- Froehlich, T. E., Fogler, J., Barbaresi, W. J., Elsayed, N. A., Evans, S. W., & Chan, E. (2018). Using ADHD Medications to Treat Coexisting ADHD and Reading Disorders: A Systematic Review. *Clinical Pharmacology and Therapeutics*, 104(4), 619–637. <https://doi.org/10.1002/cpt.1192>
- Ghirardi, L., Pettersson, E., Taylor, M. J., Freitag, C. M., Franke, B., Asherson, P., Larsson, H., & Kuja-Halkola, R. (2019). Genetic and environmental contribution to the overlap between ADHD and ASD trait dimensions in young adults: a twin

- study. *Psychological Medicine*, 49(10), 1713–1721.
<https://doi.org/10.1017/S003329171800243X>
- Grados, M., Huselid, R., & Duque-Serrano, L. (2018). Transcranial Magnetic Stimulation in Tourette Syndrome: A Historical Perspective, Its Current Use and the Influence of Comorbidities in Treatment Response. *Brain Sciences*, 8(7), 129.
<https://doi.org/10.3390/brainsci8070129>
- Groth, C. (2018). Tourette syndrome in a longitudinal perspective. Clinical course of tics and comorbidities, coexisting psychopathologies, phenotypes and predictors. *Danish Medical Journal*, 65(4).
<http://www.ncbi.nlm.nih.gov/pubmed/29619935>
- Grova, N., Schroeder, H., Olivier, J.-L., & Turner, J. D. (2019). Epigenetic and Neurological Impairments Associated with Early Life Exposure to Persistent Organic Pollutants. *International Journal of Genomics*, 2019, 2085496.
<https://doi.org/10.1155/2019/2085496>
- Hafeman, D., Bebko, G., Bertocci, M. A., Fournier, J. C., Chase, H. W., Bonar, L., Perlman, S. B., Travis, M., Gill, M. K., Diwadkar, V. A., Sunshine, J. L., Holland, S. K., Kowatch, R. A., Birmaher, B., Axelson, D., Horwitz, S. M., Arnold, L. E., Fristad, M. A., Frazier, T. W., ... Phillips, M. L. (2017). Amygdala-prefrontal cortical functional connectivity during implicit emotion processing differentiates youth with bipolar spectrum from youth with externalizing disorders. *Journal of Affective Disorders*, 208, 94–100. <https://doi.org/10.1016/j.jad.2016.09.064>
- Hall, F. S., Sora, I., Hen, R., & Uhl, G. R. (2014). Serotonin/dopamine interactions in a hyperactive mouse: reduced serotonin receptor 1B activity reverses effects of dopamine transporter knockout. *PloS One*, 9(12), e115009.
<https://doi.org/10.1371/journal.pone.0115009>
- Hamza, M., Halayem, S., Bourgou, S., Daoud, M., Charfi, F., & Belhadj, A. (2019). Epigenetics and ADHD: Toward an Integrative Approach of the Disorder Pathogenesis. *Journal of Attention Disorders*, 23(7), 655–664.
<https://doi.org/10.1177/1087054717696769>

- Hanć, T. (2018). ADHD as a risk factor for obesity. Current state of research. *Psychiatria Polska*, 52(2), 309–322. <https://doi.org/10.12740/PP/70388>
- Harich, B., van der Voet, M., Klein, M., Čížek, P., Fenckova, M., Schenck, A., & Franke, B. (2019). From rare copy number variations to biological processes in ADHD. *BioRxiv*. <https://doi.org/10.1101/762419>
- Harris, S. R., Mickelson, E. C. R., & Zwicker, J. G. (2015). Diagnosis and management of developmental coordination disorder. *CMAJ : Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne*, 187(9), 659–665. <https://doi.org/10.1503/cmaj.140994>
- Harvey, E. A., Breau, R. P., & Lugo-Candelas, C. I. (2016). Early development of comorbidity between symptoms of attention-deficit/hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD). *Journal of Abnormal Psychology*, 125(2), 154–167. <https://doi.org/10.1037/abn0000090>
- Heinrich, H., Grunitz, J., Stonawski, V., Frey, S., Wahl, S., Albrecht, B., Goecke, T. W., Beckmann, M. W., Kornhuber, J., Fasching, P. A., Moll, G. H., & Eichler, A. (2017). Attention, cognitive control and motivation in ADHD: Linking event-related brain potentials and DNA methylation patterns in boys at early school age. *Scientific Reports*, 7(1), 3823. <https://doi.org/10.1038/s41598-017-03326-3>
- Helseth, S. A., Waschbusch, D. A., Gnagy, E. M., Onyango, A. N., Burrows-MacLean, L., Fabiano, G. A., Coles, E. K., Chacko, A., Wymbs, B. T., Walker, K. S., Wymbs, F. A., Garefino, A., Massetti, G. M., Robb Mazzant, J., Hoffman, M. T., Waxmonsky, J. G., Nichols-Lopez, K., & Pelham, W. E. (2015). Effects of behavioral and pharmacological therapies on peer reinforcement of deviancy in children with ADHD-only, ADHD and conduct problems, and controls. *Journal of Consulting and Clinical Psychology*, 83(2), 280–292. <https://doi.org/10.1037/a0038505>
- Horowitz-Kraus, T., Hershey, A., Kay, B., & DiFrancesco, M. (2019). Differential effect of reading training on functional connectivity in children with reading difficulties with and without ADHD comorbidity. *Journal of Neurolinguistics*, 49, 93–108. <https://doi.org/10.1016/j.jneuroling.2018.09.002>

- Hwang, I. W., Hong, J. H., Kwon, B. N., Kim, H. J., Lee, N. R., Lim, M. H., Kwon, H. J., & Jin, H. J. (2017). Association of mitochondrial DNA 10398 A/G polymorphism with attention deficit and hyperactivity disorder in Korean children. *Gene*, 630(July), 8–12. <https://doi.org/10.1016/j.gene.2017.08.004>
- Jacobson, L. A., Peterson, D. J., Rosch, K. S., Crocetti, D., Mori, S., & Mostofsky, S. H. (2015). Sex-Based Dissociation of White Matter Microstructure in Children With Attention-Deficit/Hyperactivity Disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 54(11), 938–946. <https://doi.org/10.1016/j.jaac.2015.08.014>
- Jiang, X., Liu, L., Ji, H., & Zhu, Y. (2018). Association of Affected Neurocircuitry With Deficit of Response Inhibition and Delayed Gratification in Attention Deficit Hyperactivity Disorder: A Narrative Review. *Frontiers in Human Neuroscience*, 12, 506. <https://doi.org/10.3389/fnhum.2018.00506>
- Jin, B., & Robertson, K. D. (2013). DNA methyltransferases, DNA damage repair, and cancer. *Advances in Experimental Medicine and Biology*, 754, 3–29. https://doi.org/10.1007/978-1-4419-9967-2_1
- Karmakar, A., Maitra, S., Chakraborti, B., Verma, D., Sinha, S., Mohanakumar, K. P., Rajamma, U., & Mukhopadhyay, K. (2016). Monoamine oxidase B gene variants associated with attention deficit hyperactivity disorder in the Indo-Caucasoid population from West Bengal. *BMC Genetics*, 17(1), 1–15. <https://doi.org/10.1186/s12863-016-0401-6>
- Khacho, M., Harris, R., & Slack, R. S. (2019). Mitochondria as central regulators of neural stem cell fate and cognitive function. *Nature Reviews Neuroscience*, 20(1), 34–48. <https://doi.org/10.1038/s41583-018-0091-3>
- Kim, J. I., Lee, S.-Y., Park, M., Kim, S. Y., Kim, J.-W., Kim, S. A., & Kim, B.-N. (2019). Peripheral Mitochondrial DNA Copy Number is Increased in Korean Attention-Deficit Hyperactivity Disorder Patients. *Frontiers in Psychiatry*, 10(July), 1–7. <https://doi.org/10.3389/fpsy.2019.00506>

- Klein, M., Onnink, M., van Donkelaar, M., Wolfers, T., Harich, B., Shi, Y., Dammers, J., Arias-Vásquez, A., Hoogman, M., & Franke, B. (2017). Brain imaging genetics in ADHD and beyond - Mapping pathways from gene to disorder at different levels of complexity. *Neuroscience and Biobehavioral Reviews*, 80, 115–155.
<https://doi.org/10.1016/j.neubiorev.2017.01.013>
- Klein, M., van Donkelaar, M., Verhoef, E., & Franke, B. (2017). Imaging genetics in neurodevelopmental psychopathology. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics : The Official Publication of the International Society of Psychiatric Genetics*, 174(5), 485–537.
<https://doi.org/10.1002/ajmg.b.32542>
- Knopik, V. S., Marceau, K., Bidwell, L. C., & Rolan, E. (2019). Prenatal substance exposure and offspring development: Does DNA methylation play a role? *Neurotoxicology and Teratology*, 71, 50–63.
<https://doi.org/10.1016/j.ntt.2018.01.009>
- Kumar, A., Trescher, W., & Byler, D. (2016). Tourette Syndrome and Comorbid Neuropsychiatric Conditions. *Current Developmental Disorders Reports*, 3(4), 217–221. <https://doi.org/10.1007/s40474-016-0099-1>
- Lam, J. K. W., Chow, M. Y. T., Zhang, Y., & Leung, S. W. S. (2015). siRNA Versus miRNA as Therapeutics for Gene Silencing. *Molecular Therapy. Nucleic Acids*, 4, e252.
<https://doi.org/10.1038/mtna.2015.23>
- Langer, N., Benjamin, C., Becker, B. L. C., & Gaab, N. (2019). Comorbidity of reading disabilities and ADHD: Structural and functional brain characteristics. *Human Brain Mapping*, 40(9), 2677–2698. <https://doi.org/10.1002/hbm.24552>
- Langevin, L. M., Macmaster, F. P., Crawford, S., Lebel, C., & Dewey, D. (2014). Common white matter microstructure alterations in pediatric motor and attention disorders. *The Journal of Pediatrics*, 164(5), 1157-1164.e1.
<https://doi.org/10.1016/j.jpeds.2014.01.018>
- Langevin, L. M., MacMaster, F. P., & Dewey, D. (2015). Distinct patterns of cortical

- thinning in concurrent motor and attention disorders. *Developmental Medicine and Child Neurology*, 57(3), 257–264. <https://doi.org/10.1111/dmcn.12561>
- Lei, D., Ma, J., Du, X., Shen, G., Jin, X., & Gong, Q. (2014). Microstructural abnormalities in the combined and inattentive subtypes of attention deficit hyperactivity disorder: a diffusion tensor imaging study. *Scientific Reports*, 4(1), 6875. <https://doi.org/10.1038/srep06875>
- Leitner, Y. (2014). The co-occurrence of autism and attention deficit hyperactivity disorder in children - what do we know? *Frontiers in Human Neuroscience*, 8, 268. <https://doi.org/10.3389/fnhum.2014.00268>
- Li, Z., Chang, S. hua, Zhang, L. yan, Gao, L., & Wang, J. (2014). Molecular genetic studies of ADHD and its candidate genes: A review. *Psychiatry Research*, 219(1), 10–24. <https://doi.org/10.1016/j.psychres.2014.05.005>
- Lindblad, F., Isaksson, J., Heiskala, V., Koposov, R., & Ruchkin, V. (2020). Comorbidity and Behavior Characteristics of Russian Male Juvenile Delinquents With ADHD and Conduct Disorder. *Journal of Attention Disorders*, 24(7), 1070–1077. <https://doi.org/10.1177/1087054715584052>
- Luciano, D. V. A. S. J. (2001). *Μηχανισμοί ελέγχου από το νευρικό σύστημα, Φυσιολογία του ανθρώπου, Μηχανισμοί της λειτουργίας του οργανισμού* (Ιατρικές εκδόσεις Π.Χ. Πασχαλίδη (ed.); 8th ed.).
- Luisa Pedroso Ayub, A., D'Angelo Papaiz, D., da Silva Soares, R., & Galvonas Jasiulionis, M. (2020). The Function of lncRNAs as Epigenetic Regulators. In *Non-Coding RNAs*. IntechOpen. <https://doi.org/10.5772/intechopen.88071>
- Lukito, S. D., O'Daly, O. G., Lythgoe, D. J., Whitwell, S., Debnam, A., Murphy, C. M., Ashwood, K., Stoencheva, V., Simonoff, E., & Rubia, K. (2018). Neural Correlates of Duration Discrimination in Young Adults with Autism Spectrum Disorder, Attention-Deficit/Hyperactivity Disorder and Their Comorbid Presentation. *Frontiers in Psychiatry*, 9, 569. <https://doi.org/10.3389/fpsy.2018.00569>
- Mahlberg, N., James, M. E., Bulten, R., Rodriguez, C., Kwan, M., & Cairney, J. (2019).

- Investigating the Association Between Exposure to Second Hand Smoke in utero and Developmental Coordination Disorder. *Frontiers in Pediatrics*, 7(9), 438.
<https://doi.org/10.3389/fped.2019.00438>
- Maldonado, M. B. C., De Rezende Neto, N. B., Nagamatsu, S. T., Carazzolle, M. F., Hoff, J. L., Whitacre, L. K., Schnabel, R. D., Behura, S. K., McKay, S. D., Taylor, J. F., & Lopes, F. L. (2019). Identification of bovine CpG SNPs as potential targets for epigenetic regulation via DNA methylation. *PLoS ONE*, 14(9), 1–19.
<https://doi.org/10.1371/journal.pone.0222329>
- Marangoni, C., De Chiara, L., & Faedda, G. L. (2015). Bipolar disorder and ADHD: comorbidity and diagnostic distinctions. *Current Psychiatry Reports*, 17(8), 604.
<https://doi.org/10.1007/s11920-015-0604-y>
- Martin, J., Cooper, M., Hamshere, M. L., Pocklington, A., Scherer, S. W., Kent, L., Gill, M., Owen, M. J., Williams, N., O'Donovan, M. C., Thapar, A., & Holmans, P. (2014). Biological overlap of attention-deficit/hyperactivity disorder and autism spectrum disorder: evidence from copy number variants. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53(7), 761-70.e26.
<https://doi.org/10.1016/j.jaac.2014.03.004>
- Mayer, J. S., Hees, K., Medda, J., Grimm, O., Asherson, P., Bellina, M., Colla, M., Ibáñez, P., Koch, E., Martinez-Nicolas, A., Muntaner-Mas, A., Rommel, A., Rommelse, N., de Ruiter, S., Ebner-Priemer, U. W., Kieser, M., Ortega, F. B., Thome, J., Buitelaar, J. K., ... Freitag, C. M. (2018). Bright light therapy versus physical exercise to prevent co-morbid depression and obesity in adolescents and young adults with attention-deficit / hyperactivity disorder: study protocol for a randomized controlled trial. *Trials*, 19(1), 140.
<https://doi.org/10.1186/s13063-017-2426-1>
- McAllister, A. K. (2014). Major histocompatibility complex I in brain development and schizophrenia. *Biological Psychiatry*, 75(4), 262–268.
<https://doi.org/10.1016/j.biopsych.2013.10.003>
- McGrath, L. M., & Stoodley, C. J. (2019). Are there shared neural correlates between

- dyslexia and ADHD? A meta-analysis of voxel-based morphometry studies. *Journal of Neurodevelopmental Disorders*, 11(1), 31.
<https://doi.org/10.1186/s11689-019-9287-8>
- McLeod, K. R., Langevin, L. M., Dewey, D., & Goodyear, B. G. (2016). Atypical within- and between-hemisphere motor network functional connections in children with developmental coordination disorder and attention-deficit/hyperactivity disorder. *NeuroImage. Clinical*, 12, 157–164.
<https://doi.org/10.1016/j.nicl.2016.06.019>
- McLeod, K. R., Langevin, L. M., Goodyear, B. G., & Dewey, D. (2014). Functional connectivity of neural motor networks is disrupted in children with developmental coordination disorder and attention-deficit/hyperactivity disorder. *NeuroImage. Clinical*, 4, 566–575.
<https://doi.org/10.1016/j.nicl.2014.03.010>
- Mehta, T., Mannem, N., Yarasi, N. K., & Bollu, P. C. (2020). Biomarkers for ADHD: the Present and Future Directions. *Current Developmental Disorders Reports*, 7(3), 85–92. <https://doi.org/10.1007/s40474-020-00196-9>
- Mersin Kilic, S., Dondu, A., Memis, C. O., Ozdemiroglu, F., & Sevincok, L. (2020). The Clinical Characteristics of ADHD and Obsessive-Compulsive Disorder Comorbidity. *Journal of Attention Disorders*, 24(12), 1757–1763. <https://doi.org/10.1177/1087054716669226>
- Naaijen, J., Bralten, J., Poelmans, G., IMAGE consortium, Glennon, J. C., Franke, B., & Buitelaar, J. K. (2017). Glutamatergic and GABAergic gene sets in attention-deficit/hyperactivity disorder: association to overlapping traits in ADHD and autism. *Translational Psychiatry*, 7(1), e999.
<https://doi.org/10.1038/tp.2016.273>
- Nagai, J., Rajbhandari, A. K., Gangwani, M. R., Hachisuka, A., Coppola, G., Masmanidis, S. C., Fanselow, M. S., & Khakh, B. S. (2019). Hyperactivity with Disrupted Attention by Activation of an Astrocyte Synaptogenic Cue. *Cell*, 177(5), 1280-1292.e20. <https://doi.org/10.1016/j.cell.2019.03.019>

- Nagamitsu, S., Yamashita, Y., Tanigawa, H., Chiba, H., Kaida, H., Ishibashi, M., Kakuma, T., Croarkin, P. E., & Matsuishi, T. (2015). Upregulated GABA Inhibitory Function in ADHD Children with Child Behavior Checklist-Dysregulation Profile: 123I-Iomazenil SPECT Study. *Frontiers in Psychiatry, 6*, 84.
<https://doi.org/10.3389/fpsy.2015.00084>
- Napoli, E., Schneider, A., Hagerman, R., Song, G., Wong, S., Tassone, F., & Giulivi, C. (2018). Impact of FMR1 premutation on neurobehavior and bioenergetics in young monozygotic twins. *Frontiers in Genetics, 9*(AUG), 1–16.
<https://doi.org/10.3389/fgene.2018.00338>
- Naviaux, R. K. (2014). Metabolic features of the cell danger response. *Mitochondrion, 16*, 7–17. <https://doi.org/10.1016/j.mito.2013.08.006>
- Nickel, K., Maier, S., Endres, D., Joos, A., Maier, V., Tebartz van Elst, L., & Zeeck, A. (2019). Systematic Review: Overlap Between Eating, Autism Spectrum, and Attention-Deficit/Hyperactivity Disorder. *Frontiers in Psychiatry, 10*, 708.
<https://doi.org/10.3389/fpsy.2019.00708>
- Nigg, J. T., Johnstone, J. M., Musser, E. D., Long, H. G., Willoughby, M. T., & Shannon, J. (2016). Attention-deficit/hyperactivity disorder (ADHD) and being overweight/obesity: New data and meta-analysis. *Clinical Psychology Review, 43*, 67–79.
<https://doi.org/10.1016/j.cpr.2015.11.005>
- Nobusako, S., Sakai, A., Tsujimoto, T., Shuto, T., Nishi, Y., Asano, D., Furukawa, E., Zama, T., Osumi, M., Shimada, S., Morioka, S., & Nakai, A. (2018). Deficits in Visuo-Motor Temporal Integration Impacts Manual Dexterity in Probable Developmental Coordination Disorder. *Frontiers in Neurology, 9*, 114.
<https://doi.org/10.3389/fneur.2018.00114>
- Noordermeer, S. D. S., Luman, M., & Oosterlaan, J. (2016). A Systematic Review and Meta-analysis of Neuroimaging in Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) Taking Attention-Deficit Hyperactivity Disorder (ADHD) Into Account. *Neuropsychology Review, 26*(1), 44–72.
<https://doi.org/10.1007/s11065-015-9315-8>

- O'Dwyer, L., Tanner, C., van Dongen, E. V., Greven, C. U., Bralten, J., Zwiers, M. P., Franke, B., Heslenfeld, D., Oosterlaan, J., Hoekstra, P. J., Hartman, C. A., Groen, W., Rommelse, N., & Buitelaar, J. K. (2016). Decreased Left Caudate Volume Is Associated with Increased Severity of Autistic-Like Symptoms in a Cohort of ADHD Patients and Their Unaffected Siblings. *PloS One*, *11*(11), e0165620. <https://doi.org/10.1371/journal.pone.0165620>
- Oades, R. D. (2008). Dopamine-serotonin interactions in attention-deficit hyperactivity disorder (ADHD). *Progress in Brain Research*, *172*, 543–565. [https://doi.org/10.1016/S0079-6123\(08\)00926-6](https://doi.org/10.1016/S0079-6123(08)00926-6)
- Öğütlü, H., Esin, İ. S., Erdem, H. B., Tatar, A., & Dursun, O. B. (2020). Mitochondrial DNA Copy Number is Associated with Attention Deficit Hyperactivity Disorder. *Psychiatria Danubina*, *32*(2), 168–175. <https://doi.org/10.24869/psyd.2020.168>
- Onnink, A. M. H., Zwiers, M. P., Hoogman, M., Mostert, J. C., Dammers, J., Kan, C. C., Vasquez, A. A., Schene, A. H., Buitelaar, J., & Franke, B. (2015). Deviant white matter structure in adults with attention-deficit/hyperactivity disorder points to aberrant myelination and affects neuropsychological performance. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, *63*, 14–22. <https://doi.org/10.1016/j.pnpbp.2015.04.008>
- Ott, J., Wang, J., & Leal, S. M. (2015). Genetic linkage analysis in the age of whole-genome sequencing. *Nature Reviews. Genetics*, *16*(5), 275–284. <https://doi.org/10.1038/nrg3908>
- Pagliaroli, L., Vető, B., Arányi, T., & Barta, C. (2016). From Genetics to Epigenetics: New Perspectives in Tourette Syndrome Research. *Frontiers in Neuroscience*, *10*, 277. <https://doi.org/10.3389/fnins.2016.00277>
- Paris, J., Bhat, V., & Thombs, B. (2015). Is Adult Attention-Deficit Hyperactivity Disorder Being Overdiagnosed? *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, *60*(7), 324–328. <https://doi.org/10.1177/070674371506000705>

- Pérez de los Cobos, J., Siñol, N., Pérez, V., & Trujols, J. (2014). Pharmacological and clinical dilemmas of prescribing in co-morbid adult attention-deficit/hyperactivity disorder and addiction. *British Journal of Clinical Pharmacology*, 77(2), 337–356. <https://doi.org/10.1111/bcp.12045>
- Pineda-Cirera, L., Shivalikanjli, A., Cabana-Domínguez, J., Demontis, D., Rajagopal, V. M., Børglum, A. D., Faraone, S. V., Cormand, B., & Fernández-Castillo, N. (2019). Exploring genetic variation that influences brain methylation in attention-deficit/hyperactivity disorder. *Translational Psychiatry*, 9(1), 242. <https://doi.org/10.1038/s41398-019-0574-7>
- Polanczyk, G. V, Willcutt, E. G., Salum, G. A., Kieling, C., & Rohde, L. A. (2014). ADHD prevalence estimates across three decades: an updated systematic review and meta-regression analysis. *International Journal of Epidemiology*, 43(2), 434–442. <https://doi.org/10.1093/ije/dyt261>
- Polderman, T. J. C., Hoekstra, R. A., Posthuma, D., & Larsson, H. (2014). The co-occurrence of autistic and ADHD dimensions in adults: an etiological study in 17,770 twins. *Translational Psychiatry*, 4(9), e435. <https://doi.org/10.1038/tp.2014.84>
- Polyanska, L., Critchley, H. D., & Rae, C. L. (2017). Centrality of prefrontal and motor preparation cortices to Tourette Syndrome revealed by meta-analysis of task-based neuroimaging studies. *NeuroImage. Clinical*, 16, 257–267. <https://doi.org/10.1016/j.nicl.2017.08.004>
- Pringsheim, T., Hirsch, L., Gardner, D., & Gorman, D. A. (2015). The pharmacological management of oppositional behaviour, conduct problems, and aggression in children and adolescents with attention-deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder: a systematic review and meta-analysis. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, 60(2), 42–51. <https://doi.org/10.1177/070674371506000202>
- Ptacek, R., Stefano, G. B., Weissenberger, S., Akotia, D., Raboch, J., Papezova, H., Domkarova, L., Stepankova, T., & Goetz, M. (2016). Attention deficit

hyperactivity disorder and disordered eating behaviors: links, risks, and challenges faced. *Neuropsychiatric Disease and Treatment*, 12, 571–579.
<https://doi.org/10.2147/NDT.S68763>

Ramtekkar, U. P. (2017). DSM-5 Changes in Attention Deficit Hyperactivity Disorder and Autism Spectrum Disorder: Implications for Comorbid Sleep Issues. *Children (Basel, Switzerland)*, 4(8), 62. <https://doi.org/10.3390/children4080062>

Richard-Lepouriel, H., Etain, B., Hasler, R., Bellivier, F., Gard, S., Kahn, J.-P., Prada, P., Nicastro, R., Ardu, S., Dayer, A., Leboyer, M., Aubry, J.-M., Perroud, N., & Henry, C. (2016). Similarities between emotional dysregulation in adults suffering from ADHD and bipolar patients. *Journal of Affective Disorders*, 198, 230–236.
<https://doi.org/10.1016/j.jad.2016.03.047>

Rivero, O., Selten, M. M., Sich, S., Popp, S., Bacmeister, L., Amendola, E., Negwer, M., Schubert, D., Proft, F., Kiser, D., Schmitt, A. G., Gross, C., Kolk, S. M., Strekalova, T., van den Hove, D., Resink, T. J., Nadif Kasri, N., & Lesch, K. P. (2015). Cadherin-13, a risk gene for ADHD and comorbid disorders, impacts GABAergic function in hippocampus and cognition. *Translational Psychiatry*, 5(10), e655.
<https://doi.org/10.1038/tp.2015.152>

Schäfer, N., Friedrich, M., Jorgensen, M. E., Kollert, S., Koepsell, H., Wischmeyer, E., Lesch, K. P., Geiger, D., & Döring, F. (2018). Functional analysis of a triplet deletion in the gene encoding the sodium glucose transporter 3, a potential risk factor for ADHD. *PLoS ONE*, 13(10), 1–20.
<https://doi.org/10.1371/journal.pone.0205109>

Seideman, M. F., & Seideman, T. A. (2020). A Review of the Current Treatment of Tourette Syndrome. *The Journal of Pediatric Pharmacology and Therapeutics : JPPT : The Official Journal of PPAG*, 25(5), 401–412.
<https://doi.org/10.5863/1551-6776-25.5.401>

Sekaninova, N., Mestanik, M., Mestanikova, A., Hamrakova, A., & Tonhajzerova, I. (2019). Novel approach to evaluate central autonomic regulation in attention deficit/hyperactivity disorder (ADHD). *Physiological Research*, 68(4), 531–545.

<https://doi.org/10.33549/physiolres.934160>

Services, S. A. and M. H. (2016). *DSM-5 Changes: Implications for Child Serious Emotional Disturbance [Internet]*. Rockville (MD): Substance Abuse and Mental Health Services Administration (US).

<https://pubmed.ncbi.nlm.nih.gov/30199184/>

Shaywitz, S., Shaywitz, B., Wietecha, L., Wigal, S., McBurnett, K., Williams, D., Kronenberger, W. G., & Hooper, S. R. (2017). Effect of Atomoxetine Treatment on Reading and Phonological Skills in Children with Dyslexia or Attention-Deficit/Hyperactivity Disorder and Comorbid Dyslexia in a Randomized, Placebo-Controlled Trial. *Journal of Child and Adolescent Psychopharmacology*, 27(1), 19–28. <https://doi.org/10.1089/cap.2015.0189>

Silveri, M. M., Sneider, J. T., Crowley, D. J., Covell, M. J., Acharya, D., Rosso, I. M., & Jensen, J. E. (2013). Frontal lobe γ -aminobutyric acid levels during adolescence: associations with impulsivity and response inhibition. *Biological Psychiatry*, 74(4), 296–304. <https://doi.org/10.1016/j.biopsych.2013.01.033>

Smith, A., Kaufman, F., Sandy, M. S., & Cardenas, A. (2020). Cannabis Exposure During Critical Windows of Development: Epigenetic and Molecular Pathways Implicated in Neuropsychiatric Disease. *Current Environmental Health Reports*, 7(3), 325–342. <https://doi.org/10.1007/s40572-020-00275-4>

Sokolova, E., Oerlemans, A. M., Rommelse, N. N., Groot, P., Hartman, C. A., Glennon, J. C., Claassen, T., Heskes, T., & Buitelaar, J. K. (2017). A Causal and Mediation Analysis of the Comorbidity Between Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD). *Journal of Autism and Developmental Disorders*, 47(6), 1595–1604. <https://doi.org/10.1007/s10803-017-3083-7>

Sterley, T.-L., Howells, F. M., & Russell, V. A. (2013). Evidence for reduced tonic levels of GABA in the hippocampus of an animal model of ADHD, the spontaneously hypertensive rat. *Brain Research*, 1541, 52–60. <https://doi.org/10.1016/j.brainres.2013.10.023>

- Stoodley, C. J. (2016). The Cerebellum and Neurodevelopmental Disorders. *The Cerebellum*, 15(1), 34–37. <https://doi.org/10.1007/s12311-015-0715-3>
- Sudre, G., Choudhuri, S., Szekely, E., Bonner, T., Goduni, E., Sharp, W., & Shaw, P. (2017). Estimating the Heritability of Structural and Functional Brain Connectivity in Families Affected by Attention-Deficit/Hyperactivity Disorder. *JAMA Psychiatry*, 74(1), 76–84. <https://doi.org/10.1001/jamapsychiatry.2016.3072>
- Svatkova, A., Nestrasil, I., Rudser, K., Goldenring Fine, J., Bledsoe, J., & Semrud-Clikeman, M. (2016). Unique white matter microstructural patterns in ADHD presentations-a diffusion tensor imaging study. *Human Brain Mapping*, 37(9), 3323–3336. <https://doi.org/10.1002/hbm.23243>
- Tam, V., Patel, N., Turcotte, M., Bossé, Y., Paré, G., & Meyre, D. (2019). Benefits and limitations of genome-wide association studies. *Nature Reviews. Genetics*, 20(8), 467–484. <https://doi.org/10.1038/s41576-019-0127-1>
- Tamm, L., Denton, C. A., Epstein, J. N., Schatschneider, C., Taylor, H., Arnold, L. E., Bukstein, O., Anixt, J., Koshy, A., Newman, N. C., Maltinsky, J., Brinson, P., Loren, R. E. A., Prasad, M. R., Ewing-Cobbs, L., & Vaughn, A. (2017). Comparing treatments for children with ADHD and word reading difficulties: A randomized clinical trial. *Journal of Consulting and Clinical Psychology*, 85(5), 434–446. <https://doi.org/10.1037/ccp0000170>
- Tan, Z., Robinson, H. L., Yin, D.-M., Liu, Y., Liu, F., Wang, H., Lin, T. W., Xing, G., Gan, L., Xiong, W.-C., & Mei, L. (2018). Dynamic ErbB4 Activity in Hippocampal-Prefrontal Synchrony and Top-Down Attention in Rodents. *Neuron*, 98(2), 380–393.e4. <https://doi.org/10.1016/j.neuron.2018.03.018>
- Tantra, M., Guo, L., Kim, J., Zainolabidin, N., Eulenburg, V., Augustine, G. J., & Chen, A. I. (2018). Conditional deletion of Cadherin 13 perturbs Golgi cells and disrupts social and cognitive behaviors. *Genes, Brain, and Behavior*, 17(6), e12466. <https://doi.org/10.1111/gbb.12466>

- Tong, L., Shi, H., & Li, X. (2017). Associations among ADHD, Abnormal Eating and Overweight in a non-clinical sample of Asian children. *Scientific Reports*, 7(1), 2844. <https://doi.org/10.1038/s41598-017-03074-4>
- Tran, N. Q. V., & Miyake, K. (2017). Neurodevelopmental Disorders and Environmental Toxicants: Epigenetics as an Underlying Mechanism. *International Journal of Genomics*, 2017, 7526592. <https://doi.org/10.1155/2017/7526592>
- Tung, I., Li, J. J., Meza, J. I., Jezior, K. L., Kianmahd, J. S. V., Hentschel, P. G., O'Neil, P. M., & Lee, S. S. (2016). Patterns of Comorbidity Among Girls With ADHD: A Meta-analysis. *Pediatrics*, 138(4), e20160430–e20160430. <https://doi.org/10.1542/peds.2016-0430>
- Van De Glind, G., Brynte, C., Skutle, A., Kaye, S., Konstenius, M., Levin, F., Mathys, F., Demetrovics, Z., Moggi, F., Ramos-Quiroga, J. A., Schellekens, A., Crunelle, C., Dom, G., Van Den Brink, W., & Franck, J. (2020). The International Collaboration on ADHD and Substance Abuse (ICASA): Mission, Results, and Future Activities. *European Addiction Research*, 26(4–5), 173–178. <https://doi.org/10.1159/000508870>
- van Dongen, J., Zilhão, N. R., Sugden, K., BIOS Consortium, Hannon, E. J., Mill, J., Caspi, A., Agnew-Blais, J., Arseneault, L., Corcoran, D. L., Moffitt, T. E., Poulton, R., Franke, B., & Boomsma, D. I. (2019). Epigenome-wide Association Study of Attention-Deficit/Hyperactivity Disorder Symptoms in Adults. *Biological Psychiatry*, 86(8), 599–607. <https://doi.org/10.1016/j.biopsych.2019.02.016>
- van Emmerik-van Oortmerssen, K., Vedel, E., Koeter, M. W., de Bruijn, K., Dekker, J. J. M., van den Brink, W., & Schoevers, R. A. (2013). Investigating the efficacy of integrated cognitive behavioral therapy for adult treatment seeking substance use disorder patients with comorbid ADHD: study protocol of a randomized controlled trial. *BMC Psychiatry*, 13(1), 132. <https://doi.org/10.1186/1471-244X-13-132>
- van Ewijk, H., Bralten, J., van Duin, E. D. A., Hakobjan, M., Buitelaar, J. K., Heslenfeld,

- D. J., Hoekstra, P. J., Hartman, C., Hoogman, M., Oosterlaan, J., & Franke, B. (2017). Female-specific association of NOS1 genotype with white matter microstructure in ADHD patients and controls. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 58(8), 958–966.
<https://doi.org/10.1111/jcpp.12742>
- van Hulzen, K. J. E., Scholz, C. J., Franke, B., Ripke, S., Klein, M., McQuillin, A., Sonuga-Barke, E. J., PGC ADHD Working Group, Kelsoe, J. R., Landén, M., Andreassen, O. A., PGC Bipolar Disorder Working Group, Lesch, K.-P., Weber, H., Faraone, S. V., Arias-Vasquez, A., & Reif, A. (2017). Genetic Overlap Between Attention-Deficit/Hyperactivity Disorder and Bipolar Disorder: Evidence From Genome-wide Association Study Meta-analysis. *Biological Psychiatry*, 82(9), 634–641.
<https://doi.org/10.1016/j.biopsych.2016.08.040>
- Verma, P., Singh, A., Nthenge-Ngumbau, D. N., Rajamma, U., Sinha, S., Mukhopadhyay, K., & Mohanakumar, K. P. (2016). Attention deficit-hyperactivity disorder suffers from mitochondrial dysfunction. *BBA Clinical*, 6, 153–158. <https://doi.org/10.1016/j.bbacli.2016.10.003>
- Villalón-Reina, J. E., Martínez, K., Qu, X., Ching, C. R. K., Nir, T. M., Kothapalli, D., Corbin, C., Sun, D., Lin, A., Forsyth, J. K., Kushan, L., Vajdi, A., Jalbrzikowski, M., Hansen, L., Jonas, R. K., van Amelsvoort, T., Bakker, G., Kates, W. R., Antshel, K. M., ... Bearden, C. E. (2020). Altered white matter microstructure in 22q11.2 deletion syndrome: a multisite diffusion tensor imaging study. *Molecular Psychiatry*, 25(11), 2818–2831. <https://doi.org/10.1038/s41380-019-0450-0>
- Villodas, M. T., Pfiffner, L. J., & McBurnett, K. (2012). Prevention of serious conduct problems in youth with attention deficit/hyperactivity disorder. *Expert Review of Neurotherapeutics*, 12(10), 1253–1263. <https://doi.org/10.1586/ern.12.119>
- Wadsworth, S. J., DeFries, J. C., Willcutt, E. G., Pennington, B. F., & Olson, R. K. (2015). The Colorado Longitudinal Twin Study of Reading Difficulties and ADHD: Etiologies of Comorbidity and Stability. *Twin Research and Human Genetics : The Official Journal of the International Society for Twin Studies*, 18(6), 755–761.

<https://doi.org/10.1017/thg.2015.66>

- Wadsworth, S. J., DeFries, J. C., Willcutt, E. G., Pennington, B. F., & Olson, R. K. (2016). Genetic Etiologies of Comorbidity and Stability for Reading Difficulties and ADHD: A Replication Study. *Twin Research and Human Genetics : The Official Journal of the International Society for Twin Studies*, 19(6), 647–651. <https://doi.org/10.1017/thg.2016.80>
- Wan, L., Li, Y., Zhang, Z., Sun, Z., He, Y., & Li, R. (2018). Methylenetetrahydrofolate reductase and psychiatric diseases. *Translational Psychiatry*, 8(1), 242. <https://doi.org/10.1038/s41398-018-0276-6>
- Wang, T., Zhang, J., & Xu, Y. (2020). Epigenetic Basis of Lead-Induced Neurological Disorders. *International Journal of Environmental Research and Public Health*, 17(13), 4878. <https://doi.org/10.3390/ijerph17134878>
- Weintraub, M. J., Axelson, D. A., Kowatch, R. A., Schneck, C. D., & Miklowitz, D. J. (2019). Comorbid disorders as moderators of response to family interventions among adolescents with bipolar disorder. *Journal of Affective Disorders*, 246, 754–762. <https://doi.org/10.1016/j.jad.2018.12.125>
- Wietecha, L., Williams, D., Shaywitz, S., Shaywitz, B., Hooper, S. R., Wigal, S. B., Dunn, D., & McBurnett, K. (2013). Atomoxetine improved attention in children and adolescents with attention-deficit/hyperactivity disorder and dyslexia in a 16 week, acute, randomized, double-blind trial. *Journal of Child and Adolescent Psychopharmacology*, 23(9), 605–613. <https://doi.org/10.1089/cap.2013.0054>
- Witt, S. T., & Stevens, M. C. (2015). Relationship between white matter microstructure abnormalities and ADHD symptomatology in adolescents. *Psychiatry Research*, 232(2), 168–174. <https://doi.org/10.1016/j.psychresns.2015.02.009>
- Wolraich, M. L., Hagan, J. F., Allan, C., Chan, E., Davison, D., Earls, M., Evans, S. W., Flinn, S. K., Froehlich, T., Frost, J., Holbrook, J. R., Lehmann, C. U., Lessin, H. R., Okechukwu, K., Pierce, K. L., Winner, J. D., & Zurhellen, W. (2019). Clinical

- Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. *Pediatrics*, 144(4), e20192528. <https://doi.org/10.1542/peds.2019-2528>
- Yoncheva, Y. N., Somandepalli, K., Reiss, P. T., Kelly, C., Di Martino, A., Lazar, M., Zhou, J., Milham, M. P., & Castellanos, F. X. (2016). Mode of Anisotropy Reveals Global Diffusion Alterations in Attention-Deficit/Hyperactivity Disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 55(2), 137–145. <https://doi.org/10.1016/j.jaac.2015.11.011>
- Yu, C., & Gopalakrishnan, G. (2018). In vitro pharmacological characterization of SPN-810M (molindone). *Journal of Experimental Pharmacology*, 10, 65–73. <https://doi.org/10.2147/JEP.S180777>
- Zayats, T., Jacobsen, K. K., Kleppe, R., Jacob, C. P., Kittel-Schneider, S., Ribasés, M., Ramos-Quiroga, J. A., Richarte, V., Casas, M., Mota, N. R., Grevet, E. H., Klein, M., Corominas, J., Bralten, J., Galesloot, T., Vasquez, A. A., Herms, S., Forstner, A. J., Larsson, H., ... Johansson, S. (2016). Exome chip analyses in adult attention deficit hyperactivity disorder. *Translational Psychiatry*, 6(10), e923. <https://doi.org/10.1038/tp.2016.196>
- Zhan, C., Liu, Y., Wu, K., Gao, Y., & Li, X. (2017). Structural and Functional Abnormalities in Children with Attention-Deficit/Hyperactivity Disorder: A Focus on Subgenual Anterior Cingulate Cortex. *Brain Connectivity*, 7(2), 106–114. <https://doi.org/10.1089/brain.2016.0444>
- Zhao, Y., Liang, X., Zhu, F., Wen, Y., Xu, J., Yang, J., Ding, M., Cheng, B., Ma, M., Zhang, L., Cheng, S., Wu, C., Wang, S., Wang, X., Ning, Y., Guo, X., & Zhang, F. (2018). A large-scale integrative analysis of GWAS and common meQTLs across whole life course identifies genes, pathways and tissue/cell types for three major psychiatric disorders. *Neuroscience and Biobehavioral Reviews*, 95, 347–352. <https://doi.org/10.1016/j.neubiorev.2018.10.005>
- Zulauf, C. A., Sprich, S. E., Safren, S. A., & Wilens, T. E. (2014). The complicated relationship between attention deficit/hyperactivity disorder and substance use

disorders. *Current Psychiatry Reports*, 16(3), 436.
<https://doi.org/10.1007/s11920-013-0436-6>