

**‘Specialization in ICTs and Special Education: Psychopedagogy of Integration’
Postgraduate Program Studies
DEMOKRITUS UNIVERSITY OF THRACE Department of Hellenic Philology
in collaboration with
NCSR DEMOKRITOS Informatics and Telecommunications Institute**

**WORKING MEMORY AND ATTENTION IN RELATION TO ICTs AND
OTHER FACTORS - ADHD**

ZAVITSANOU AGGELIKI - MARIA

POSTGRADUATE
THESIS

SUPERVISOR – COMMITTEE

1. Αθανάσιος Δρίγκας
Ερευνητής Α' Βαθμίδας Ι.Π.&Τ. ΔΗΜΟΚΡΙΤΟΣ
2. Ζωή Καραμπατζάκη
Συνεργαζόμενη Ερευνήτρια, Ι.Π.&Τ. ΔΗΜΟΚΡΙΤΟΣ
3. Διονύσιος Λουκέρης
Συνεργαζόμενος Ερευνητής, Ι.Π.&Τ. ΔΗΜΟΚΡΙΤΟΣ

KOMOTINI / ATHENS 2018

ABSTRACT

Working memory and attention are considered basic cognitive functions. Deficits in them create problems and affect everyday life. The Attention Deficit Hyperactivity Disorder (ADHD) is related to these cognitive skills. There are several studies that mention the importance of enhancing memory and attention. This research has been based on articles in scientific journals to explore some factors that have a positive or negative effect on memory, attention and ADHD. The results have shown that Information and Communication Technologies (ICT), environmental factors, nutrition, hormones, neurotransmitters and alternative techniques are directly related to memory and attention. Thus, we have come to the conclusion that we can intervene in the deficits of cognitive functions through the above factors.

References

- Adolfsson, P., Lindstedt, H., Pettersson, I., Hermansson, L. & Janeslätt, G. (2014). Perception of the influence of environmental factors in the use of electronic planning devices in adults with cognitive disabilities. *Disability and Rehabilitation: Assistive Technology*, 11(6), 493-500. doi:10.3109/17483107.2014.989418.
- American Psychiatric Association. (2013). *The Diagnostic and statistical manual of mental disorders, text revision*. Washington, D.C.: American Psychiatric Association.
- Archer, T. & Kostrzewa, R. (2011). Physical Exercise Alleviates ADHD Symptoms: Regional Deficits and Development Trajectory. *Neurotox Res*, 21(2), 195-209. doi: 10.1007/s12640-011-9260-0.
- Arnold, E., Hurt, E. & Lofthouse, N. (2013). Attention-Deficit/Hyperactivity Disorder: Dietary and Nutritional Treatments. *Child Adolesc Psychiatric Clin N Am*, 22(3), 381-402. doi:org/10.1016/j.chc.2013.03.001.
- Awh, E., Vogel, E., Oh, S. (2006). Interactions between attention and working memory. *Neuroscience*, 139(1), 201-208. doi: 10.1016/j.neuroscience.2005.08.023.
- Baddeley, A. (2000). The episodic buffer: a new component of working memory? Send to *Trends Cogn Sci*, 4(11), 417-423. doi:org/10.1016/S1364-6613(00)01538-2.
- Bala, K., Doğan, M., Kaba, S., Mutluer, T., Aslan, O., Doğan, S. (2016). Hormone disorder and vitamin deficiency in attention deficit hyperactivity disorder (ADHD) and autism spectrum disorders (ASDs). *J Pediatr Endocrinol Metab*, 29(9), 1077-1082. doi:10.1515/jpem-2015-0473.
- Banerjee, D., Middleton, F. & Faraone S. (2007). Environmental risk factors for attention-deficit hyperactivity disorder. *Acta Paediatr*, 96(9), 1269-1274. doi: 10.1111/j.1651-2227.2007.00430.x.

- Barzegary, L., Zamini, S. (2011). The effect of play therapy on children with ADHD. *Procedia - Social and Behavioral Sciences*, 30(2011), 2216 – 2218. doi:10.1016/j.sbspro.2011.10.432.
- Bavelier, D. & Davidson, R. J. (2013). Brain training: Games to do you good. *Nature*, 494(7438), 425-426. doi: 10.1038/494425a.
- Bernstein, B. (1990). Vitamin B, in Clinical Neurology. *Annals of the New York Academy of Sciences*, 585(1), 250-260. doi:org/10.1111/j.1749-6632.1990.tb28058.x.
- Bhat, V., Joobar, R. & Sengupta, S. (2017). How Environmental Factors Can Get Under the Skin: Epigenetics in Attention-Deficit/Hyperactivity Disorder. *J Am Acad Child Adolesc Psychiatry*, 56(4), 278-280. doi: 10.1016/j.jaac.
- Biederman, J. (2005). Attention-Deficit/Hyperactivity Disorder: A Selective Overview. *Biol Psychiatry*, 57(11), 1215-1220. doi: 10.1016/j.biopsych.2004.10.020.
- Bikic, A., Christensen, T., Leckman, J. F., Bilenberg N. & Dalsgaard, S. (2017). A double-blind randomized pilot trial comparing computerized cognitive exercises to Tetris in adolescents with attention-deficit/hyperactivity disorder. *Nordic Journal of Psychiatry*, 71(6), 455-464, doi:10.1080/08039488.2017.1328070.
- Blacker, K. J. & Curby, K. M. (2004). Effects of Action Video Game Training on Visual Working Memory. *Journal of Experimental Psychology: Human Perception and Performance*, 40(5), 1992-2004. doi:http://dx.doi.org/10.1037/a0037556.supp.
- Bornstein, R., Baker, G., Carroll, A., King, G., Wong, J., Douglass, A. (1990). Plasma Amino Acids in Attention Deficit Disorder. *Psychiatry Res*, 33(3), 301-6.
- Bouchard, M., Laforest, F., Vandelac, L., Bellinger, D. & Mergle, D. (2007). Hair Manganese and Hyperactive Behaviors: Pilot Study of School-Age Children Exposed through Tap Water. *Environ Health Perspect*, 115(1), 122-127. doi: 10.1289/ehp.9504.

- Braun, J., Kahn, R., Froehlich, T., Auinger, P. & Lanphear, B. (2006). Exposures to Environmental Toxicants and Attention Deficit Hyperactivity Disorder in U.S. Children. *Environmental Health Perspectives*, 114(12), 1904–1909. doi:10.1289/ehp.9478.
- Caglio, M., Latini-Corazzini, L., D'agata, F., Cauda, F., Sacco, K., Monteverdi, S., Zettin, M., Duca, S. & Geminiani, G. (2009). Video game play changes spatial and verbal memory: rehabilitation of a single case with traumatic brain injury. *Cogn Process*, 10(2), 195-197. doi: 10.1007/s10339-009-0295-6.
- Cerrillo-Urbina, A., García-Hermoso, A., Sánchez-López, M., Pardo-Guijarro, M., Santos Gómez, J. & Martínez-Vizcaíno, V. (2015). The effects of physical exercise in children with attention deficit hyperactivity disorder: a systematic review and meta-analysis of randomized control trials. *Child Care Health*, 41(6), 779-788. doi: 10.1111/cch.12255.
- Chou, C. & Huang, C. (2016). Effects of an 8-week yoga program on sustained attention and discrimination function in children with attention deficit hyperactivity disorder. *PeerJ*, 5(2017). doi: 10.7717/peerj.2883.
- Comings, D., Gade-Andavolu, R., Gonzalez, N., Wu, S., Muhleman, D., Blake, H., Dietz, G., Saucier, G., MacMurray, J. (2000). Comparison of the role of dopamine, serotonin, and noradrenaline genes in ADHD, ODD and conduct disorder: multivariate regression analysis of 20 genes. *Clin Genet*, 57(3), 178-196.
- Cruchet, S., Lucero, Y. & Cornejo, V. (2016). Truths, Myths and Needs of Special Diets: Attention-Deficit/Hyperactivity Disorder, Autism, Non-Celiac Gluten Sensitivity, and Vegetarianism. *Ann Nutr Metab*, 68(1), 43-50. doi:10.1159/000445393.
- Den Heijer, A., Groen, Y., Tucha, L., Fuermaier, A., Koerts, J., Lange, K., Thome, J. & Tucha, O. (2016). Sweat it out? The effects of physical exercise on cognition & behavior in ADHD. A systematic literature. *J Neural Transm*, 124(1), 3-26. doi: 10.1007/s00702-016-1593-7.
- Drigas, A., Dourou, A. (2017). A Review on ICT Based Applications for Intervention and Assistance of People with Memory Deficits. *International Journal of Emerging Technologies in*

Learning, 8(5), 47-49. Ανακτήθηκε στις 10.03.2018 από <http://online-journals.org/index.php/i-jet/article/viewFile/3009/2832>.

Drigas, A. & Ioannidou, E. (2013). Special education and ICTs. *International Journal of Emerging Technologies in Learning*, 8(2), 41-47. doi:org/10.3991/ijet.v8i2.2514.

Drigas, A., Ioannidou, R. E., Kokkalia, G. & Lytras, M. (2014). ICTs, Mobile Learning and Social Media to Enhance Learning for Attention Difficulties. *Journal of Universal Computer Science*, 20(10), 1499-1510. doi:10.3217/jucs-020-10-1499.

Drigas, A. & Karyotaki, M. (2014). Learning Tools and Applications for Cognitive Improvement, *IJEP*, 4(3). 71-77. doi:http://dx.doi.org/10.3991/ijep.v4i3.3665.

Drigas, A. & Kokkalia, G. (2014). ICTs and Special Education in Kindergarten. *International Journal of Emerging Technologies in Learning*, 9(4), 35-42. doi:10.3991/ijet.v9i4.3662.

Drigas, A. & Kokkalia, G. (2014). ICTs in Kindergarten. *International Journal of Emerging Technologies in Learning*, 9(2), 52-58. doi:10.3991/ijet.v9i2.3278.

Drigas, A. & Tourimpampa, A. (2014). Processes and ICT Tools for ADHD Assessment, Intervention and Attention Training. *International Journal of Emerging Technologies in Learning*, 9(6), 20-15. doi:org/10.3991/ijet.v9i6.4001.

Du Prel Carroll, X., Yi, H., Liang, Y., Pang, K., Leeper-Woodford, S., Riccardi, P. & Liang, X. (2012). Family-Environmental Factors Associated with Attention Deficit Hyperactivity Disorder in Chinese Children: A Case-Control Study. *PLoS One*, 7(11), 1-7. doi: 10.1371/journal.pone.0050543.

Eubig, P. A., Aguiar, A. & Schantz, S. L. (2010). Lead and PCBs as Risk Factors for Attention Deficit/Hyperactivity Disorder. *Environmental Health Perspectives*, 118(12), 1654-1667. doi:10.1289/ehp.0901852.

- Evans, S., Ling, M., Hill, B., Rinehart, N., Austin, D. & Sciberras, E. (2017). Systematic review of meditation-based interventions for children with ADHD. *Eur Child Adolesc Psychiatry*, 27(1), 9-27. doi: 10.1007/s00787-017-1008-9.
- Field, T. (2012). Exercise research on children and adolescents. *Complement Ther Clin Pract*, 18(1), 54-9. doi: 10.1016/j.ctcp.2011.04.002.
- Fluegge, K. & Fluegge, K. (2018). Environmental factors influencing the link between childhood ADHD and risk of adult coronary artery disease. *Med Hypotheses*, 110, 83-85. doi: 10.1016/j.mehy.2017.11.007.
- Fovet, F. (2007). Using Distance Learning Electronic Tools within the Class to Engage ADHD Students: a Key to Inclusion? *IEEE*, 15-20. doi: 10.1109/FIE.2007.4417842.
- Frøehlich, T. E., Anixt, J. S., Loe, I. M., Chirdkiatgumchai, V., Kuan, L. & Gilman, R. C. (2011). Update on Environmental Risk Factors for Attention-Deficit/Hyperactivity Disorder. *Curr Psychiatry Rep*, 13(5). 333-334. doi:10.1007/s11920-011-0221-3.
- Frutos-Pascual, M. & Zapirain, B. G. (2014). Guided Crossword-Puzzle Games aimed at Children with Attentional Deficit: Preliminary Results. *IEEE*. 1-4. doi: 10.1109/CGames.2014.6934137.
- Fujiwara, C., Filho, R., Aderaldo, C. & Chaves, D. (2017). The Internet of Things as a Helping Tool in the Daily Life of Adult Patients with ADHD. *IEEE Global Communications Conference*. doi:10.1109/GLOCOM.2017.8254442.
- Games for the brain. (n.d). Ανακτήθηκε στις 20.03.2018 από <https://www.gamesforthebrain.com/>.
- Garcia, L., Nussbaum, M. & Preiss, D. (2011). Is the use of information and communication technology related to performance in working memory tasks? Evidence from seventh-grade students. *Elsevier*, 57(3), 2068-2076. doi:10.1016/j.compedu.2011.05.009.

- Germano, M., Meleleo, D., Montorfano, G., Adorni, L., Negroni, M., Berra, B., Rizzo, A. (2006). Plasma, red blood cells phospholipids and clinical evaluation after long chain omega-3 supplementation in children with attention deficit hyperactivity disorder (ADHD). *Nutr Neurosci*, 10(1-2), 1-9. doi: 10.1080/10284150601153801.
- Gleich, T., Lorenz, R. C., Gallinat J. & Kühn, S. (2017). Functional changes in the reward circuit in response to gaming-related cues after training with a commercial video game. *Elsevier*, 152(2017), 467–475, doi:10.1016/j.neuroimage.2017.03.032.
- Grabbe, J. (2011). Sudoku and Working Memory Performance for Older Adults. *Activities Adaptation & Aging*, 35(3), 241-254. doi:org/10.1080/01924788.2011.596748.
- Gronlund, E., Renck, B. & Weibul, J. (2005). Dance & Movement Therapy as an Alternative Treatment for Young Boys Diagnosed as ADHD. A pilot study. *American Journal of Dance Therapy*, 27(2), 63–85. doi: 10.1007/s10465-005-9000-1.
- Guía, E., Lozano, M. & Penichet, V. (2015). Educational games based on distributed and tangible user interfaces to stimulate cognitive abilities in children with ADHD. , *British Journal of Educational Technology*, 46(3), 664–678. doi:10.1111/bjet.12165.
- Hariprasad, V.R., Arasappa, R., Varambally, S., Srinath, S. & Gangadhar, B. N. (2013). Feasibility and efficacy of yoga as an add-on intervention in attention deficit-hyperactivity disorder: An exploratory study. *Indian Journal of Psychiatry*, 55(3), 379-384. doi:10.4103/0019-5545.116317.
- Hill, D. A., (2013). *Perceptions of Using Web 2.0 Tools for Students with ADHD or the Tendencies of ADHD*. A Master's Research Project Presented to The Faculty of the Patton College of Education Ohio University.
- Jackson, N. (2003). A Survey of Music Therapy Methods and Their Role in the Treatment of Early Elementary School Children with ADHD. *J Music Ther*, 40(4), 302-323. doi: 10.1093/jmt/40.4.302.

- Jensen, P. & Kenny, D. (2004). The effects of yoga on attention & behavior of boys with ADHD. *J Atten Disord*, 7(4), 205-216. doi: 10.1177/108705470400700403.
- Johansen, E., Aase, H., Meyer, A. & Sagvolden, T. (2002). Attention-deficit/hyperactivity disorder (ADHD) behavior explained by dysfunctioning reinforcement and extinction processes. *Behavioural Brain Research*, 130(1-2), 37-45.
- Johnston, C. & Mash, E. (2001). Families of Children With Attention-Deficit/Hyperactivity Disorder: Review and Recommendations for Future Research. *Clin Child Fam Psychol Rev*. 4(3), 183-207. doi: 10.1023/A:1017592030434.
- Johnstone, S. (2013). Computer Gaming and ADHD: Potential Positive Influences on Behavior. *IEEE Technology and Society Magazine*, 32(1), 20-22. Ανακτήθηκε στις 15.03.2018 από <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=6479437>.
- Jones, T., Borg, W., Boulware, S., McCarthy, G., Sherwin, R. & Tamborlane, W. (1995). Enhanced adrenomedullary response and increased susceptibility to neuroglycopenia: Mechanisms underlying the adverse effects of sugar ingestion in healthy children. *The Journal of Pediatrics*, 126(2), 171-7.
- Kang, K., Choi, J., Kang, S. & Han, D. (2011). Sports Therapy for Attention, Cognitions and Sociality. *Int J Sports Med*, 32(12), 953-9. doi: 10.1055/s-0031-1283175.
- Karpouzis, F., Pollard, H. & Bonello, R. (2009). A randomised controlled trial of the Neuro Emotional Technique (NET) for childhood Attention Deficit Hyperactivity Disorder (ADHD): a protocol. *Trials*, 10(6), 1-11. doi: 10.1186/1745-6215-10-6.
- Kaura, K., Simond, A., Chauhana, V. & Chauhana, A. (2015). Effect of bisphenol A on *Drosophila melanogaster* behavior. A new model for the studies on neurodevelopmental disorders. *Behav Brain Res*, 284, 77-84. doi:org/10.1016/j.bbr.2015.02.001.
- Kiluk, B., Weden, S., Culotta, V. (2009). Sport Participation and Anxiety in Children With ADHD. *J Atten Disord*, 12(6), 499-506. doi: 10.1177/1087054708320400.

- Kim, Y. & Chang, H. (2011). Correlation between attention deficit hyperactivity disorder and sugar consumption, quality of diet, and dietary behavior in school children. *Nutrition Research and Practice*, 5(3). 236-245. doi:10.4162/nrp.2011.5.3.236.
- Kokkalia, G. & Drigas, A. (2015). Working Memory and ADHD in Preschool Education. The Role of ICT'S as a Diagnostic and Intervention Tool: An Overview. *International Journal of Emerging Technologies in Learning*, 10(5), 4-9. doi:org/10.3991/ijet.v10i5.4359.
- Krisanaprakornkit, T., Ngamjarus, C., Witoonchart C. & Piyavhatkul, N. (2010). Meditation therapies for attention-deficit/hyperactivity disorder (ADHD) (Protocol). *Cochrane Database Syst Rev*, 6. doi: 10.1002/14651858.CD006507.
- Kroesbergen, E., van' t Noordende, J. & Kolkman, M. (2012). Training working memory in kindergarten children: Effects on working memory and early numeracy. *Child Neuropsychol*, 20(1), 23-37. doi: 10.1080/09297049.2012.736483.
- Kuppili, P., Pattanayak, R., Sagar, R., Mehta, M. & Vivekanandhan, S. (2017). Thyroid and Cortisol hormones in Attention Deficit Hyperactivity Disorder : A casecontrol study. *Asian J Psychiatr*, 28, 73-77. doi: 10.1016/j.ajp.2017.03.005.
- Lange, K. (2007). Dietary factors in the etiology and therapy of attention deficit/hyperactivity disorder. *Curr Opin Clin Nutr Metab Care*, 20(6), 464-469. doi: 10.1097/MCO.0000000000000415.
- Lee, S., Lee, C.M. & Park, J.H. (2015). Effects of combined exercise on physical fitness and neurotransmitters in children with ADHD: a pilot randomized controlled study. *J Phys Ther Sci*, 27(9), 2915-2919. doi: 10.1589/jpts.27.2915.
- Lee Blunden, S., Milte, C. & Sinn, N. (2011). Diet and sleep in children with ADHD: Preliminary data in Australian children. *Journal of Child Health Care*, 15(1), 14–24. doi: 10.1177/1367493510385020.

- Liu, L., Yang, J., Lei, G., Wang, G., Wang, Y. & Sun, R. (2007). Atomoxetine Increases Histamine Release and Improves Learning Deficits in an Animal Model of Attention-Deficit Hyperactivity Disorder: The Spontaneously Hypertensive Rat. *Basic Clin Pharmacol Toxicol*, 102(6), 527-32. doi: 10.1111/j.1742-7843.2008.00230.x.
- Liu, W., Huo, X., Liu, D., Zeng, X., Zhang, Y. & Xu, X. (2014). S100 in heavy metal related child attention – deficit hyperactivity disorder in an informal e – waste recycling areas. *Neurotoxicology*, 45, 185-191. doi: 10.1016/j.neuro.2014.10.013.
- Lyon, M., Kapoor, M., Juneja, L. (2011). The effects of L-theanine (Suntheanine) on objective sleep quality in boys with attention deficit hyperactivity disorder (ADHD): A randomized, double-blind, placebo-controlled clinical trial. *Altern Med Rev*, 16(4), 348-54.
- Macedoni-Lukšič, M., Gosar, D., Bjørklund, G., Oražem, J., Kodrič, J., Lešnik-Musek, P., Zupančič, M., France-Štiglic, A., Sešek-Briški, A., Neubauer, D. & Osredkar, J. (2015). Levels of Metals in the Blood and specific porphyrins in the urine in children with Autism Spectrum Disorders. *Biological Trace Element Research*, 163(1-2), 2-10. doi: 10.1007/s12011-014-0121-6.
- Mahone, M. (2010). Why fewer females than males are diagnosed with attentiondeficit–hyperactivity disorder it might not be hormones. *Developmental Medicine & Child Neurology*, 52, 788–793. doi: 10.1111/j.1469-8749.2010.03709.x.
- Malchiodi, C. (2011). Handbook of Art Therapy. New York, London. The Guilford Press.
- Mautone J. A., DuPaul G. J. & Jitendra A. K. (2005). The Effects of Computer-Assisted Instruction on the Mathematics Performance and Classroom Behavior of Children With ADHD. *Journal of Attention Disorders*, 9(1), 301-312. doi: 10.1177/1087054705278832.
- Millichap, G. & Yee, M. (2012). The Diet Factor in Attention-Deficit/Hyperactivity Disorder. *Pediatrics*. 129(2):330-337. doi: 10.1542/peds.2011-2199.

- Miranda, A., Presentación, J.M. (2000). Efficacy of Cognitive-Behavioral therapy in the treatment of children with adhd, with and without aggressiveness. *Psychology in the Schools*, 37(2), 169-182. doi:org/10.1002/(SICI)1520-6807(200003)37:2<169::AID-PITS8>3.0.CO;2-8.
- Miyazaki, C., Koyama, M., Ota, E., Swa, T., Mlunde, L., Amiya, R. et al (2017). Allergic diseases in children with attention deficit hyperactivity disorder: a systematic review and meta-analysis. *BMC Psychiatry*, 17(120), 1-12. doi:10.1186/s12888-017-1281-7.
- Niederhofer, H. & Pittschieler, K. (2006). A Preliminary Investigation of ADHD Symptoms in Persons With Celiac Disease. *Journal of Attention Disorders*, 10(2), 200-204. doi: 10.1177/1087054706292109.
- Päkkilä, F., Männistö, T., Pouta, A., Hartikainen, A.L., Aimo Ruokonen, A., Surcel, H.M., Bloigu, A., Vääräsmäki, M., Järvelin, M.R., Moilanen, I. & Suvanto, E. (2013). The Impact of Gestational Thyroid Hormone Concentrations on ADHD Symptoms of the Child. *J Clin Endocrinol Metab*, 99(1), 1-8. doi: 10.1210/jc.2013-2943.
- Papanastasiou, G. & Drigas, A. (2014). Interactive White Boards' Added Value in Special Education. *International Journal of Online Engineering*, 10(6), 58-62, doi:org/10.3991/ijoe.v10i6.4004.
- Park, Y. Y. & Choi, Y. J. (2017). Effects of interactive metronome training on timing, attention, working memory, and processing speed in children with ADHD: a case study of two children. *J Phys Ther Sci*, 29(12), 2165-2167. doi: 10.1589/jpts.29.2165.
- Patrick, R. & Ames, B. (2015). Vitamin D and the omega-3 fatty acids control serotonin synthesis and action, part 2: relevance for ADHD, bipolar, schizophrenia, and impulsive behavior. *The FASEB Journal*, 29(6). 2207-2222. doi:10.1096/fj.14-268342.
- Peper, E. (2015). Allergies, asthma, ADHD: Is it the food we eat? *Western Edition*, 10, 1-5.
- Ανακτήθηκε στις 25.03.2018 από [https://www.researchgate.net/publication/277019795 Allergies asthma ADHD Is it the food we eat](https://www.researchgate.net/publication/277019795_Allergies_asthma_ADHD_Is_it_the_food_we_eat).

- Polańska, K., Jurewicz, J. & Hanke, W. (2012). Exposure to environmental and lifestyle factors and attention-deficit / hyperactivity disorder in children – a review of epidemiological studies. *International Journal of Occupational Medicine and Environmental Health*, 25(4), 330-355. doi:10.2478/S13382-012-0048-0.
- Rauch, S. & Lanphear, B. (2012). Prevention of Disability in Children: Elevating the Role of Environment. *The future of children*, 22(1). 193-217. doi:org/10.1353/foc.2012.0006.
- Ray, D., Schottelkorb, A. & Tsai, M-H. (2007). Play Therapy With Children Exhibiting Symptoms of Attention Deficit Hyperactivity Disorder. *International Journal of Play Therapy*, 16(2), 95–111. doi: 10.1037/1555-6824.16.2.95.
- Rijlaarsdam, J., Cecil, C., Walton, E., Mesirow, M., Relton, C., Gaunt, T., McArdle, W. & Barker, E. (2017). Prenatal unhealthy diet, insulin-like growth factor 2 gene (IGF2) methylation, and attention deficit hyperactivity disorder symptoms in youth with earlyonset conduct problems. *J Child Psychol Psychiatry*, 58(1), 19-27. doi: 10.1111/jcpp.12589.
- Ritz, B. & Lord, R. (2005). Case study: the effectiveness of a dietary supplement regimen in reducing IgG-mediated food sensitivity in ADHD. *Alternative Therapies*, 11(3). 72-75.
- Roodenrys, S., Koloski, N. & Grainger, J. (2001). Working memory function in attention deficit hyperactivity disorder and reading disabled children, *British Journal of Developmental Psychology*, 19, 325–337. doi:org/10.1348/026151001166128.
- Rodríguez-Barranco, M., Lacasaña, M., Aguilar-Garduño, C., Alguacil, J., Gil, F., González-Alzaga, B. & Rojas-García, A. (2013). Association of arsenic, cadmium and manganese exposure with neurodevelopment and behavioural disorders in children: A systematic review and meta-analysis. *Sci Total Environ*, 454(455), 562-577. doi: 10.1016/j.scitotenv.2013.03.047.
- Schettler, T. (2001). Toxic Threats to Neurologic Development of Children. *Environmental Health Perspectives*. 109(6), 813–816. Ανακτήθηκε στις 20.03.2018 από <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1240616/pdf/ehp109s-000813.pdf>.

- Schnoll, R., Burshteyv, D. & Cea-Aravena, J. (2003). Nutrition in the Treatment of Attention-Deficit Hyperactivity Disorder: Neglected but Important Aspect. *Appl Psychophysiol Biofeedback*, 28(1), 63-75. doi: 10.1023/A:1022321017467.
- Schweizera, K. & Moosbrugger, H. (2004). Attention and working memory as predictors of intelligence. *Intelligence*, 32 (4), 329-347. doi: 10.1016/j.intell.2004.06.006.
- Sharma, A., Gerbarg, P., Brown, R. (2015). Non-Pharmacological Treatments for ADHD in Youth. *Adolesc Psychiatry (Hilversum)*, 5(2), 84-95. doi: 10.2174/221067660502150430154937.
- Smitheman-Brown, V. & Church, R. (2013). Mandala Drawing: Facilitating Creative Growth in Children with ADD or ADHD. *Journal of the American Art Therapy Association*. 13(4). 252-260. doi:org/10.1080/07421656.1996.10759233.
- Stevens, L., Kuczek, T., Burgess, J., Hurt, E. & Arnold, E. (2011). Dietary Sensitivities and ADHD Symptoms: Thirty-five Years of Research. *Clinical Pediatrics*, 50(4), 279-293. doi: 10.1177/0009922810384728.
- Stevens, L., Kuczek, T., Burgess, J., Stochelski, M., Arnold, E. & Galland, L. (2013). Mechanisms of behavioral, atopic, and other reactions to artificial food colors in children. *Nutrition Reviews*, 71(5), 268–281. doi:10.1111/nure.12023.
- Stevenson, J., Sonuga-Barke, E., McCann, D., Grimshaw, K., Parker, K., Rose-Zerilli, M., Holloway, J. & Warner, J.(2010). The Role of Histamine Degradation Gene Polymorphisms in Moderating the Effects of Food Additives on Children’s ADHD Symptoms. *Am J Psychiatry*, 167(9), 1108-1115. doi: 10.1176/appi.ajp.2010.09101529.
- Swanson, J.M., Kinsbourne, M., Nigg, J., Lanphear, B., Stefanatos, G.A., Volkow, N., Taylor, E., Casey, B.J, Castellanos, F.X. & Wadhwani, P.D. (2007). Etiologic Subtypes of Attention-Deficit/Hyperactivity Disorder: Brain Imaging, Molecular Genetic and Environmental Factors and the Dopamine Hypothesis. *Neuropsychol Rev*, 17(1), 39-59. doi:10.1007/s11065-007-9019-9.

- Szkup-Jabłońska, M., Karakiewicz, B., Grochans, E., Jurczak, A., Nowak-Starz, G., Rotter, I. & Prokopowicz, A. (2012). Effects of blood lead and cadmium levels on the functioning of children with behavior disorders in the family environment. *Annals of Agricultural and Environmental Medicine*, 19(2), 241-246. Ανακτήθηκε 20.03.2018 από <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.agro-97b6d8c7-01e1-44a6-8a1a-9fcfb5a44f6>.
- Tang, Y.Y. & Tang, R. (2015). Mindfulness Meditation — A New Preventive Intervention for ADHD, *Intech open science*. 294-301. doi: 10.5772/61213.
- Thompson, J., Waldie, K., Wall, C., Murphy, R. & Mitchell, E. (2014). Associations between Acetaminophen Use during Pregnancy and ADHD Symptoms Measured at Ages 7 and 11 Years. *PLoS One*, 9(9), 1-6. doi:10.1371/journal.pone.0108210.
- Torres-Vega, A., Pliego-Rivero, B., Otero-Ojeda, G., Gómez-Oliván, L. & Vieyra-Reyes, P. (2012). Limbic system pathologies associated with deficiencies and excesses of the trace elements iron, zinc, copper, and selenium. *Nutr Rev*, 70(12), 679-92. doi: 10.1111/j.1753-4887.2012.00521.x.
- Tran, N.Q.V. & Miyake, K. (2017). Neurodevelopmental Disorders and Environmental Toxicants: Epigenetics as an Underlying Mechanism. *International Journal of Genomics*, 2017, 1-23. doi: 10.1155/2017/7526592.doi:org/10.1155/2017/7526592.
- Van den Bergh, B. & Marcoen, A. (2004). High antenatal maternal anxiety is related to ADHD symptoms, externalizing problems, and anxiety in 8- and 9-year-olds. *Child Dev*, 75(4), 1085-1097. doi: 10.1111/j.1467-8624.2004.00727.x.
- Vassilopoulou, A. & Mavrikaki, R. E. (2016). Can ICT in biology courses improve AD/HD students' achievement? *Sage Journals*, 19(3), 246-257. doi:10.1177/1365480216647144.

Ιστοσελίδες:

Chinese Checkers. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/chinesecheckers/>.

Counterfeit. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/counterfeit/>.

Colored Lines. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/colorlines/>.

Dragger. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/dragger/>.

Δρίγκας, Α. (2016). ΤΠΕ στην Προσχολική Αγωγή και την Πρωτοσχολική Αγωγή. Βασικός Στόχος και Δράσεις για τα Α.Μ.Ε.Α. [Image]. Ανακτήθηκε από Ε.Κ.Ε.Φ.Ε. «ΔΗΜΟΚΡΙΤΟΣ» Ινστιτούτο Πληροφορικής & Τηλεπικοινωνιών - Net Media Lab Online: <https://eclass.duth.gr/modules/document/?course=KOM04380>.

Four vital nutrients to keep your brain healthy. [Image]. Ανακτήθηκε στις 20.04.2018 από https://oxl.s3.amazonaws.com/wpcontent/uploads/2016/06/20140555/OmegaXL_brainhealth2.png.

Mastercards. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/mastercards/>.

Mastermind. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/mastermind/>.

MineHunter. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/minehunter/https://www.gamesforthebrain.com/game/numberhunt/>.

MineHunter. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/minehunter/>.

Μοντέλο της εργαζόμενης μνήμης των Baddeley και Hitch (1974). [Image]. Ανακτήθηκε στις 20.04.2018 από <https://image.slideserve.com/679699/the-working-memory-model-baddeley-and-hitch-1974-n.jpg>.

Μοντέλο της εργαζόμενης μνήμης του Baddeley (2000). [Image]. Ανακτήθηκε στις 20.04.2018 από <https://upload.wikimedia.org/wikipedia/commons/a/ae/Working-memory-en.svg>.

Num6erHunt. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/numberhunt/>.

Neurotransmitters. [Image]. Ανακτήθηκε στις 20.04.2018 από https://study.com/cimages/videopreview/arousal-in-psychology-definition_177765.jpg.

Oooze. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/oooze/>.

Rotate. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/rotate/>.

TwinCol. [Image]. Ανακτήθηκε στις 25.04.2018 από <https://www.gamesforthebrain.com/game/twincol/>.

Your brain loves the gym. [Image]. Ανακτήθηκε στις 20.04.2018 από <https://www.ahealthblog.com/ball-exercise-chart-1.html>.