**Supplementary Material**

# Treatment efficacy and clinical effectiveness of EEG neurofeedback as a personalized and multimodal treatment in ADHD: a critical review

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**Table S-1:** Excluded studies, with reasons (chronological order).

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| **Excluded Articles** | **Reasons for exclusion** |
| Ogrim G, Kropotov JD. Event Related Potentials (ERPs) and other EEG Based Methods for Extracting Biomarkers of Brain Dysfunction: Examples from Pediatric Attention Deficit/Hyperactivity Disorder (ADHD). J Vis Exp. 2020 Mar 12;(157).doi: 10.3791/60710. PMID: 32225146. | Not standard NF protocol |
| Arns M, Clark CR, Trullinger M, deBeus R, Mack M, Aniftos M. Neurofeedback and Attention-Deficit/Hyperactivity-Disorder (ADHD) in Children: Rating the Evidence and Proposed Guidelines. Appl Psychophysiol Biofeedback. 2020Jun;45(2):39-48. doi: 10.1007/s10484-020-09455-2. PMID: 32206963; PMCID:PMC7250955. | Systematic review |
| van Kooten JAMC, Maurice-Stam H, Schouten AYN, van Vuurden DG, Granzen B, Gidding C, de Ruiter MA, van Litsenburg RRL, Grootenhuis MA. High occurrence of sleep problems in survivors of a childhood brain tumor with neurocognitive complaints: The association with psychosocial and behavioral executive functioning. Pediatr Blood Cancer. 2019 Nov;66(11):e27947. doi:10.1002/pbc.27947. Epub 2019 Aug 16. PMID: 31418996. | Primary diagnosis was not ADHD |
| Lim CG, Poh XWW, Fung SSD, Guan C, Bautista D, Cheung YB, Zhang H, Yeo SN,Krishnan R, Lee TS. A randomized controlled trial of a brain-computer interface based attention training program for ADHD. PLoS One. 2019 May 21;14(5):e0216225.doi: 10.1371/journal.pone.0216225. PMID: 31112554; PMCID: PMC6528992. | Not standard NF protocol |
| Hoogman M, Muetzel R, Guimaraes JP, Shumskaya E, Mennes M, Zwiers MP,Jahanshad N, Sudre G, Wolfers T, Earl EA, Soliva Vila JC, Vives-Gilabert Y,Khadka S, Novotny SE, Hartman CA, Heslenfeld DJ, Schweren LJS, Ambrosino S,Oranje B, de Zeeuw P, Chaim-Avancini TM, Rosa PGP, Zanetti MV, Malpas CB, KohlsG, von Polier GG, Seitz J, Biederman J, Doyle AE, Dale AM, van Erp TGM, EpsteinJN, Jernigan TL, Baur-Streubel R, Ziegler GC, Zierhut KC, Schrantee A, Høvik MF,Lundervold AJ, Kelly C, McCarthy H, Skokauskas N, O'Gorman Tuura RL, Calvo A,Lera-Miguel S, Nicolau R, Chantiluke KC, Christakou A, Vance A, Cercignani M,Gabel MC, Asherson P, Baumeister S, Brandeis D, Hohmann S, Bramati IE, Tovar-Moll F, Fallgatter AJ, Kardatzki B, Schwarz L, Anikin A, Baranov A,Gogberashvili T, Kapilushniy D, Solovieva A, El Marroun H, White T, KarkashadzeG, Namazova-Baranova L, Ethofer T, Mattos P, Banaschewski T, Coghill D, PlessenKJ, Kuntsi J, Mehta MA, Paloyelis Y, Harrison NA, Bellgrove MA, Silk TJ, CubilloAI, Rubia K, Lazaro L, Brem S, Walitza S, Frodl T, Zentis M, Castellanos FX,Yoncheva YN, Haavik J, Reneman L, Conzelmann A, Lesch KP, Pauli P, Reif A, TammL, Konrad K, Oberwelland Weiss E, Busatto GF, Louza MR, Durston S, Hoekstra PJ,Oosterlaan J, Stevens MC, Ramos-Quiroga JA, Vilarroya O, Fair DA, Nigg JT, Thompson PM, Buitelaar JK, Faraone SV, Shaw P, Tiemeier H, Bralten J, Franke B.Brain Imaging of the Cortex in ADHD: A Coordinated Analysis of Large-Scale Clinical and Population-Based Samples. Am J Psychiatry. 2019 Jul1;176(7):531-542. doi: 10.1176/appi.ajp.2019.18091033. | Not standard NF protocol |
| Bussalb A, Congedo M, Barthélemy Q, Ojeda D, Acquaviva E, Delorme R, MayaudL. Clinical and Experimental Factors Influencing the Efficacy of Neurofeedback in ADHD: A Meta-Analysis. Front Psychiatry. 2019 Feb 18;10:35. doi:10.3389/fpsyt.2019.00035. | Meta-analysis |
| Rajabi S, Pakize A, Moradi N. Effect of combined neurofeedback and game-based cognitive training on the treatment of ADHD: A randomized controlled study. Appl Neuropsychol Child. 2020 Jul-Sep;9(3):193-205. doi:10.1080/21622965.2018.1556101. | Not multicentre RCT |
| Heinrich H, Gevensleben H, Becker A, Rothenberger A. Effects of neurofeedback on the dysregulation profile in children with ADHD: SCP NF meets SDQ-DP - a retrospective analysis. Psychol Med. 2020 Jan;50(2):258-263. doi:10.1017/S0033291718004130. | Outcomes reported in Gevensleben (2009, 2010) |
| Razoki B. Neurofeedback versus psychostimulants in the treatment of childrenand adolescents with attention-deficit/hyperactivity disorder: a systematic review. Neuropsychiatr Dis Treat. 2018 Oct 30;14:2905-2913. doi:10.2147/NDT.S178839. | Systematic review |
| Shereena EA, Gupta RK, Bennett CN, Sagar KJV, Rajeswaran J. EEG Neurofeedback Training in Children With Attention Deficit/Hyperactivity Disorder: A Cognitive and Behavioral Outcome Study. Clin EEG Neurosci. 2019Jul;50(4):242-255. doi: 10.1177/1550059418813034. | Not multicentre RCT  Not standard NF protocol |
| Pakdaman F, Irani F, Tajikzadeh F, Jabalkandi SA. The efficacy of Ritalin inADHD children under neurofeedback training. Neurol Sci. 2018Dec;39(12):2071-2078. doi: 10.1007/s10072-018-3539-3. | Not multicentre RCT  Not standard NF protocol |
| Sudnawa KK, Chirdkiatgumchai V, Ruangdaraganon N, Khongkhatithum C,Udomsubpayakul U, Jirayucharoensak S, Israsena P. Effectiveness of neurofeedbackversus medication for attention-deficit/hyperactivity disorder. Pediatr Int.2018 Sep;60(9):828-834. doi: 10.1111/ped.13641. Epub 2018 Sep 5. PMID: 29931709. | Not multicentre RCT |
| Goode AP, Coeytaux RR, Maslow GR, Davis N, Hill S, Namdari B, LaPointe NMA,Befus D, Lallinger KR, Bowen SE, Kosinski A, McBroom AJ, Sanders GD, Kemper AR.Nonpharmacologic Treatments for Attention-Deficit/Hyperactivity Disorder: A Systematic Review. Pediatrics. 2018 Jun;141(6):e20180094. doi:10.1542/peds.2018-0094. | Systematic review |
| Geissler J, Jans T, Banaschewski T, Becker K, Renner T, Brandeis D, DöpfnerM, Dose C, Hautmann C, Holtmann M, Jenkner C, Millenet S, Romanos M.Individualised short-term therapy for adolescents impaired by attention-deficit/hyperactivity disorder despite previous routine care treatment(ESCAadol)-Study protocol of a randomised controlled trial within the consortium ESCAlife. Trials. 2018 Apr 27;19(1):254. doi: 10.1186/s13063-018-2635-2. | Not standard NF protocol |
| Lee GJ, Suhr JA. Expectancy Effects on Self-Reported Attention-Deficit/Hyperactivity Disorder Symptoms in Simulated Neurofeedback: A Pilot Study. Arch Clin Neuropsychol. 2019 Mar 1;34(2):200-205. doi:10.1093/arclin/acy026. | Not standard NF protocol |
| Lavermicocca V, Dellomonaco AR, Tedesco A, Notarnicola M, Di Fede R,Battaglini PP. Neurofeedback nella malattia di Parkinson: tecnologie inlogopedia [Neurofeedback in Parkinson's disease: technologies in speech andlanguage therapy.]. Recenti Prog Med. 2018 Feb;109(2):130-132. Italian. doi:10.1701/2865.28908. | Not available in English language |
| Van Doren J, Arns M, Heinrich H, Vollebregt MA, Strehl U, K Loo S. Sustainedeffects of neurofeedback in ADHD: a systematic review and meta-analysis. EurChild Adolesc Psychiatry. 2019 Mar;28(3):293-305. doi:10.1007/s00787-018-1121-4. | Systematic review and meta-analysis |
| Minder F, Zuberer A, Brandeis D, Drechsler R. Informant-related effects of neurofeedback and cognitive training in children with ADHD including a waiting control phase: a randomized-controlled trial. Eur Child Adolesc Psychiatry. 2018Aug;27(8):1055-1066. doi: 10.1007/s00787-018-1116-1. | Not multicentre RCT |
| Moreno-García I, Meneres-Sancho S, Camacho-Vara de Rey C, Servera M. ARandomized Controlled Trial to Examine the Posttreatment Efficacy of Neurofeedback, Behavior Therapy, and Pharmacology on ADHD Measures. J AttenDisord. 2019 Feb;23(4):374-383. doi: 10.1177/1087054717693371. | Not multicentre RCT |
| Schönenberg M, Wiedemann E, Schneidt A, Scheeff J, Logemann A, Keune PM,Hautzinger M. Neurofeedback, sham neurofeedback, and cognitive-behavioural grouptherapy in adults with attention-deficit hyperactivity disorder: a triple-blind,randomised, controlled trial. Lancet Psychiatry. 2017 Sep;4(9):673-684. doi:10.1016/S2215-0366(17)30291-2. | Not multicentre RCT |
| Barth B, Mayer K, Strehl U, Fallgatter AJ, Ehlis AC. EMG biofeedback training in adult attention-deficit/hyperactivity disorder: An active (control)training? Behav Brain Res. 2017 Jun 30;329:58-66. doi:10.1016/j.bbr.2017.04.021. | Not standard NF protocol |
| Alegria AA, Wulff M, Brinson H, Barker GJ, Norman LJ, Brandeis D, Stahl D,David AS, Taylor E, Giampietro V, Rubia K. Real-time fMRI neurofeedback inadolescents with attention deficit hyperactivity disorder. Hum Brain Mapp. 2017Jun;38(6):3190-3209. doi: 10.1002/hbm.23584. | Not standard NF protocol |
| Mohagheghi A, Amiri S, Moghaddasi Bonab N, Chalabianloo G, Noorazar SG,Tabatabaei SM, Farhang S. A Randomized Trial of Comparing the Efficacy of TwoNeurofeedback Protocols for Treatment of Clinical and Cognitive Symptoms ofADHD: Theta Suppression/Beta Enhancement and Theta Suppression/AlphaEnhancement. Biomed Res Int. 2017:3513281. doi: 10.1155/2017/3513281. | Not multicentre RCT |
| Lee EJ, Jung CH. Additive effects of neurofeedback on the treatment of ADHD:A randomized controlled study. Asian J Psychiatr. 2017 Feb;25:16-21. doi:10.1016/j.ajp.2016.09.002. Epub 2016 Sep 30. PMID: 28262140. | Not multicentre RCT |
| Gapen M, van der Kolk BA, Hamlin E, Hirshberg L, Suvak M, Spinazzola J. APilot Study of Neurofeedback for Chronic PTSD. Appl Psychophysiol Biofeedback.2016 Sep;41(3):251-61. doi: 10.1007/s10484-015-9326-5. | Primary diagnosis was not ADHD |
| Mayer K, Blume F, Wyckoff SN, Brokmeier LL, Strehl U. Neurofeedback of slow cortical potentials as a treatment for adults with AttentionDeficit-/Hyperactivity Disorder. Clin Neurophysiol. 2016 Feb;127(2):1374-1386.doi: 10.1016/j.clinph.2015.11.013. Epub 2015 Nov 23. PMID: 2684900. | Mean age was higher than 18 years old |
| Shin MS, Jeon H, Kim M, Hwang T, Oh SJ, Hwangbo M, Kim KJ. Effects of Smart-Tablet-Based Neurofeedback Training on Cognitive Function in Children with Attention Problems. J Child Neurol. 2016 May;31(6):750-60. doi:10.1177/0883073815620677. | Not standard NF protocol |