



Neurofeedback Therapy - Information for NDIS

Neurofeedback is a non-invasive person-centred therapy that helps to improve function and quality of life for children and adults with lifelong disability-related impairment.

Neurofeedback uses real-time feedback technology and learning theory to shape brainwave activity and improve brain function. There is substantial research supporting the use of neurofeedback as a cost-effective and beneficial therapeutic support helping participants to achieve their NDIS goals by improving behaviour, cognitive function (attention, cognitive flexibility, decision-making, impulse-control, learning, planning, problem-solving, working memory) and emotional self-regulation.

For a summary of the research supporting neurofeedback please see:

<https://www.perthbraincentre.com.au/health-professionals/research-evidence>

For a reference list of research* supporting neurofeedback **improving behaviour** please see below:

Enriquez-Geppert, S., Smit, D., Pimenta, M. G., & Arns, M. (2019). Neurofeedback as a treatment intervention in adhd: Current evidence and practice. *Current Psychiatry Reports*, 21(6), 46.

<https://doi.org/10.1007/s11920-019-1021-4>

Masterpasqua, F., & Healey, K. N. (2003). Neurofeedback in psychological practice. *Professional Psychology: Research and Practice*, 34(6), 652–656. <https://doi.org/10.1037/0735-7028.34.6.652>

Meisel, V., Servera, M., Garcia-Banda, G., Cardo, E., & Moreno, I. (2013). Neurofeedback and standard pharmacological intervention in ADHD: A randomized controlled trial with six-month follow-up. *Biological Psychology*, 94(1), 12–21. <https://doi.org/10.1016/j.biopsycho.2013.04.015>

Moreno-García, I., Meneres-Sancho, S., Camacho-Vara De Rey, C., & Servera, M. (2019). A randomized controlled trial to examine the posttreatment efficacy of neurofeedback, behavior therapy, and pharmacology on adhd measures. *Journal of Attention Disorders*, 23(4), 374–383. <https://doi.org/10.1177/1087054717693371>

Riesco-Matías, P., Yela-Bernabé, J. R., Crego, A., & Sánchez-Zaballos, E. (2021). What do meta-analyses have to say about the efficacy of neurofeedback applied to children with adhd? Review of previous meta- analyses and a new meta-analysis. *Journal of Attention Disorders*, 25(4), 473–485. <https://doi.org/10.1177/1087054718821731>

Roy, S., Mandal, N., Ray, A., Roy, P. K., Bhattacharyya, A., & Saha, P. K. (2022). Effectiveness of neurofeedback training, behaviour management including attention enhancement training and medication in children with attention-deficit/hyperactivity disorder – A comparative follow up study. *Asian Journal of Psychiatry*, 76, 103133. <https://doi.org/10.1016/j.ajp.2022.103133>



Shereena, E. A., Gupta, R. K., Bennett, C. N., Sagar, K. J. V., & Rajeswaran, J. (2019). Eeg neurofeedback training in children with attention deficit/hyperactivity disorder: A cognitive and behavioral outcome study. *Clinical EEG and Neuroscience*, 50(4), 242–255.

<https://doi.org/10.1177/1550059418813034>

For a reference list of research* supporting neurofeedback **improving cognitive function** please see below:

Askovic, M., Soh, N., Elhindi, J., & Harris, A. (2023). Neurofeedback for post-traumatic stress disorder: Systematic review and meta-analysis of clinical and neurophysiological outcomes.

European Journal of Psychotraumatology. <https://doi.org/10.1080/20008066.2023.2257435>

Askovic, M., Watters, A. J., Coello, M., Aroche, J., Harris, A., & Kropotov, J. (2020). Evaluation of neurofeedback for posttraumatic stress disorder related to refugee experiences using self-report and cognitive ERP measures. **Clinical EEG and Neuroscience**.

<https://doi.org/10.1177/1550059419849170>

Bennett, C., Gupta, R., Prabhakar, P., Christopher, R., Sampath, S., Thennarasu, K., & Rajeswaran, J. (2018). Clinical and biochemical outcomes following EEG neurofeedback training in traumatic brain injury in the context of spontaneous recovery. **Clinical EEG and Neuroscience**.

<https://doi.org/10.1177/1550059417744899>

Cortese, S., Ferrín, M., Brandeis, D., Holtmann, M., Aggensteiner, P. M., Daley, D., Santosh, P., Simonoff, E., Stevenson, J., Stringaris, A., & Sonuga-Barke, E. (2016). Neurofeedback for attention- deficit/hyperactivity disorder: Meta-analysis of clinical and neuropsychological outcomes from randomized controlled trials. **Journal of the American Academy of Child and Adolescent Psychiatry**.

<https://doi.org/10.1016/j.jaac.2016.03.007>

Escolano, C., Navarro-Gil, M., García-Campayo, J., Congedo, M., Ridder, D. De, & Minguez, J. (2014). A controlled study on the cognitive effect of alpha neurofeedback training in patients with major depressive disorder. **Frontiers in Behavioral Neuroscience**.

<https://doi.org/10.3389/fnbeh.2014.00296>

Kolk, B. A. van der, Hodgdon, H., Gapen, M., Musicaro, R., Suvak, M. K., Hamlin, E., & Spinazzola, J. (2016). A randomized controlled study of neurofeedback for chronic PTSD. **PLoS ONE**. <https://doi.org/10.1371/journal.pone.0166752>

Kratzke, I., Campbell, A. M., Yefimov, M., Mosaly, P., Adapa, K., Meltzer-Brody, S., Farrell, T., & Mazur, L. (2020). Pilot study using neurofeedback as a tool to reduce surgical resident burnout. **Journal of Graduate Medical Education**. <https://doi.org/10.4300/JGME-D-19-00675.1>

Lee, E.-J., & Jung, C. (2017). Additive effects of neurofeedback on the treatment of ADHD: A randomized controlled study. **Asian Journal of Psychiatry**.

<https://doi.org/10.1016/j.ajp.2016.09.002>



- Luctkar-Flude, M., & Groll, D. (2015). A systematic review of the safety and effect of neurofeedback on fatigue and cognition. **Integrative Cancer Therapies**.
<https://doi.org/10.1177/1534735415572886>
- Munivenkatappa, A., Rajeswaran, J., Devi, B. I., Bennet, N., & Upadhyay, N. (2014). EEG neurofeedback therapy: Can it attenuate brain changes in TBI? **NeuroRehabilitation (Reading, MA)**. <https://doi.org/10.3233/NRE-141140>
- Rance, M., Walsh, C., Sukhodolsky, D., Pittman, B., Qiu, M., Kichuk, S., Wasyluk, S., Koller, W. N., Bloch, M., Gruner, P., Scheinost, D., Pittenger, C., & Hampson, M. (2018). Time course of clinical change following neurofeedback. **NeuroImage**.
<https://doi.org/10.1016/j.neuroimage.2018.05.001>
- Renton, T., Tibbles, A., & Topolovec-Vranic, J. (2015). Neurofeedback as a form of cognitive rehabilitation therapy following stroke: A systematic review. **PLOS ONE**.
<https://doi.org/10.1371/journal.pone.0177290>
- Shereena, E. A., Gupta, R. K., Bennett, C., Sagar, K. V., & Rajeswaran, J. (2018). EEG neurofeedback training in children with attention deficit/hyperactivity disorder: A cognitive and behavioral outcome study. **Clinical EEG and Neuroscience**.
<https://doi.org/10.1177/1550059418813034>
- Steiner, N. J., Frenette, E. C., Rene, K., Brennan, R., & Perrin, E. (2014). In-school neurofeedback training for ADHD: Sustained improvements from a randomized control trial. **Pediatrics**.
<https://doi.org/10.1542/peds.2013-2059>
- Zoefel, B., Huster, R. J., & Herrmann, C. (2011). Neurofeedback training of the upper alpha frequency band in EEG improves cognitive performance. **NeuroImage**.
<https://doi.org/10.1016/j.neuroimage.2010.08.078>

For a reference list of research* supporting neurofeedback **improving emotional self-regulation** please see below:

- Brühl, A. B., Scherpiet, S., Sulzer, J., Stämpfli, P., Seifritz, E., & Herwig, U. (2014). Real-time neurofeedback using functional mri could improve down-regulation of amygdala activity during emotional stimulation: A proof-of-concept study. *Brain Topography*, 27(1), 138–148.
<https://doi.org/10.1007/s10548-013-0331-9>
- Choi, M.-J., & Park, W.-J. (2018). The effects of neurofeedback training on physical, psychoemotional stress response and self-regulation for late adolescence: A non-randomized trial. *Journal of Korean Academy of Nursing*, 48(2), 208.
<https://doi.org/10.4040/jkan.2018.48.2.208>
- Choi, S. W., Chi, S. E., Chung, S. Y., Kim, J. W., Ahn, C. Y., & Kim, H. T. (2011). Is alpha wave neurofeedback effective with randomized clinical trials in depression? A pilot study. *Neuropsychobiology*, 63(1), 43– 51. <https://doi.org/10.1159/000322290>



- Dehghani, A., Soltanian-Zadeh, H., & Hossein-Zadeh, G.-A. (2023). Probing fMRI brain connectivity and activity changes during emotion regulation by EEG neurofeedback. *Frontiers in Human Neuroscience*, 16, 988890. <https://doi.org/10.3389/fnhum.2022.988890>
- Friedrich, E. V. C., Sivanathan, A., Lim, T., Suttie, N., Louchart, S., Pillen, S., & Pineda, J. A. (2015). An effective neurofeedback intervention to improve social interactions in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 45(12), 4084–4100. <https://doi.org/10.1007/s10803-015-2523-5>
- Hong, J., & Park, J.-H. (2022). Efficacy of neuro-feedback training for PTSD symptoms: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 19(20), 13096. <https://doi.org/10.3390/ijerph192013096>
- Huang, W., Wu, W., Lucas, M. V., Huang, H., Wen, Z., & Li, Y. (2023). Neurofeedback training with an electroencephalogram-based brain-computer interface enhances emotion regulation. *IEEE Transactions on Affective Computing*, 14(2), 998–1011. <https://doi.org/10.1109/TAFFC.2021.3134183>
- Lipp A, Cohen Kadosh K. Training the anxious brain: using fMRI-based neurofeedback to change brain activity in adolescence. *Dev Med Child Neurol*. 2020 Nov;62(11):1239-1244. doi: 10.1111/dmcn.14611. Epub 2020 Jul 7. PMID: 32638360.
- Johnston, S. J., Boehm, S. G., Healy, D., Goebel, R., & Linden, D. E. J. (2010). Neurofeedback: A promising tool for the self-regulation of emotion networks. *NeuroImage*, 49(1), 1066–1072. <https://doi.org/10.1016/j.neuroimage.2009.07.056>
- Koush, Y., Meskaldji, D.-E., Pichon, S., Rey, G., Rieger, S. W., Linden, D. E. J., Van De Ville, D., Vuilleumier, P., & Scharnowski, F. (2015). Learning control over emotion networks through connectivity-based neurofeedback. *Cerebral Cortex*, bhv311. <https://doi.org/10.1093/cercor/bhv311>
- Linhartová, P., Látalová, A., Kóša, B., Kašpárek, T., Schmahl, C., & Paret, C. (2019). Fmri neurofeedback in emotion regulation: A literature review. *NeuroImage*, 193, 75–92. <https://doi.org/10.1016/j.neuroimage.2019.03.011>
- Mennella, R., Patron, E., & Palomba, D. (2017). Frontal alpha asymmetry neurofeedback for the reduction of negative affect and anxiety. *Behaviour Research and Therapy*, 92, 32–40. <https://doi.org/10.1016/j.brat.2017.02.002>
- Nguyen, G. H., Oh, S., Schneider, C., Teoh, J. Y., Engstrom, M., Santana-Gonzalez, C., Porter, D., & Quevedo, K. (2023). Neurofeedback and affect regulation circuitry in depressed and healthy adolescents. *Biology*, 12(11), 1399. <https://doi.org/10.3390/biology12111399>
- Paret, C., & Hendler, T. (2020). Live from the “regulating brain”: Harnessing the brain to change emotion. *Emotion*, 20(1), 126–131. <https://doi.org/10.1037/emo0000674>
- Ryan A, Files N. The efficacy of neurofeedback and traditional therapies with autism spectrum disorder in a clinic setting. *Asia Pacific J Neurotherapy*. 2019;1(2):14-20.
- Ryan, A. (2021). Review of Studies on Amplitude Neurofeedback with Autism: Critical Overview, Efficacy Level and Research Direction.



- Sulzer, J., Sitaram, R., Blefari, M. L., Kollias, S., Birbaumer, N., Stephan, K. E., Luft, A., & Gassert, R. (2013). Neurofeedback-mediated self-regulation of the dopaminergic midbrain. *NeuroImage*, 83, 817–825. <https://doi.org/10.1016/j.neuroimage.2013.05.115>
- Van Der Kolk, B. A., Hodgdon, H., Gapen, M., Musicaro, R., Suvak, M. K., Hamlin, E., & Spinazzola, J. (2016). A randomized controlled study of neurofeedback for chronic ptsd. *PLOS ONE*, 11(12), e0166752. <https://doi.org/10.1371/journal.pone.0166752>
- Ward, K. P., Porter, N. A., & Wood, D. S. (2019). The effectiveness of neurofeedback in an outpatient setting: A multilevel modeling approach. *Research on Social Work Practice*, 29(8), 939–948. <https://doi.org/10.1177/1049731519831355>
- Yu, L., Long, Q., Tang, Y., Yin, S., Chen, Z., Zhu, C., & Chen, A. (2021). Improving emotion regulation through real-time neurofeedback training on the right dorsolateral prefrontal cortex: Evidence from behavioral and brain network analyses. *Frontiers in Human Neuroscience*, 15, 620342. <https://doi.org/10.3389/fnhum.2021.620342>
- Zotey, V., Phillips, R., Yuan, H., Misaki, M., & Bodurka, J. (2014). Self-regulation of human brain activity using simultaneous real-time fMRI and EEG neurofeedback. *NeuroImage*, 85, 985–995. <https://doi.org/10.1016/j.neuroimage.2013.04.126>

*Note: Research published after 2000, and within Q1 or Q2 ranked journals. For information about Journal Quality Indicators please see:

https://library.westernsydney.edu.au/archived_content/2023_web_presence_update/evaluating-success/metrics/journal_quality_indicators#:~:text=Ranked%20lists%20are%20divided%20into.2%2F256%2C%2064%2F89