taVNS (transcutaneous auricular Vagus Nerve Stimulation) Research — Attention List

This document lists curated peer-reviewed taVNS studies that reported positive effects on attention, working memory, executive control, or attention-related biomarkers. Each entry includes a short technical line, and 'In other words' plain-English restatement.

1. Chen Y. et al. (2023)
General Psychiatry (BMJ)
Left-ear taVNS shortened RTs, reduced RT variability and increased attention-related ERP (event-related potential (measured with EEG)) amplitudes.
In other words, participants were quicker and more consistent in their responses, and their brain activity showed clearer signs of paying attention.
Confidence: High Outcome: Behavioural + EEG (RT, P3 (P300 (an attention-related positive ERP component around 300 ms)))
[Source]

2. Sun J.B. et al. (2021)
Frontiers in Neuroscience
Offline taVNS increased correct hits on a spatial 3-back task vs sham (improved WM accuracy).
In other words, using the device before the task helped people remember more items correctly on a difficult memory test.
Confidence: High Outcome: Behavioural (working memory)
[Source]

3. Ridgewell C. et al. (2021)
Meta-analysis (Neuropsychology)
Meta-analysis showing a small overall cognitive benefit of taVNS, strongest on executive/accuracy measures.
In other words, across many studies, ear stimulation produces a small but consistent boost on tasks that require attention and control, especially accuracy.
Confidence: High Outcome: Meta-analysis (behavioural outcomes)
[Source]

4. Zhao R. et al. (2023)
Behavioural Brain Research
taVNS improved accuracy on high-load working-memory tasks and mitigated performance decline under sleep deprivation.
In other words, the device helped people get more answers right on hard tasks and reduced the drop in performance when they were tired.
Confidence: High Outcome: Behavioural (WM under sleep deprivation)
[Source]

5. Tian Q.Q. et al. (2023)
Frontiers in Neuroscience
taVNS + slow-paced breathing produced additive improvements in spatial 3-back accuracy.
In other words, combining the stimulation with slow, paced breathing produced larger memory benefits than either alone.
Confidence: Medium-High Outcome: Behavioural (WM)
[Source]

6. Giraudier M. et al. (2024)
Brain Sciences
Continuous taVNS increased P300 (P300 (an attention-related positive ERP component around 300 ms)) amplitudes for attention targets; effect depends on stimulation type.
In other words, the brain's attention-related wave (P300) grew larger, meaning the brain allocated more attention to important items.
Confidence: High Outcome: EEG (electroencephalography (brain electrical recording)) (P300)
[Source]

7. Sharon O. et al. (2021)
Journal of Neuroscience
Short taVNS pulses induced pupil dilation and occipital alpha attenuation — markers of arousal/attention readiness.
In other words, brief pulses of stimulation made pupils widen and brain rhythms shift in ways that indicate increased alertness.
Confidence: High Outcome: Biomarker (pupil, alpha)
[Source]

8. Ventura-Bort C. et al. (2018)
Frontiers in Human Neuroscience
tVNS (transcutaneous vagus nerve stimulation) increased P3b amplitude and salivary alpha-amylase, supporting noradrenergic engagement.
In other words, the device increased an attention-related brain response and a saliva marker linked to alertness — signs the brain is more 'on'.
Confidence: High Outcome: ERP + sAA (salivary alpha-amylase (a peripheral biomarker linked to noradrenergic activity)) (biomarker)
[Source]

9. Warren C.M. et al. (2019)
Brain Stimulation
tVNS modulated salivary α-amylase, cortisol and P3 — evidence of noradrenergic/arousal effects.
In other words, multiple physiological signals (saliva, hormones, brainwaves) changed in ways that suggest greater arousal and attention.
Confidence: High Outcome: Hormonal/ERP biomarkers
[Source]

10. D'Agostini M. et al. (2021)
Biol Psychol / 2023 follow-ups
taVNS enhances reversal learning and increases noradrenergic biomarkers (pupil, sAA).
In other words, the stimulation helped people adapt to changing rules and produced saliva/pupil signs of increased alertness.
Confidence: Medium-High Outcome: Behavioural + biomarkers (pupil, sAA)
[Source]

11. Giraudier M. et al. (pooled) (2022)
Data pooling / meta (Biomarker)
Pooled analyses indicate taVNS increases salivary α-amylase compared to sham, supporting NA (noradrenaline (norepinephrine)) engagement.
In other words, when studies are combined, a saliva marker tied to attention tends to rise after stimulation, supporting a biological mechanism.
Confidence: High Outcome: Pooled biomarker analysis
[Source]

12. Konjusha A. et al. (2023)
Journal of Neuroscience
atVNS (auricular transcutaneous vagus nerve stimulation) modulated neural gating mechanisms of working memory, improving maintenance and selection.
In other words, the device helped the brain keep the right information in mind and ignore distractions — better mental 'filtering'.
Confidence: High Outcome: Neural mechanisms (WM gating)
[Source]

13. Beste C. et al. (2016)
NeuroImage/related
tVNS reduced false alarms and improved inhibitory control under working-memory load.
In other words, when tasks were demanding, stimulation reduced careless mistakes and improved self-control.
Confidence: Medium-High Outcome: Behavioural (inhibition)
[Source]

14. Jacobs H.I.L. et al. (2015)
Neurobiology of Aging
tVNS boosted associative memory in older adults — memory enhancement linked to attentional processes.
In other words, older adults remembered paired items (like names with faces) better after stimulation.
Confidence: Medium Outcome: Behavioural (associative memory)
[Source]

15. Colzato L.S. et al. (2018)
Neuropsychologia
tVNS enhanced divergent thinking/creativity, indicating cognitive-enhancement effects.
In other words, a session of stimulation helped people generate more creative ideas.
Confidence: Medium Outcome: Behavioural (divergent thinking)
[Source]

16. Jongkees B.J. et al. (2018)
Frontiers in Psychology
tVNS improved response selection during sequential action tasks, consistent with enhanced cognitive control.
In other words, it helped people select the correct actions faster during quick action sequences.
Confidence: Medium Outcome: Behavioural (response selection)
[Source]

17. Neuser M.P. et al. (2020)
Nature Communications
taVNS increased motivation to work for rewards — relevant to sustained engagement and attention (note mixed replication).
In other words, the stimulation made people more willing to put effort into reward-seeking tasks — which can help sustained focus (note mixed replications).
Confidence: Medium Outcome: Motivation/invigoration (behavioural)
[Source]

18. Pan L. et al. (2023)
CNS Neuroscience & Therapeutics
taVNS improved working memory in clinical (epilepsy) populations, indicating broader cognitive impact.
In other words, in clinical patients, stimulation improved working-memory performance, suggesting benefits beyond healthy samples.
Confidence: Medium Outcome: Behavioural (clinical WM)
[Source]

19. Miyatsu T. et al. (2024)
Scientific Reports
tcVNS (transcutaneous cervical vagus nerve stimulation) enhanced vocabulary acquisition and reduced fatigue during multi-day training.
In other words, over multi-day training, stimulation helped people learn more words and feel less tired.
Confidence: Medium Outcome: Behavioural (skill learning)
[Source]

20. Zhu S. et al. (2024)
Review (Frontiers)
Review summarising evidence taVNS can modulate behavioral inhibition and attention-related processes.
In other words, reviews conclude that ear stimulation can influence attention and inhibitory control under certain protocols.
Confidence: High Outcome: Review (mechanisms)
[Source]

21. Sellaro R. et al. (2015)
Cortex / related
tVNS enhanced recognition of emotional faces, indicating selective attention modulation.
In other words, the device helped people better notice and identify emotional expressions in faces.
Confidence: Medium Outcome: Behavioural (social attention)
[Source]

22. Fischer R. et al. (2018)
Cognitive, Affective, & Behavioral Neuroscience
tVNS enhanced conflict-triggered adaptation of cognitive control (behavioral and ERP evidence).
In other words, when facing conflicting information, stimulation helped people adjust and make better decisions.
Confidence: Medium-High Outcome: Behavioural + ERPs (conflict adaptation)
[Source]

23. D'Agostini M. et al. (2023) (2023)
Biol Psychol
taVNS increased P300 magnitudes and salivary alpha-amylase during an auditory oddball task.
In other words, the stimulation increased attention-related brainwaves and a saliva marker linked to alertness during an oddball task.
Confidence: High Outcome: P300 + sAA
[Source]

Acronyms / Abbreviations — expanded:

taVNS — transcutaneous auricular vagus nerve stimulation

tVNS — transcutaneous vagus nerve stimulation

atVNS — auricular transcutaneous vagus nerve stimulation

tcVNS — transcutaneous cervical vagus nerve stimulation

P3 — P300 (an attention-related positive ERP component around 300 ms)

P300 — P300 (an attention-related positive ERP component around 300 ms)

ERP — event-related potential (measured with EEG)

EEG — electroencephalography

sAA — salivary alpha-amylase (a peripheral biomarker linked to noradrenergic activity)

LC (locus coeruleus (brainstem noradrenergic nucleus)) — locus coeruleus

NA — noradrenaline (norepinephrine)

MRCP (movement-related cortical potential) — movement-related cortical potential