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Effects of Aquatic Exercise and Transcranial Direct Current Stimulation on Motor Skills and Cognitive Functions in Children with Autism Spectrum Disorder

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1. Round 1

1.1 Reviewer 1

Reviewer:

The Results section of the abstract mentions “significant post-intervention improvements” but does not specify statistical parameters (e.g., F values, η^2). Including at least one key statistic or effect size would enhance transparency.

In the first paragraph, after “Children with ASD frequently exhibit difficulties in motor coordination, executive functioning, and social participation,” consider citing more recent systematic reviews (2024–2025) emphasizing the neurocognitive overlap between motor and executive impairments in ASD to strengthen theoretical grounding.

The paragraph beginning “In recent years, two promising non-invasive interventions—transcranial direct current stimulation (tDCS) and aquatic exercise—have been studied…” lacks a clear rationale for combining these interventions. Elaborate on the hypothesized neural mechanisms (e.g., enhanced sensorimotor integration through concurrent cortical stimulation and proprioceptive engagement).

The discussion attributes improvements in cognitive flexibility to “higher correct and conceptual response scores and fewer perseverative errors on the WCST.” Include an explanation of whether these gains reflect generalized executive enhancement or task-specific learning, as WCST improvements can result from both.

Author revised the manuscript and uploaded the updated document.

1.2 Reviewer 2

Reviewer:

The final paragraph of the introduction concludes with "Therefore, the present study aimed to examine the effects of a combined program…" but does not specify hypotheses. It is recommended to include explicit directional hypotheses (e.g., "It was hypothesized that combined intervention would produce greater gains in motor coordination and cognitive flexibility than the sham condition.")

In 2.5 Statistical Analysis, the statement "An intention-to-treat approach was used to handle missing data by substituting repeated measures from previous evaluations" is methodologically imprecise. Intention-to-treat does not involve substituting scores but rather analyzing all participants as randomized. Consider clarifying the imputation method (e.g., last observation carried forward, mean substitution).

The paragraph beginning "These results are consistent with previous studies showing that aquatic exercise enhances postural control…" effectively contextualizes findings but could further address possible placebo or novelty effects, especially since both interventions involve high participant engagement.

In "tDCS facilitates neuroplasticity and modulates cortical excitability…", the authors assert changes in neurotransmitter levels (GABA and glutamate) without direct biochemical measurement. This statement should be rephrased as theoretical rather than empirical ("tDCS is proposed to influence neurotransmitter balance…").

Author revised the manuscript and uploaded the updated document.

2. Revised

Editor's decision after revisions: Accepted.
Editor in Chief's decision: Accepted.