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Comparison of the Effectiveness of Transcranial Direct Current Stimulation and Cognitive Emotion Regulation Training on Impulsivity in Adults with Attention-Deficit/Hyperactivity Disorder

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1. Round 1

1.1. Reviewer 1

Reviewer:

In the paragraph beginning “Among the defining characteristics of ADHD, impulsivity has received particular attention,” the manuscript discusses motor, cognitive, and non-planning impulsivity, yet no conceptual framework is provided to explain how these dimensions may respond differently to neurostimulation versus psychological interventions. A more explicit theoretical model would strengthen the rationale for the comparative design.

The paragraph beginning “In recent years, growing attention has been directed toward understanding the emotional dimensions of ADHD” presents emotional dysregulation as a major component of ADHD; however, emotional dysregulation

itself was not measured in the study. The authors should justify why they evaluated only impulsivity outcomes despite proposing emotional regulation mechanisms as central explanatory variables.

In the paragraph discussing Garnefski's cognitive emotion regulation framework, the manuscript assumes that maladaptive cognitive emotion regulation strategies contribute directly to impulsivity. However, no empirical evidence specific to adult ADHD populations is critically synthesized. Additional discussion of mediating pathways between emotion regulation and impulsivity would improve the conceptual coherence of the study rationale.

The manuscript reports Cronbach's alpha coefficients for the BIS-11 and AIS in the current sample; however, no validity analyses were conducted. Given that impulsivity is the primary outcome, additional psychometric evidence such as confirmatory factor analysis or convergent validity statistics would strengthen confidence in the measures.

In the Data Analysis section, ANCOVA was selected as the primary analytic method. However, because the study involved repeated measurements (pretest and posttest) and three groups, a mixed-design ANOVA or repeated-measures ANCOVA may have been more appropriate. The authors should justify their analytical choice and discuss its assumptions.

Authors revised the manuscript and uploaded the document.

1.2. Reviewer 2

Reviewer:

The statement "Comparing these approaches may therefore help clarify whether impulsivity in adult ADHD is more responsive to direct neural modulation, cognitive-emotional intervention, or both" is scientifically important, but the manuscript does not formulate corresponding research hypotheses. Explicit directional hypotheses should be presented before the Methods section.

In the Methods section, the sentence "The sample size was determined based on previous similar studies that reported the effectiveness of tDCS and emotion regulation interventions with sample sizes of 15–20 participants per group" is insufficient. The authors should provide a formal power analysis, including assumed effect size, alpha level, statistical power, and software used, to justify the adequacy of the sample size.

The inclusion criterion requiring "a score higher than 72 on the Barratt Impulsiveness Scale" raises methodological concerns. The manuscript should provide a citation supporting this cutoff and explain whether this threshold has been validated specifically for adults with ADHD in Iranian populations.

The study reports random assignment after convenience sampling; however, no information is provided regarding the randomization procedure. The authors should clarify whether simple randomization, block randomization, or another allocation method was used and describe allocation concealment procedures to reduce selection bias.

The demographic paragraph reports that "Chi-square and analysis of variance tests indicated no significant differences among the three groups in terms of age ($\chi^2 = 0.60$, $p = .74$) or gender ($F = 0.23$, $p = .86$)." This appears statistically inappropriate because age is typically analyzed using ANOVA and gender using Chi-square. The reported statistics should be rechecked and corrected if necessary.

The description of the tDCS protocol specifies anodal stimulation at F3 and cathodal stimulation at Fp2 with an intensity of 2 mA for 20 minutes. However, no rationale is provided for selecting this montage. The authors should cite previous ADHD studies using the same electrode configuration and explain why this protocol was expected to influence impulsivity.

The cognitive emotion regulation intervention is described across ten sessions, but treatment fidelity procedures are not reported. The manuscript should explain whether therapist adherence was monitored, whether sessions were standardized, and whether independent evaluators assessed protocol implementation.

Authors revised the manuscript and uploaded the document.

2. Revised

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Editor's decision: Accepted.
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