

Comparison of the Effects of Sensory–Motor Integration and Cognitive Restructuring on Executive Functions and Social Skills in Individuals with Autism Spectrum Disorder

Shahrad. Arjmand¹, Hassan Mohammad. Tehrani^{1*}, Vahid. Manzari Tavakoli², Hamid. Moulayi Zarandi¹

¹ Department of Psychology, Zar.C., Islamic Azad University, Zarand, Iran

² Department of Psychology, Farhangian University, Kerman, Iran

* Corresponding author email address: h.m.tehrani@iau.ac.ir

E d i t o r	R e v i e w e r s
Abolghasem Yaghoobi ^{id} Professor of Psychology, Department of Psychology, Faculty of Economics and Social Sciences, Bu-Ali Sina University, Hamedan, Iran yaghoobi@basu.ac.ir	Reviewer 1: Mohsen Golparvar ^{id} Professor, Department of Psychology, Isfahan (Khorasgan) Branch, Islamic Azad University, Isfahan, Iran. mgolparvar@khuif.ac.ir Reviewer 2: Shahrokh Makvand Hoseini ^{id} Associate Professor, Department of Psychology, Semnan University, Iran. Email: shmakvand@semnan.ac.ir

1. Round 1

1.1. Reviewer 1

Reviewer:

The manuscript should provide a sample-size justification. The Methods reports that “a total of 45 eligible students were selected” and divided into three groups of 15, but no a priori power analysis or other justification for this sample size is presented. With repeated measurements, three groups, and interaction effects as the principal inferential focus, statistical power depends on the expected effect size, within-person correlation, alpha level, and number of measurements. The authors should report whether an a priori power calculation was conducted and specify the assumed effect size, statistical power, alpha level, and resulting minimum sample size. If no power analysis was performed before recruitment, this should be acknowledged and a sensitivity or achieved-power analysis should not be used as a substitute for a priori justification.

The exclusion criterion concerning medication requires revision and clearer operationalization. The Methods states that children were excluded for “use of medications considered likely to substantially affect the study variables,” but this criterion is too ambiguous for replication and may introduce selection bias. Many children with ASD receive medications for attention-

deficit/hyperactivity symptoms, irritability, anxiety, sleep problems, or other comorbid conditions. The authors should identify which medication classes were considered exclusionary, whether participants taking stable doses were eligible, whether medication status was monitored during the intervention period, and whether medication changes occurred between pretest and follow-up. Concurrent psychological, occupational therapy, speech-language, behavioral, and educational interventions should similarly be reported because these could confound treatment effects.

A major measurement issue concerns the interpretation of the Behavior Rating Inventory of Executive Function. The manuscript reports that executive-function scores increased from 41.57 to 49.98 in the sensory-motor integration group and interprets this increase as “improvement.” However, in the standard BRIEF scoring system, higher raw or standardized scores generally represent greater executive dysfunction rather than better executive functioning. This issue must be resolved before the findings can be interpreted. The authors should clearly explain the scoring method used, identify whether scores were reverse-scored or transformed, specify whether a total score or a particular composite/index was analyzed, and state explicitly whether higher scores indicate better or poorer functioning. If standard BRIEF scoring was used, the current interpretation of increasing scores may be directionally incorrect and would require revision throughout the Abstract, Results, Discussion, and Conclusion.

The paragraph describing the BRIEF should also provide more precise psychometric and scoring information. The manuscript states that the 86-item Teacher Form assesses “inhibition, shifting or cognitive flexibility, emotional control, working memory, planning and organization, monitoring, and initiation,” but it does not identify the exact index or composite used as the dependent variable. The authors should indicate whether the Behavioral Regulation Index, Metacognition Index, Global Executive Composite, or another derived score was analyzed. They should also provide the scoring range, item response anchors, relevant evidence of reliability and validity in the language and cultural context in which the measure was administered, and preferably reliability coefficients obtained separately for the major measurement occasions rather than only a single Cronbach’s alpha of .85.

The description of the “Social Skills Rating System developed by Gresham and Elliott (1990)” requires verification against the exact instrument version used. The manuscript reports a 48-item scale and states that the teacher form assessed cooperation, assertion, and self-control, but the item structure, scoring procedure, and total score used in analysis should be described precisely according to the relevant manual or validated adaptation. The authors should identify the translated version, provide evidence of validity and reliability for the population in which it was administered, explain whether the reported outcome is the total social-skills score or a composite derived from specific subscales, and report internal consistency in the current sample. Without this information, reproducibility and interpretation of the reported mean values are limited.

The intervention protocols are currently insufficiently detailed for replication. For example, the cognitive restructuring paragraph states that participants received “six 45-minute sessions” involving relaxation, identification of thoughts and emotions, cognitive restructuring, problem solving, self-instruction, and positive self-talk. The authors should specify whether sessions were delivered individually or in groups, how frequently they occurred, who delivered them, the therapist’s professional training and experience, whether a treatment manual was used, and how cognitive techniques were developmentally adapted for 7–12-year-old children with ASD. Given the cognitive and language heterogeneity of ASD, the manuscript should also explain how comprehension was checked and whether visual supports, modeling, reinforcement, simplified language, or caregiver involvement were incorporated.

The Levene’s test results reported in the assumptions paragraph should be checked carefully. The manuscript gives $df1 = 1$ and $df2 = 43$ for tests comparing three independent groups. For a conventional Levene test across three groups, the numerator degrees of freedom would ordinarily correspond to $k - 1$, which would be 2 rather than 1. The authors should verify the statistical output, identify exactly which test was performed, and correct the reported degrees of freedom if necessary. This discrepancy raises concern regarding transcription of the statistical output and warrants rechecking all inferential statistics against the original analysis files.

Table 2 and its accompanying paragraph should provide complete ANOVA reporting. At present, effects are reported as, for example, “ $F = 13.90, p < .01, \eta^2 = .54$,” but no numerator or denominator degrees of freedom are supplied. APA-style reporting should include the complete statistic, such as $F(df1, df2) = \text{value}, p = \text{value}$, together with an appropriately identified effect-size estimate. The manuscript should also clarify whether η^2 represents eta squared or partial eta squared, because

repeated-measures software commonly reports partial eta squared. The same notation should be used consistently in the Abstract, Results, tables, and Discussion.

Authors revised the manuscript and uploaded the document.

1.2. Reviewer 2

Reviewer:

The sensory–motor integration protocol similarly needs greater procedural detail. The sentence “The intervention was designed to provide structured sensory and motor experiences with particular emphasis on vestibular, proprioceptive, and tactile stimulation” is conceptually appropriate but does not provide enough information to reproduce the intervention. The authors should identify specific exercises, equipment, intensity, duration of individual activities, progression across sessions, number of repetitions, rest periods, safety procedures, and whether activities were standardized or individualized according to each child’s sensory profile. It is also important to distinguish the intervention from formal Ayres Sensory Integration if the latter fidelity criteria were not followed; terminology should accurately reflect the actual treatment delivered.

Treatment fidelity should be addressed for both intervention groups. The manuscript currently describes intervention content but does not indicate whether adherence to the planned protocol was monitored. The authors should report whether session checklists, therapist supervision, independent observation, video review, or another fidelity procedure was used. Treatment fidelity is particularly important in a comparative intervention study because the conclusion that sensory–motor integration was superior to cognitive restructuring assumes that both interventions were delivered consistently and with comparable treatment exposure. Session attendance should also be reported by group, including whether any participant missed sessions and how missed sessions were handled.

The control condition requires a more rigorous description. The Methods states that “the control group received no research-related intervention during the study period,” but it is unclear whether these children continued receiving routine educational, rehabilitation, occupational therapy, behavioral, or clinical services. If usual care continued, the comparator should be described as a treatment-as-usual or usual-care control rather than simply “no intervention.” If routine therapies were restricted, this raises different methodological and ethical considerations. The authors should therefore specify exactly what the control participants received during the six-session period and whether access to other services differed among the three groups.

The demographic results in the first paragraph of the Findings should be expanded to demonstrate baseline comparability across groups. The manuscript reports that 26 participants were girls and 19 were boys and gives the overall age distribution, but these characteristics are not presented separately for the sensory–motor integration, cognitive restructuring, and control groups. Because only 15 participants were assigned to each condition, even modest imbalances in age, sex, ASD severity, language ability, or baseline executive functioning could influence outcomes. The authors should present group-specific demographic and clinical characteristics and statistically or descriptively assess whether important baseline differences were present before intervention.

The statistical-assumption section contains analyses that appear inconsistent with the stated repeated-measures ANOVA framework. Specifically, the manuscript reports tests of “homogeneity of regression slopes” based on interactions between pretest scores and group membership. Homogeneity of regression slopes is primarily an assumption of ANCOVA, not conventional repeated-measures ANOVA. If the authors used repeated-measures ANOVA without baseline scores entered as covariates, this analysis is unnecessary and should either be removed or its methodological purpose explained. Conversely, if an ANCOVA or mixed ANCOVA was actually performed, the statistical analysis section and tables should be revised to accurately reflect the model used.

The repeated-measures assumptions are incomplete because the manuscript does not report a test of sphericity. The Methods states that “the assumption of sphericity” was examined, but the Findings provide no Mauchly’s test statistic, degrees of freedom, or significance value, nor do they report a Greenhouse–Geisser or Huynh–Feldt correction. Since each dependent variable was assessed at three time points, sphericity is directly relevant to the within-subject time effect and time $\times$ group interaction. The authors should report Mauchly’s test for each outcome and, where violated, provide corrected degrees of

freedom and corrected p values. The statistical tables should include the corresponding degrees of freedom rather than reporting only F , p , and effect size.

Authors revised the manuscript and uploaded the document.

2. Revised

Editor's decision: Accepted.

Editor in Chief's decision: Accepted.