

Comparing the Effectiveness of Cognitive Rehabilitation and Play-Based Intervention on Reducing Behavioral Problems in Children with Autism Spectrum Disorder: A Quasi-Experimental Study

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Abstract

Background: Behavioral problems are among the most common challenges in children with Autism Spectrum Disorder (ASD), often leading to difficulties in social adjustment and family functioning. Finding effective interventions to reduce these behavioral difficulties is a continuing concern for clinicians and researchers.

Objective: This study aimed to compare the effectiveness of cognitive rehabilitation and play-based intervention in reducing behavioral problems among children with ASD.

Methods: A quasi-experimental design with pre-test, post-test, and control group was employed. Thirty-six children with ASD, aged 6 to 12 years, were selected through purposive sampling from autism rehabilitation centers in Marand, Iran, and randomly assigned to three groups: cognitive rehabilitation, play-based intervention, and control. The Strengths and Difficulties Questionnaire (SDQ) was used for assessment. The interventions lasted for 10 to 12 sessions, each 40–60 minutes, held twice weekly. Data were analyzed using SPSS-26 with mixed ANOVA and Bonferroni post-hoc tests.

Results: Both cognitive rehabilitation and play-based intervention significantly reduced behavioral problems compared to the control group ($p < 0.05$). However, no significant difference was found between the two experimental groups.

Conclusion: Cognitive rehabilitation and play-based approaches are both effective in improving behavioral outcomes in children with ASD. Integrating these methods into educational and therapeutic programs may enhance emotional regulation and social functioning in affected children.

Keywords: Autism Spectrum Disorder, Behavioral Problems, Cognitive Rehabilitation, Play-Based Intervention, Quasi-Experimental Study.

Introduction

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by deficits in social communication, restricted interests, and repetitive behaviors. In recent years, the global prevalence of ASD has increased, creating major concerns for families, healthcare systems, and educational settings. Children with ASD frequently experience behavioral difficulties such as aggression, irritability, inattention, and noncompliance.

These behavioral problems not only affect their learning and adaptation but also place a heavy psychological and emotional burden on parents and caregivers, particularly mothers. Managing these behavioral problems requires a multidimensional approach that considers cognitive, emotional, and social aspects of the child's functioning. Numerous therapeutic models have been proposed to address behavioral difficulties in ASD, ranging from behavioral modification programs to play therapy and cognitive-based interventions. Two of the most promising approaches in this regard are cognitive rehabilitation and play-based intervention, both of which aim to enhance cognitive and emotional functioning but through different mechanisms. Cognitive rehabilitation focuses on improving attention, memory, problem-solving, and executive functioning through structured mental exercises and gradual task progression. This approach helps children develop cognitive control, which can indirectly reduce impulsive or maladaptive behaviors. In contrast, play-based intervention utilizes structured or semi-structured play to foster communication, social interaction, and emotional regulation in a naturalistic environment. Through play, children can express their inner experiences, develop empathy, and learn adaptive social responses. While several studies have demonstrated the effectiveness of each method independently, there remains a lack of comparative research examining the relative efficacy of these two approaches within the same population. Understanding whether cognitive rehabilitation or play-based intervention produces greater behavioral improvements can provide valuable guidance for clinicians, therapists, and educators working with children on the autism spectrum. In the Iranian context, research on ASD interventions is still emerging, and cultural factors play a significant role in shaping both family dynamics and therapeutic outcomes. Therefore, conducting a comparative study in this setting contributes not only to evidence-based practice but also to the localization of effective therapeutic strategies. Accordingly, the present study was designed to compare the effectiveness of cognitive rehabilitation and play-based intervention in reducing behavioral problems among children with ASD. It was hypothesized that both interventions would lead to significant reductions in behavioral difficulties compared to the control group, but the degree of effectiveness between the two methods might vary depending on the specific nature of each intervention.

Methodology

This study employed a **quasi-experimental design** with **pre-test, post-test, and a control group**, aiming to compare the effectiveness of cognitive rehabilitation and play-based intervention in reducing behavioral problems among children with Autism Spectrum Disorder (ASD).

Participants and Sampling:

The study population included children diagnosed with ASD who were receiving services from autism rehabilitation centers in Marand, Iran, during 2023. Using a purposive sampling method, 36 children aged between 6 and 12 years were selected based on clinical diagnosis by a child psychiatrist and confirmation from the rehabilitation centers. The inclusion criteria were: (a) a confirmed diagnosis of ASD, (b) no comorbid intellectual disability,

(c) absence of concurrent psychological interventions, and (d) parental consent to participate. Exclusion criteria included irregular attendance or incomplete participation in the intervention sessions.

After recruitment, participants were randomly assigned to three equal groups (n=12 per group):

1. **Cognitive Rehabilitation Group**
2. **Play-Based Intervention Group**
3. **Control Group** (no structured intervention; received only routine center-based education).

Instruments:

Data were collected using the **Strengths and Difficulties Questionnaire (SDQ)** developed by Goodman (1997). The SDQ is a 25-item behavioral screening tool that measures five domains: emotional symptoms, conduct problems, hyperactivity, peer relationship problems, and prosocial behaviors. The Persian version of the SDQ has demonstrated acceptable validity and reliability in prior studies.

Intervention Procedures:

The cognitive rehabilitation program consisted of 12 structured sessions, each lasting 40 to 60 minutes, held twice weekly. The sessions included activities designed to enhance attention, working memory, cognitive flexibility, and problem-solving skills through interactive and task-based exercises.

The play-based intervention involved 10 sessions of semi-structured play therapy, also lasting 40 to 60 minutes per session, conducted twice a week. These sessions focused on developing communication, cooperation, and emotional expression through role-play, storytelling, and symbolic play activities tailored to the developmental level of each child.

Both interventions were administered by trained therapists under the supervision of clinical psychologists specializing in child development. The control group continued their

usual rehabilitation schedule without additional interventions during the study period.

Data Collection and Analysis:

Pre-test and post-test data were collected using the SDQ for all participants. Data were analyzed using SPSS version 26, employing descriptive statistics (mean and standard deviation) and inferential statistics, including mixed-design ANOVA and Bonferroni post-hoc tests to examine group differences and time effects. Statistical significance was set at $p < 0.05$.

Ethical Considerations:

The study adhered to the ethical principles of research involving human participants. Approval was obtained from the Ethics Committee of Tabriz University of Medical Sciences. Informed consent was received from all parents prior to data collection. Confidentiality and anonymity of participants were maintained throughout the study, and participation was voluntary, with the right to withdraw at any time.

Results

The statistical analysis was conducted using SPSS version 26 to examine the effects of the interventions on behavioral problems among children with Autism Spectrum Disorder (ASD). Descriptive statistics, including means and standard deviations, were first calculated for the pre-test and post-test scores in all three groups (cognitive rehabilitation, play-based intervention, and control).

Descriptive Findings

At baseline, there were no significant differences among the three groups in terms of behavioral problem scores. Following the intervention period, the mean post-test scores in both the cognitive rehabilitation and play-based intervention groups decreased noticeably compared to the control group, indicating improvements in behavioral outcomes.

Table 1. Mean and Standard Deviation of Behavioral Problems Scores in Pre-test and Post-test

| Group | Pre-test (Mean \pm SD) | Post-test (Mean \pm SD) | Mean Difference |
|---------------------------------|--------------------------|---------------------------|-----------------|
| Cognitive Rehabilitation | 19.83 \pm 4.21 | 13.41 \pm 3.82 | -6.42 |
| Play-Based Intervention | 20.16 \pm 3.94 | 14.03 \pm 4.05 | -6.13 |
| Control | 19.50 \pm 4.07 | 19.08 \pm 3.76 | -0.42 |

As presented in Table 1, both intervention groups demonstrated substantial reductions in behavioral problem scores, while changes in the control group were minimal.

Inferential Findings

The results of the **mixed-design ANOVA** revealed a significant main effect of time ($F(1,33) = 24.87, p <$

0.001) and a significant interaction effect between time and group ($F(2,33) = 17.54, p < 0.001$). These findings indicate that the changes in behavioral scores over time differed significantly among the three groups.

Further pairwise comparisons using the **Bonferroni post-hoc test** showed that both cognitive rehabilitation and play-based intervention groups had significantly greater reductions in behavioral problems compared to the control group ($p < 0.05$). However, the difference between the two intervention groups was not statistically significant ($p > 0.05$), suggesting that both methods were equally effective in improving behavioral regulation and social functioning in children with ASD.

A visual representation of the results (Figure 1) illustrates the reduction in behavioral problem scores across the three groups from pre-test to post-test. The graph clearly shows a downward trend in the two intervention groups compared with the control group, highlighting the positive impact of both therapeutic approaches.

Summary of Findings

The findings support the hypothesis that both cognitive rehabilitation and play-based interventions are effective in reducing behavioral problems among children with ASD. The similarity in their impact suggests that both approaches can be considered complementary tools in behavioral management and social skill enhancement programs for children on the autism spectrum.

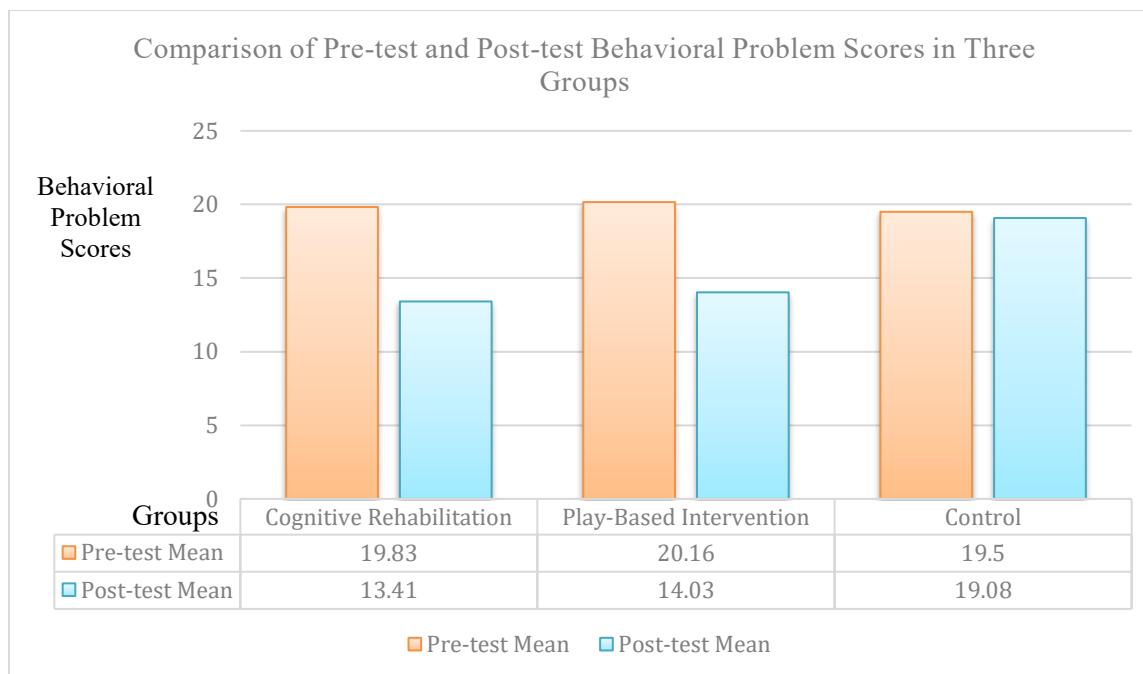


Figure (1). Comparison of Pre-test and Post-test Behavioral Problem Scores in Three Groups

Discussion

The findings of the present study demonstrated that both cognitive rehabilitation and play-based intervention were effective in reducing behavioral problems among children with Autism Spectrum Disorder (ASD), while no significant difference was observed between the two intervention methods. These results suggest that both cognitive and play-oriented therapeutic approaches can contribute meaningfully to the improvement of behavioral regulation and social functioning in children with ASD.

The significant reduction in behavioral problems among participants who received cognitive rehabilitation supports previous research emphasizing the importance of cognitive training in the

management of ASD-related symptoms. Cognitive rehabilitation strengthens executive functions such as attention, working memory, and problem-solving, which are essential for self-regulation and adaptive behavior. Enhanced cognitive control allows children to better manage impulsivity and emotional reactions, thereby reducing the frequency and intensity of behavioral difficulties.

Similarly, the observed improvement in the play-based intervention group aligns with prior studies that highlight the therapeutic value of play in child development. Play-based interventions offer children an opportunity to express emotions, communicate needs, and develop social understanding in a natural, engaging context. Through guided play, children can learn turn-taking, cooperation, and empathy, which in

turn foster improved social adjustment and reduced behavioral conflicts.

The absence of a statistically significant difference between the two experimental groups suggests that both methods operate through distinct yet complementary mechanisms. Cognitive rehabilitation primarily targets neurocognitive processes underlying behavior regulation, while play-based therapy focuses on socio-emotional learning and experiential growth. The comparable efficacy of these interventions implies that integrating cognitive and play-based components could yield even greater benefits for children with ASD, especially when delivered in a structured, family-centered framework.

These findings are consistent with the growing body of evidence emphasizing the need for multimodal interventions in autism therapy. A combination of cognitive training and play-based engagement may provide a holistic approach that simultaneously addresses the cognitive and emotional domains of functioning. Such integrated approaches can enhance not only behavioral outcomes but also parental satisfaction and family well-being.

From a cultural perspective, the context of this study in Iran underscores the role of familial involvement and community support in therapeutic success. Given the stigma often associated with ASD in some societies, interventions that promote active parental participation and accessible therapeutic modalities are particularly valuable.

Limitations and Future Directions:

Although the study achieved its objectives, certain limitations should be acknowledged. The relatively small sample size and limited geographic scope restrict the generalizability of findings. Future research with larger and more diverse samples, longer follow-up periods, and combined intervention models is recommended to verify and expand upon these results.

In conclusion, the present study highlights that both cognitive rehabilitation and play-based intervention are effective, practical, and culturally adaptable methods for reducing behavioral problems in children with ASD. Integrating these approaches within rehabilitation and educational programs can promote better emotional regulation, social communication, and overall quality of life for children and their families.

Conclusion

The present study aimed to compare the effectiveness of cognitive rehabilitation and play-based intervention in reducing behavioral problems among children with Autism Spectrum Disorder (ASD). The findings revealed that both interventions significantly improved behavioral outcomes compared to the control group, while no meaningful difference was observed between the two methods.

These results highlight that both cognitive and play-based approaches can serve as effective therapeutic strategies for managing behavioral difficulties in

children with ASD. Cognitive rehabilitation enhances executive functions such as attention, memory, and self-regulation, whereas play-based intervention promotes emotional expression, communication, and social competence through interactive experiences. Together, these approaches address complementary domains of child development—cognition and emotion—thereby offering a comprehensive model for behavioral improvement.

From a practical standpoint, the results emphasize the importance of integrating evidence-based interventions into rehabilitation and educational programs for children with ASD. Therapists and educators are encouraged to adopt flexible, child-centered methods that combine cognitive training with structured play activities to maximize engagement and therapeutic benefit.

Furthermore, this study underscores the need for continued professional training and parental involvement in the management of autism-related behavioral problems. Empowering parents with strategies derived from both cognitive and play-based frameworks can help sustain the child's progress beyond the clinical setting.

Although the current findings are promising, future research should aim to replicate them with larger and more diverse samples and to examine the long-term effects of such interventions. Evaluating hybrid models that combine cognitive rehabilitation with play-based activities could further enhance the scope and sustainability of behavioral improvements in children with ASD.

In conclusion, both cognitive rehabilitation and play-based intervention represent valuable, practical, and culturally adaptable tools that can meaningfully enhance behavioral, emotional, and social functioning in children with autism spectrum disorder.

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