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ARTICLE

THE CLINICAL STUDY OF TCM SANDPLAY THERAPY ON THE PSYCHOLOGICAL INTERVENTION FOR PRESCHOOL CHILDREN WITH AUTISM SPECTRUM DISORDER

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ABSTRACT

Objective: To explore the efficacy of TCM Sandplay on the psychological and behavioral symptoms of preschool children with ASD. Methods: Sixty children with ASD were randomly divided into two groups, each with 30 people. The control group adopted comprehensive intervention strategies such as structured education; the experimental group received TCM Sandplay intervention on top of the control group. Both groups used the Autism Behavioral Assessment Scale (ABC) to score before, 2 months after, and 4 months after intervention. In addition, the experimental group also used the TCM sand tray five element analysis method to score the sand tray works before, 2 months after, and 4 months after intervention. Results: There was a significant difference in the total number of sand tray space toys between the experimental group before and after intervention (P<0.05), and the number of sand tray space toys increased after intervention. There was also a significant difference in the traffic of the sand tray space before and after intervention in the experimental group (P<0.05), with the traffic of the sand tray space strengthened after intervention. Within the two groups, there were significant differences in the total scores and scores of various aspects such as sensation, interaction, movement, language, and self-care before and after intervention (P<0.05). Between the two groups, there were no significant differences in the scores of sensation, movement, and self-care 2 months after intervention (P>0.05), but there were significant differences in the scores of interaction and speech (P<0.05), and the experimental group's scores were lower than the control group's. At 4 months after intervention, there were significant differences in the total scores and scores of various aspects for both groups (P<0.05), and the total score of the experimental group was lower than that of the control group. Conclusion: TCM sandplay can significantly improve the psychological and behavioral symptoms of preschool children with ASD.

KEYWORDS

ASD, TCM sandplay, total number of sand tray space, traffic of sand tray space

1. Introduction

Autism spectrum disorder (ASD) is a broad definition of autism based on the core symptoms of typical autism, including not only typical autism but also atypical autism, Asperger's syndrome, autism border, and suspected autism.

For this disease, the main approaches are educational rehabilitation techniques, physical therapy, and psychological treatment. Among them, psychological treatment mainly adopts game-based psychological intervention techniques. As an important component of game therapy, sandplay therapy is widely used in various children's psychological and behavioral disorders, including ASD, both at home and abroad. Twenty years ago, researchers at home and abroad gradually applied sandplay therapy to the psychological intervention of children with ASD, achieving some results. However, most of the research was case-based and lacked evidence-based research support, making it difficult to gain widespread recognition from the clinical psychology community (Boo, 2014; Kou, 2005; Lu et al., 2010; Qiu, 2001; Yuan, 2015). In the past five years, a few researchers have begun to explore the application of sandplay therapy in children with ASD using the clinical experiment paradigm, and have obtained some evidence-based research results

(Chen and Chen, 2018; Guo and Li, 2021; Lin, 2019; Zhou et al., 2019). However, the intervention cycles in these studies varied from 12 weeks (Zhao et al., 2019) to 28 weeks (Lin, 2019), lacking consistency and causing reliability issues. In addition, the long intervention cycle led to a high dropout rate among research subjects, resulting in a higher burden on families during treatment and making it difficult for sandplay therapy to achieve effective and widespread application in ASD (Sharif Daraadi et al., 2019; Wiersma et al., 2022).

TCM Sandplay is a modern psychological intervention technique that develops on the basis of traditional sandplay therapy, using traditional Chinese psychological theory to create a technique that can both diagnose and treat (Chen, 2014a; Chen, 2014b). China's famous traditional Chinese psychologist, Professor Wang Weidong (2013), believes that TCM Sandplay Therapy draws on some ideas and techniques of traditional Chinese medicine, which is consistent with the cultural background and social historical characteristics of the Chinese people. Moreover, the intervention cycle is short and the total number of interventions is fewer, which can better meet the actual psychological intervention needs of the Chinese people. In recent years, some researchers have used TCM Sandplay Therapy in case studies of children with ASD and have achieved good clinical effects.

Based on the evidence-based research paradigm, in order to further verify the application effect of TCM Sandplay Therapy in the psychological intervention of children with ASD, it is necessary to conduct relevant research according to the research design of clinical trial studies.

2. Methods

2.1 Research subjects

Sixty cases of children aged 3-6 with mild to moderate autism spectrum disorder who visited the Fourth People's Hospital of Yulin from August 2022 to September 2023 were selected as research subjects.

Inclusion criteria include: (1) meeting the diagnostic criteria for autism spectrum disorder in the fifth edition of the American Diagnostic and Statistical Manual of Mental Disorders (DSM-V); (2) aged 3-6; (3) guardians voluntarily agree to treatment and sign informed consent forms.

Exclusion criteria: (1) children with physical disabilities such as visual and auditory impairments, congenital deformities, and other chronic somatic diseases; (2) those who cannot participate in the intervention throughout.

This study was approved by the Ethics Committee of the Fourth People's Hospital of Yulin (2022001), and no adverse events occurred during the research process.

2.2. Group intervention

A simple random grouping method was used to randomly divide the research subjects into the control group and the Experimental Group, with 30 cases in each group. There were no significant differences in age, gender, birth history, age of onset, disease course, age of main caregivers, educational level, and family monthly income between the two groups (P<0.05) (see Table 1).

2.2.1 Control group

The conventional comprehensive intervention was given, including structured education, applied behavior analysis therapy, sensory integration training, and family training. Among them, structured education is conducted once a day, 90 minutes each time, 6 times a week, and the course lasts for 4 months; applied behavior analysis therapy is conducted once a day, 120 minutes each time, 6 times a week, and the course lasts for 4 months; sensory integration training is conducted twice a day, 30 minutes each time, and the course lasts for 4 months; family training is conducted once a day, 30 minutes each time, and the course lasts for 4 months.

2.2.2 Experimental group

The Experimental Group, based on the comprehensive intervention strategy adopted by the control group, also implements traditional Chinese sand tray therapy. The traditional Chinese sand tray therapy is conducted once every 5 days, lasting 1-1.5 hours each time, with a course of 4 months. The operation process is as follows: (1) Contact Stage: When conducting traditional Chinese sand tray therapy for the first time, the therapist will briefly introduce it and guide the child to touch the sand, becoming familiar with the sequence and rules of traditional Chinese sand tray therapy; (2) Relationship-building Stage: The first 1-2 treatments will allow the child to play freely, understand the child's individual situation, and establish a relationship with the child; (3) Traditional Sand Tray Intervention Stage: In the subsequent treatments, the child, accompanied by the therapist, will create various scenarios in the sandbox using the provided sandbox and various toys. For children with better abilities, they can autonomously choose and place sand toys, while for children with poorer abilities, the therapist will select the sand toys and guide the child during the treatment; (4) Traditional Chinese Sand Tray Intervention Stage: The therapist should, based on the initial sand tray work's traditional Chinese psychology assessment results, use the treatment techniques of traditional Chinese sand tray therapy to make positive adjustments to the child's sand tray work, improving the balance of power in their spiritual world; (5) End Stage: When the child stops playing voluntarily, the single treatment can be ended. It is necessary to note that throughout the intervention process, the therapist should carefully observe the child's nonverbal and verbal expressions and changes, as well as the changes in their sand tray work. The therapist should actively respond during the child's play, using imitation and other techniques to establish a connection with the child.

2.3 Research Instruments

2.3.1 Traditional Chinese sand tray five elements analysis

The Traditional Chinese Sand Tray Five Elements Analysis is a psychological and physical assessment technique in the Traditional Chinese Sand Tray Therapy. By quantitative and qualitative analysis of sand tray works, it can carry out evaluation of the traditional Chinese psychological and physiological conditions of the subjects. The Traditional Chinese Sand Tray Five Elements Analysis includes measurement and analysis of the total number of sand figures in the sand tray space, the number of sand figures in the five regions (Gold, Wood, Water, Fire, Earth) in the sand tray (sand tray), the ratio of the number of sand figures in the regional space to the total number of sand figures in the sand tray space, and the traffic in each regional space. Then, the overall traditional Chinese psychological and physiological conditions of the subjects can be evaluated.

Specifically, the five elements corresponding to gold, wood, water, fire, and earth in traditional Chinese medicine refer to the five organs (physical) and the five emotions (mental) such as lungs, liver, kidneys, heart, and spleen. The total number of sand figures in the sand tray space reflects the degree of physical and mental activity of the subjects; the number of sand figures in each region corresponding to each of the five elements in the sand tray space reflects the degree of activity of the corresponding five organs (physical) and the five gods or emotions (mental); the ratio of the number of sand figures in the regional space to the total number of sand figures in the sand tray space reflects the relative degree of activity of each of the five elements corresponding to the five organs (physical) and the five gods or emotions (mental); the traffic between the regions reflects the communication between the two corresponding elements, reflecting the communication between the corresponding two five organs (physical) or five gods or emotions (mental), such as production, conquest, and insult. When the value is =0, it represents the lack of communication between the two divine (row) regions; when the value is =1, it represents the ability of the corresponding two divine (row) regions to communicate.

In the specific evaluation and analysis, it is necessary to use standardized individual sand trays (sand trays) and Five Elements Division Ruler to separate and measure the five elements space.

2.3.2 Autism Behavioral Checklist (ABC) for children

The ABC scale is a self-report scale, filled out by parents based on the

Table 1: Comparison of general information between the experimental and control groups

Item	Experimental group (n=30)	Control group (n=30)	$X^2/t/Z$	*P*
Age （$\bar{x} \pm s$）	4.68±1.33	4.36±1.25	1.021	0.275
Gender	-	-	0.352	0.532
Male	17	20	-	-
Female	13	10	-	-
Birth history	-	-	0.319	0.553
Age of onset	-	-	-1.169	0.237
Duration of illness	-	-	-1.319	0.189
Age of main caregiver		-	-0.394	0.642
Level of education	-	-	-1.249	0.197
Monthly family income		-	-1.456	0.138

Table 2: Multivariate test of sandbox space toy total number data

Multivariate Tests

Effect	-	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
time	Pillai's Trace	0.973	508.177[b]	2.000	28.000	0.000	0.973
-	Wilks' Lambda	0.027	508.177[b]	2.000	28.000	0.000	0.973
-	Hotelling's Trace	36.298	508.177[b]	2.000	28.000	0.000	0.973
-	Roy's Largest Root	36.298	508.177[b]	2.000	28.000	0.000	0.973

actual situation of their children. It is mainly used for the diagnosis and assessment of the severity of children with autism spectrum disorder, and is mainly suitable for children aged 3-6. There are a total of 57 items, divided into five dimensions: sensory, social interaction, body movement, language, and self-care. The sensitivity of the scale is 0.38-0.58, and the specificity is 0.76-0.97. Higher scores represent more severe autism, and lower scores represent milder autism. When the total score on the scale is ≥67, autism spectrum disorder can be diagnosed.

2.3.3 Image measurement analysis software

The Image-Pro plus 6.0 image analysis software is used to measure the spatial area and number of sand toys in the sandbox artwork photographed.

2.4 Statistical analysis

SPSS 26.0 statistical software is used for statistical analysis, and Origin 21 is used for statistical plotting. The measured data is represented by ±*s*, and t test, X2 test, and Z test are used to compare the general data, with 0.05 as the level of testing to determine whether the difference is statistically significant. Repeated measurement analysis is used to compare the differences in TCM sandbox scores at three time Group and the control group; repeated measurement analysis is used to compare the differences in ABC scores between the two groups at three time points (before intervention, 2 months after intervention, and 4 months after intervention); t test is used to compare the differences in scores between the two groups.

3. Results

3.1 Comparison of TCM sandbox scores before and after intervention in the experimental group

3.1.1 Comparison of the total number of sand toys in the sandbox space before and after intervention in the TCM sandbox scores of a single case in the Experimental Group

A total of 30 children with autism spectrum disorder were included in the Experimental Group, and their sandbox works were photographed and recorded at three time points before intervention, 2 months after intervention, and 4 months after intervention. Figures 1-3 show the sandbox works of Child A with autism spectrum disorder in the Experimental Group before, 2 months after, and 4 months after intervention. Overall, the total number of sand toys in Child A's sandbox space gradually increased, from 2 before intervention to 9 after 2 months and 31 after 4 months.

3.1.2. Comparison of the total number of sand toys in the sandbox space before and after intervention in TCM sandbox scores for the entire Experimental Group

Repeated measurement analysis was performed on the data of the total number of sand toys in the sandbox space before and after intervention in the Experimental Group. The results of the multivariate ANOVA confirmed that there were differences in the total number of sand toys in the sandbox space at the three time points before intervention ($P<0.05$), 2 months after intervention, and 4 months after intervention (see Table 2), and the total number of sand toys in the sandbox space gradually increased with the increase of intervention time (see Figure 4).

3.1.3. Comparison of sandbox space traffic before and after intervention in TCM sandbox scores for the entire experimental group

Repeated measurement analysis was performed on the data of sandbox space traffic before and after intervention in the Experimental Group. The results of the test confirmed that there were differences in sandbox space traffic at the three time points before intervention ($P<0.05$), 2 months after intervention, and 4 months after intervention (see Table 3), and the sandbox space traffic gradually increased after intervention (see Figure 5).

3.2 Comparison of ABC scores between the two groups

3.2.1 Intragroup ABC score comparison

The experimental group and the control group were compared within each group. As shown in Table 4, the experimental group and the control group were compared at the 4-month intervention time point, the

Figure 1: Sandplay artwork of Child A with Autism Spectrum Disorder in the experimental group before intervention

Figure 2: Sandplay artwork of Child A with Autism Spectrum Disorder in the experimental group after 2 months of intervention

Figure 3: Sandplay artwork of Child A with Autism Spectrum Disorder in the experimental group after 4 months of intervention

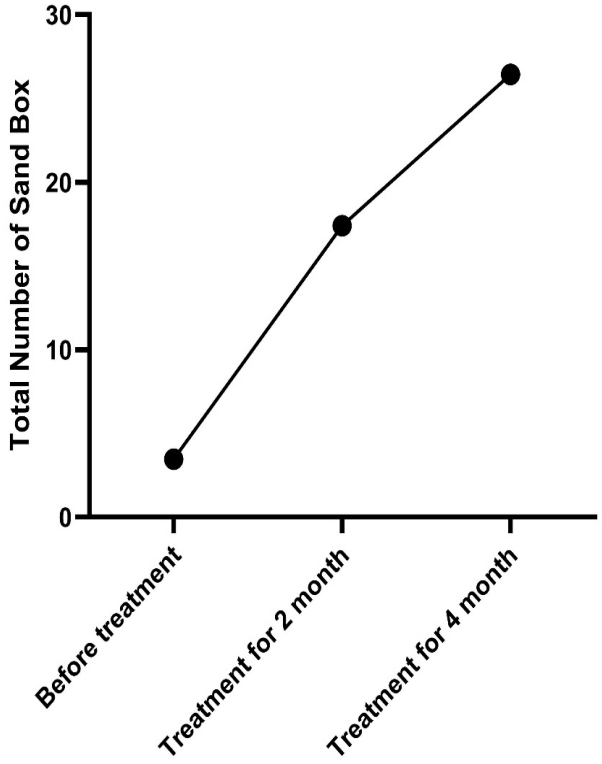

Figure 4: Comparison of sandplay items in the sandbox space before and after the intervention in the experimental group

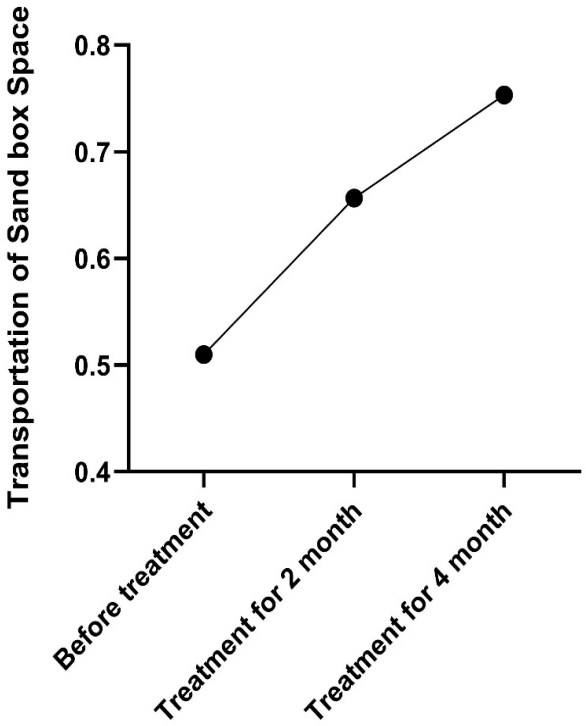

Figure 5: Comparison of Sandbox Space Traffic Before and After Intervention in the Experimental Group

2-month intervention time point, and the pre-intervention time point, respectively. There were differences in the total scores and the scores of the sensory, social, motor, language, and self-care aspects on the ABC scale between the two groups (P<0.05).

As shown in Figure 6, C-S-B, C-S-2, and C-S-4 represent the perceptual scores of the control group at three time points before and after intervention, C-R-B, C-R-2, and C-R-4 represent the social scores of the control group at three time points before and after intervention, C-B-B, C-B-2, and C-B-4 represent the physical movement scores of the control

Table 3: Wilcoxon Test of Sandbox Space Traffic Data

Wilcoxon Signed Ranks Test Statistics			
	Intervene in February Traffic-Traffic Before Intervention	**Intervene in February Traffic - Intervene in April Traffic**	**Intervene in April Traffic - Traffic Before Intervention**
Z	-3.78	-3.482	-4.229
Asymp. Sig. (2-tailed)	0.000	0.000	0.000

Table 4: Comparison of ABC scores before and after intervention within each group ($\overline{x} \pm s$, score)

Group	Item	Before treatment	Treatment for 2 months	Treatment for 4 months	*F*	*P*
Control group	Total score	84.80±5.24	63.87±1.68	56.83±4.09	321.453	0.00
	Sensory	15.30±2.35	12.17±1.56	11.03±1.33	39.494	0.00
	Relating	19.83±2.31	12.87±1.70	11.37±1.25	158.108	0.00
	Body	12.40±1.91	11.23±0.86	10.00±0.87	29.707	0.00
	Language	19.13±3.01	14.87±0.94	12.87±1.22	101.152	0.00
	Self-help	18.13±2.79	12.73±1.41	11.57±1.28	68.537	0.00
Experimental group	Total score	84.77±5.12	58.53±1.53	50.20±10.01	420.699	0.00
	Sensory	16.10±3.47	12.47±1.14	10.00±1.20	76.894	0.00
	Relating	19.77±1.96	10.90±0.80	9.70±0.88	338.632	0.00
	Body	12.43±1.43	11.03±0.93	9.00±0.788	395.777	0.00
	Language	18.70±2.59	11.07±0.98	10.23±0.82	157.466	0.00
	Self-help	17.77±2.37	13.07±1.17	9.63±1.10	219.821	0.00

group at three time points before and after intervention, C-L-B, C-L-2, and C-L-4 represent the language scores of the control group at three time points before and after intervention, C-H-B, C-H-2, and C-H-4 represent the self-care scores of the control group at three time points before and after intervention, and C-T-B, C-T-2, and C-T-4 represent the total scores of the control group at three time points before and after intervention. The control group was compared within each group at the 4-month intervention time point, the 2-month intervention time point, and the pre-intervention time point. The total scores and the scores of the sensory, social, motor, language, and self-care aspects on the ABC scale gradually decreased.

As shown in Figure 7, T-S-B, T-S-2, and T-S-4 represent the perceptual scores of the experimental group at three time points before and after intervention, T-R-B, T-R-2, and T-R-4 represent the social scores of the experimental group at three time points before and after intervention, T-B-B, T-B-2, and T-B-4 represent the physical movement scores of the experimental group at three time points before and after intervention, T-L-B, T-L-2, and T-L-4 represent the language scores of the experimental group at three time points before and after intervention, T-H-B, T-H-2, and T-H-4 represent the self-care scores of the experimental group at three time points before and after intervention, and T-T-B, T-T-2, and T-T-4 represent the total scores of the experimental group at three time points before and after intervention. The experimental group was compared within each group at the 4-month intervention time point, the 2-month intervention time point, and the pre-intervention time point. The total scores and the scores of the sensory, social, motor, language, and self-care aspects on the ABC scale gradually decreased.

3.2.2. Comparison of ABC Scores between the Two Groups

Compare the experimental group and the control group. As shown in Table 5, there was no difference between the two groups in the total ABC score and individual scores before the intervention ($P>0.05$). At the 2-month intervention time point, there was no difference between the two groups in sensory, motor, and self-care scores ($P>0.05$), but there was a difference in social and language scores ($P<0.05$), with the score of the experimental group lower than that of the control group. At the 4-month intervention time point, the total scores of both groups were less than 67, confirming that both intervention measures were effective, and there were differences in both total scores and individual scores ($P<0.05$) between the two groups, with the total score of the experimental group lower than that of the control group (see Figure 8), indicating that the intervention measures of the experimental group were more effective.

4. Discussion and Conclusion

Previous studies mainly relied on modern psychological measurement methods to assess autism spectrum disorder. In this paper, the traditional Chinese medicine sand tray five elements analysis method was first used as a psychological assessment method and tool for autism spectrum disorder. Some exploration and analysis of the psychological mechanism of traditional Chinese medicine in autism spectrum disorder were conducted. It was found that the total number of sand figures in the sand tray space and the traffic conditions of each five elements region could reflect the inner psychological state of autism spectrum disorder. The total number of sand figures in the sand tray space was indeed an indicator of the overall psychological activity of the tested person. As the psychological intervention progressed, although the psychological activity levels reflected by each five elements region in the sand tray space varied, including changes, the psychological activity of children with autism spectrum disorder indeed gradually increased. Moreover, the traffic in each five elements region space gradually increased, reflecting the interactive influence of the psychological activities represented by each five elements region and gradually occurred integrative psychological changes. “The Yellow Emperor’s Inner Canon - Simple Questions - Spiritual Orchid Secret Book” points out that “the twelve official organs (i.e., the internal organs) must not be lost to each other.” According to the theory of traditional Chinese psychology, a person’s complete and normal psychological (mental) activity is not simply attributed to different organs, but in the coordination and harmony of the five internal organs, which produces normal psychological (mental) activity. Therefore, autism spectrum disorder may lack the overall coordination of the five spirits (five internal organs), and thus also lack complete and normal psychological (mental) activity. The effective psychological interventions, including traditional Chinese medicine sand tray therapy, adopted in this paper can promote

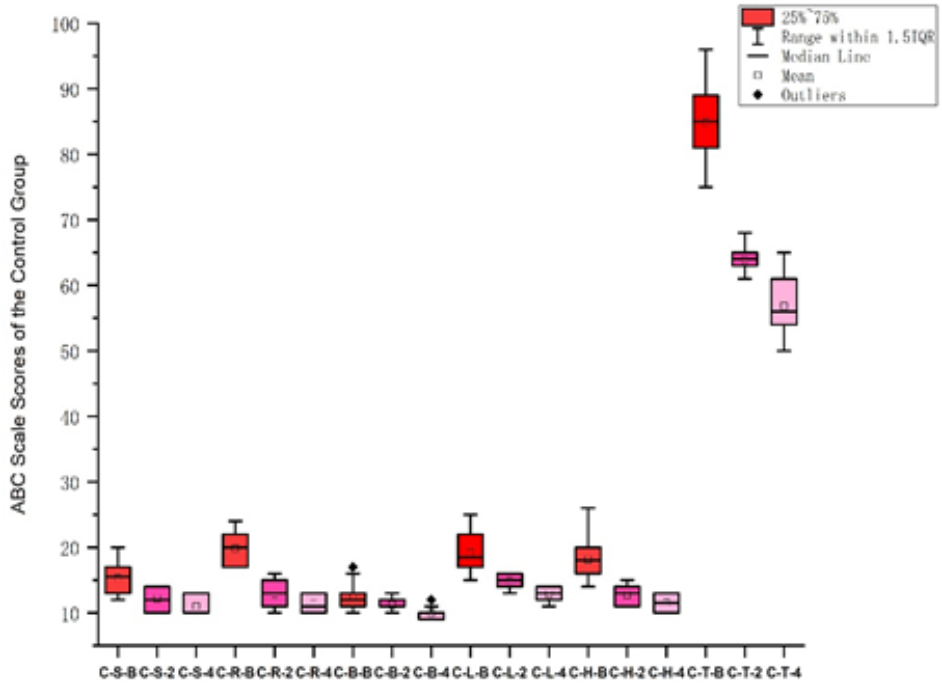

Figure 6: Comparison of ABC scores before and after intervention in the control group

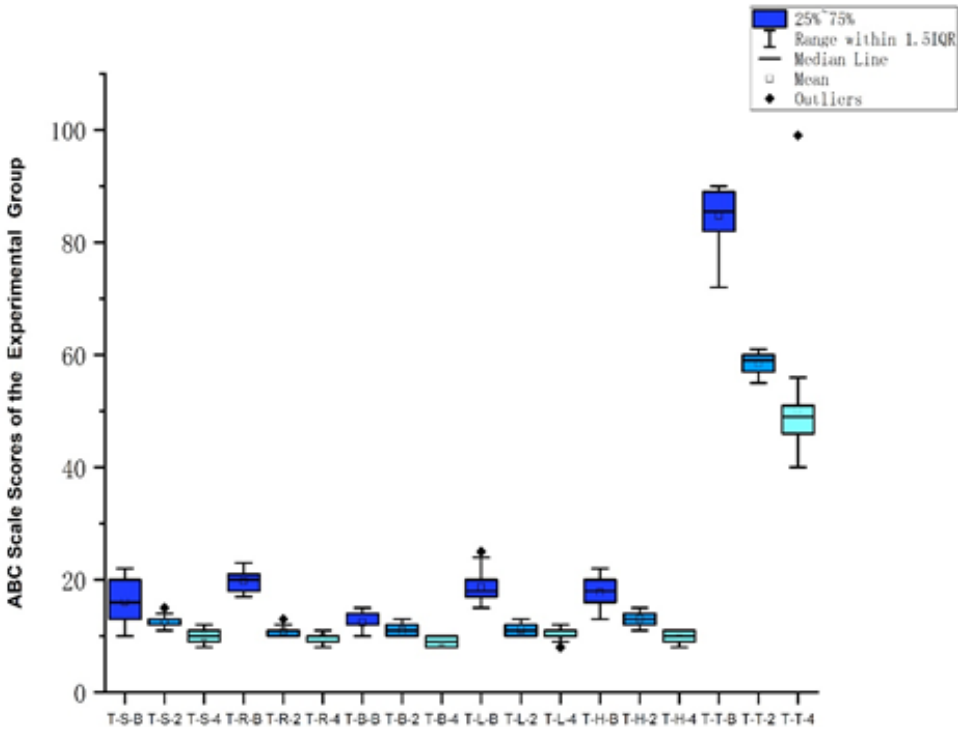

Figure 7: Comparison of ABC scores before and after intervention in the experimental group

the occurrence of such overall coordination.

In recent years, the intervention for autism spectrum disorder has shifted to a model based on the recovery of social function, emphasizing the level of social function approaching that of the general population (Alabdulkareem et al., 2022). Intervention techniques including structured education, applied behavior analysis therapy, sensory integration training, family training, and the relatively novel robot intervention technology (Wang and Wang, 2015) are all based on a binary methodological perspective, emphasizing the transformation of internal results through the intervention of external forces. Unlike the above other intervention techniques, traditional Chinese medicine sand tray therapy is not limited to the modern psychological theory interpreted mental health goals and intervention paths to change the psychological or behavior of children with autism spectrum disorder, also adopted the theories and methods of traditional Chinese medicine, such as the yin and yang five elements, the correspondence and unity of heaven and man, etc. to restore the intrinsic mental balance and mutual balance and coordination between the autistic spectrum disorder children's own inner world and the external environment (others), and enhance their mental activity level and quality. Because, according to the theory of correspondence and unity of heaven and man in traditional Chinese medicine, the individual's mind, body, and individual and external environment are one (Yi, 2019; Huang, 2015), and the yin and yang five elements view believes that the various basic structures and functions that make up the individual are interrelated and have self-organizing coordination (Tang et al., 2016).

The comparison of the traditional Chinese medicine sand tray five elements analysis scores before and after the intervention in the

Table 5: Comparison of ABC scores before and after intervention between the two groups ($\bar{x} \pm s$, score)

Item	Time	Control Group	Experimental Group	*T*	*P*
Total score	Before treatment	84.8±5.235	84.77±5.124	-0.025	0.98
	Treatment for 2 months	63.87±1.676	58.53±1.525	-12.89	0.00
Sensory	Treatment for 4 months	56.83±4.086	50.2±10.008	-3.361	0.00
	Before treatment	15.3±2.351	16.1±3.468	1.046	0.30
	Treatment for 2 months	12.17±1.555	12.47±1.137	0.853	0.40
	Treatment for 4 months	11.03±1.326	10．00±1.203	-3.161	0.00
Relating	Before treatment	19.83±2.306	19.77±1.96	-0.121	0.90
	Treatment for 2 months	12.87±1.697	10.90±0.803	-5.739	0.00
	Treatment for 4 months	11.37±1.245	9.70±0.877	-5.994	0.00
Body	Before treatment	12.40±1.905	12.43±1.431	0.077	0.94
	Treatment for 2 months	11.23±0.858	11.03±0.928	-0.867	0.39
	Treatment for 4 months	10.00±0.871	9.00±0.788	-4.664	0.00
Language	Before treatment	19.13±3.014	18.70±2.588	-0.597	0.55
	Treatment for 2 months	14.87±0.937	11.07±0.98	-15.348	0.00
	Treatment for 4 months	12.87±1.224	10.23±0.817	-9.799	0.00
Self-help	Before treatment	18.13±2.788	17.77±2.373	-0.548	0.59
	Treatment for 2 months	12.73±1.413	13.07±1.172	0.995	0.32
	Treatment for 4 months	11.57±1.278	9.63±1.098	-6.285	0.00

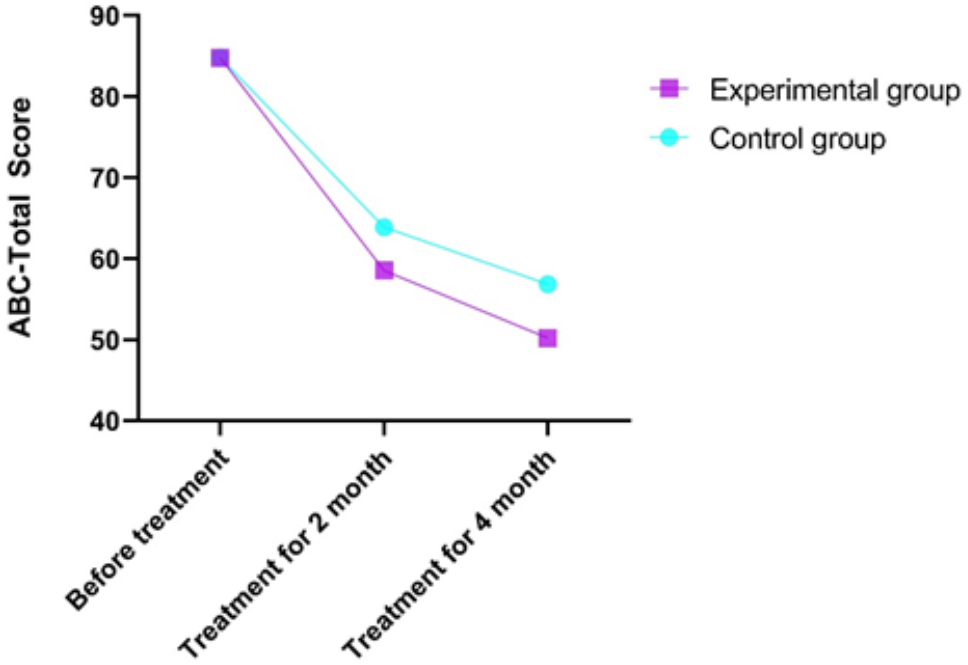

Figure 8: Comparison of total scores before and after intervention between the two groups

experimental group in this study confirmed that the traditional Chinese medicine sand tray therapy has partially restored the intrinsic mental balance and mutual balance and coordination of autistic spectrum disorder children with their external environment (others), and improved their mental activity level and quality. Compared with the ABC scoring analysis, this conclusion has also been confirmed.

More importantly, the majority of previous studies have relied on the theories and methods of modern psychology, modern medicine, and modern education, which have been produced in the Western cultural

context, to study autistic spectrum disorder, lacking corresponding theories, methods, and techniques based on the Chinese cultural context. From the basic position of scientific research, how to develop the theories, methods, and techniques of psychological assessment and treatment under the Chinese cultural context has important social and academic significance. Therefore, the psychological assessment and intervention research of the sand tray therapy for children with autism spectrum disorder before school age should be a useful attempt and exploration.

5. Limitations of the Study

The current standards for curing autism spectrum disorder have shifted towards social reintegration, although the social functions assigned to normal children are relatively simple, it is still quite challenging for children with autism spectrum disorder to reintegrate into society. Therefore, future research should expand the sampling range and time range, adopt a longitudinal research method, and follow up to the school age, observing the status of social functions and the gap with normal children to determine the final intervention effects.

6. Declarations

6.1 Acknowledgement

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6.2 Conflict of interest

No conflict of interest associated with this work.

6.3 Contribution of authors

Due to the need for a large number of human resources and the participation of experts from various disciplines such as clinical psychology, psychiatry, and special education, under the cooperation of Dr. Chen Zhenyu, experts from various disciplines in Guangxi and Sichuan and other regions have been gathered together to form a research team consisting of three research groups, and together they have completed the research results. Among them, Dr. Zhenyu Chen and Hongxing Hui, the associate chief Physician, are the core of the entire research team, and their contribution to this research is the most outstanding, and this is hereby explained.

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them. Zhenyu Chen should be considered as the corresponding author.

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