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INTERVENTION EFFECT OF THEME BUILDING BLOCK GAMES ON THE MENTAL HEALTH AND BEHAVIOR OF CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER

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SUMMARY

Background: *Children with attention deficit hyperactivity disorder (ADHD) are mainly characterized by learning difficulties, emotional impulsion, excessive activity, and distracted attention, which have a certain impact on their social ability, physical and mental health, and their living ability. This study aims to explore the effects of theme building block games on the psychological behaviors of children with ADHD, and to provide some reference for promoting the mental health development of children with ADHD.*

Subjects and methods: *A total of 180 children with ADHD in Healthcare Center for Children from January 2020 to June 2021 were selected via convenient sampling. They were randomly divided into control (n=90) and observation (n=90) groups. Children in the control and observation groups received routine and theme building block games, respectively, once a week and a total of 8 weeks of building block game interventions. Improvement of symptoms, Eysenck Personality Questionnaire (EPQ), Achenback Child Behavior Scale List (CBLC), Child Sensory Integration Development Scale, and Piers-Harris Child Self-concept Scale (PHCSS) of two groups were compared before and after intervention.*

Results: *After intervention, children in the two groups showed lower T scores in P and N, and higher T scores in E and L of EPQ; T scores of children in the observation group improved more significantly. Children (boys) in the two groups showed lower scores in discipline violation, hostility, compulsion, immaturity, poor communication, schizophrenia-like, and physical complaints in CBCL. Moreover, those in the observation group obtained significantly lower scores in CBCL than those in the control group. Children (girls) in the two groups showed lower scores in cruelty, aggressiveness, immaturity, depression withdrawal, schizophrenia-like, somatic complaints, and anxiety compulsion in CBCL. Meanwhile, those in the observation group obtained significantly lower scores in CBCL than those in the control group. After intervention, scores of children in the two groups in symptom improvement, sensory integration ability, and PHCSS were significantly improved. Lastly, those in the observation group obtained higher scores in these aspects compared with those in the control group.*

Conclusions: *The theme building block game can effectively improve symptoms of children with ADHD and also help promote their sensory integration ability, self-concept, and personality development, as well as improve their psychological and behavioral status. Accordingly, this rehabilitation intervention method is worthy of promotion, which can be recognized and accepted easily.*

Key words: *theme building block game - attention deficit hyperactivity disorder – ADHD - psychological behavior*

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INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a type of developmental self-control disorder. ADHD's clinical manifestations mainly include age-inappropriate attention span reduction, distraction, emotional impulse, and excessive activity in some occasions (Giupponi et al. 2018). These manifestations are accompanied by varying degrees of learning difficulties and cognitive impairment, and intelligence is close to normal state. ADHD is considerably common in preschool children, and this condition of about 50% of children may last to adulthood. Some studies have demonstrated that ADHD is a lifelong disease, and children with ADHA often have different degrees of learning disabilities, mood disorders, oppositional disobedience, and adaptation disorders. At present, the clinical pathogenesis and etiology of ADHD remain under continuous research, without clear conclusion yet. However, many studies have shown that children with ADHD have a certain degree of brain development delay, which is a type of neurodevelopmental disorder. At present, ADHD is generally considered to be a syndrome formed by biological, social, and psychological factors, and various reasons affects alone or each other (Shen et al. 2019, Isik et al. 2022). Although drug therapy can relatively improve its symptoms, long-term use of drugs leads to certain dependence and side effects. In recent years, several studies have confirmed that supportive program training for children with ADHD has good curative effect (Dudukina et al. 2021, Zhu et al. 2022). However, domestic research on this aspect has been minimal, thereby emphasizing the importance of choosing an effective and appropriate method to intervene in the psychological behavior of ADHD.

Building block game is one of the most basic game activities for preschool children. As a low-structure and valuable game material, building blocks are widely used. From the perspective of construction, Pilger analyzed that building block games in primary schools, preschools, and kindergartens play an important role in social cognition, logical mathematics, and physical health of children. Schmitt et al. (2018) found that building

block games can effectively alleviate the symptoms of children with ADHD and contribute to the development of their mental health. Compared with traditional game intervention, theme building block games are popular among children, particularly preschool children. This study used the theme building block game to intervene in children with ADHD. Moreover, controlled trials were designed to analyze the impact on the psychological behavior of children, thereby providing reference for promoting the development of mental health of children with ADHD.

Famous educators explained that building block games are most suitable for children, can exercise their abilities in all aspects of life, and improve their attention. Gina et al. (2018) demonstrated that giving building block games to train children can guide them to learn science and mathematics, understand social life, and build a cognition of the material world. Yang et al. (2016) found through the observation method that building block games can improve the interest and concentration of children, enhance their attention, and improve their hyperactivity impulse and attention deficit symptoms. Mostowfi et al. (2016) found that chessboard and building block games have good effects on improving the mental rotation abilities of children with ADHD, and the building block games have better effect. Newman et al. (2016) found that building block games can improve the perceptual and motor skills of children, cultivate their aesthetic abilities and artistic interests, and promote their creativity, initiative, imagination, and self-concept development. Li et al. (2021) demonstrated that a 12-week theme building block game intervention for children with ADHD improved their social and psychological behaviors. Wu et al. (2019) explained that building block games can significantly improve the psychological behavior of children, specifically for their self-concept and sensory integration ability. Zhang et al. (2021) found that compared with social language application teaching, the intervention of theme building block game is more prominent in improving the social skills and psychological behavior of children with ADHD.

Building block games are symbolic construction games for children based on building blocks. The classification of building block games is different locally and overseas. Theme building block game is a research learning activity that children develop around a certain theme, with building blocks as the main means of representation. Theme contents are mainly designed by teachers and instructors. During the intervention of children with ADHD, building block games are used as carrier to design related building block themes according to the psychological and behavioral conditions of children with ADHD, which can satisfy their interests and relatively develop their enthusiasm, creativity, and initiative, thereby improving their psychological and behavioral symptoms. Kang et al. (2020) found that building blocks play a significant role in the intervention of behavioral problems of children with ADHD. Lu et al. (2021) demonstrated that building block games intervention can improve self-perception ability and sensory integration development ability of children with ADHD.

Of particular importance is the implementation of intervention for children with ADHD. Although the current conventional clinical intervention method is effective, it is relatively boring and children have little interest in participation. Hence, there is urgency in explore an intervention method suitable for children's characteristics. Accordingly, theme building block games are effective psychological and behavioral intervention methods for children, which have been proven to have positive effects on their mental health. These games will benefit the majority of children if confirmed to have a definite effect on children with ADHD. This study conducted a randomized controlled trial to provide reference for the rehabilitation intervention of children with ADHD.

SUBJECTS AND METHODS

Participants

A total of 180 children with ADHD in Healthcare Center for Children were selected via convenient sampling from January 2020 to June 2021. They were randomly divided into control (n=90) and observation (n=90) groups. The control group had 47 boys and 43 girls, aged from 3 to 7 years old, with an average age of 5.010.36, and course of disease of 9.861.28 months. Moreover, there were 35, 28, and 27 children of distraction, hyperactivity, and mixed type, respectively. The observation group had 47 boys and 43 girls, aged from 3 to 7 years old, with an average age of 5.080.32, and course of disease of 9.921.31 months. In addition, there were 34, 27, and 29 children of distraction, hyperactivity, and mixed type. Lastly, there were no significant differences in age, gender, course of disease, and classification between the two groups (P>0.05).

Inclusion and exclusion criteria

Inclusion criteria: 1. Conforming to the diagnostic criteria for children with ADHD in the fourth edition of *Diagnostic and Statistical Manual of Mental Disorders* (Shi et al. 2015); 2. Children who had not taken psychiatric drugs, such as Ritalin, one week before treatment; 3. Children with complete family and good cooperation; 4. Children and their families agreed and signed an informed agreement; 5. Approved by the ethics committee of the hospital (2018KY3). Exclusion criteria: 1. Children with mental retardation, mental disorders, and other mental system disorders; 2. Children with heart and brain diseases and other critical disorders; 3. Behavioral disorders caused by neurological illnesses; 4. Children with autism, epilepsy, and mood and conduct disorders; 5. Children with digestive system issues and malnutrition; 6. Children with poor compliance or quit halfway.

Methods

Literature method

On the basis of this paper's research content, the relevant literature and materials were consulted through such databases as CNKI, Wanfang website, and Foreign Language Journals Network. A summary and logical analysis were likewise made to provide reference for the experimental conception and design of this study in the early stage. Lastly, ideas were provided for discussion and analysis in the later stage.

Intervention method of the control group

The control group received the previous routine building block games, once a week (30 minutes each time), for a total of 8 weeks.

Intervention method of the observation group

Scheme design basis. This study conducted scheme design according to the children's age and their level of block building combined with their psychological behavior structure. The scheme is divided into three stages. The first stage is the first two weeks, with 30 minutes of game time. The theme is for common objects with relatively few components and relatively simple structure. The second stage is the third and fourth weeks, and game time remains 30 minutes. However, the theme is for tall buildings with certain difficulty. The third stage is the last four weeks, with 30 minutes of game time. The theme is for objects with many components and complex structures, such as castles.

Some studies have confirmed that interaction between peers can produce superior learning efficiency and results. The group game can provide an interactive environment for children with ADHD. Peer learning theory shows that “peer difference” and “positive language communication” are important factors that promote behavior and cognitive change of children. Therefore, this study carried out the work through the group game scheme, with 2 to 3 people each group. The scheme provides an interactive environment for children and promote their psychological and behavioral development.

Scheme implementation. The author was responsible for the specific implementation and organization of the theme building block game intervention for children in the observation group, 8 times in 8 weeks, with each time lasting for 30 minutes. The children were randomly assigned to a group of 2 to 3 people, and group members were retained throughout the entire intervention process. Before each intervention, the research instructor will give corresponding instructions (e.g., We are going to build a castle today), and the children will build the blocks by themselves. The instructor will participate as minimally as possible but will give some help when necessary ensure the game's smooth progress. The specific content is as follows. 1. The first stage's theme is bridges, in which the children are given simple instructions in the first week (e.g., You need to build a bridge with these building blocks today). In the second week, the children are given the following simple story instructions: Baby bears are playing on the other side of the river. Suddenly, it rained heavily, and the river swelled and the flow became faster. The original bridge was washed away, and the bears could not go home. They need our help. Boys and girls, can you build a wide and strong bridge for these bears that want to go home? 2. The second stage's theme is tall buildings, in which component instructions are given in the third week (e.g., We want to build a bridge today; it needs four walls with entrance and roof and at least three floors.). Instructions for some pictures are given in the fourth week (e.g., You need to build two tall buildings and have the content in your pictures. They need a bridge to connect them. They also need the same window as in the picture). 3. The third stage's theme is castles, in which some instructions are given in the fifth and sixth weeks (e.g., I hope you can build the castle by referring to the pictures). Give Instructions are given to the complex story in the seventh and eighth weeks (e.g., Let's first listen to a story about a castle. After the end of the story, we need to build the castle in the story).

Observed Index

Doing Well

Evaluation of the improvement of children before and after intervention will be evaluated by the Reliability and validity of the Chinese version of the Swanson, Nolan, and Pelham, Version IV Rating scale-Parent Form for attention-deficit/ hyperactivity disorder (Zhou et al. 2013), which mainly consists of two major parts: hyperactivity impulse and attention deficit. Each part includes 9 items, which will be filled according to the 4-level scoring method (i.e., 0 point, 1 point, 2 points, and 3 points). The total score is 54 points; the higher the score, the more serious the disease. The internal consistency coefficient of this scale is 0.61 to 0.71, and Cronbach's alpha is 0.90.

Eysenck Personality Questionnaire

The Eysenck Personality Questionnaire (EPQ) was compiled by British psychologist and professor Hans Eysenck and revised by Professor Qian (2000), and mainly evaluates the personality of children and adolescents aged 7 to 15. EPQ contains a validity scale and three personality dimensions scale: L scale and P-, E-, and N-dimensions. Results are evaluated by standard score (T). Their personality characteristics and tendencies are judged according to the T-score of each dimension. Typically, scores below 40 points or above 60 points indicate some personality tendencies, while scores below 30 points or above 70 points indicate some typical personality characteristics. The E- and N-dimensions can be combined to classify various temperament characteristics.

Achenback Children Behavior Checklist

The Achenback Children Behavior Checklist (CBCL) is mainly used for children and adolescents aged 4-16 years to evaluate children's behavioral problems and social ability (Su et al. 1998). CBCL is divided into the

children self-filling, teachers, and parents scales. This study used the parents scale, which contains 113 behavioral problems, with each item scored according to a three-level scoring criteria of often (2 points), occasionally (1 point), and never (0 point). The sum of the item scores is the total score. The higher the score, the more behavioral problems are indicated. According to gender, problems could be summarized as follows. 1. Factors of behavioral problems in girls: cruelty, aggressiveness, discipline violation, immaturity, depression withdrawal, schizoid, physical complaint, anxiety, and compulsion. 2. Factors of behavioral problems in boys: hyperactivity, aggressiveness, discipline violation, hostility, compulsion, immaturity, bad communication, schizoid, and physical complaint. Cronbach's alpha coefficient of the scale is 0.89 and the structure validity KMO is 0.91.

Children Sensory Integration Rating Scale

The Children Sensory Integration Rating Scale (CSIRS) is used to evaluate the sensory integration function of children that includes five items: special problems of older age, insufficient development of learning ability, poor physical sense, excessive tactile defense, and verstibular imbalance. CSIRS comprises 58 problems, which are evaluated by a five-level rating method comprising "always, often, sometimes, seldom, never." Lastly, scores of each factor are converted into standard points in accordance with gender and age, thereby ensuring the objectivity and accuracy of the evaluation effect, as well as good validity and reliability. Cronbach's alpha coefficient of the scale is 0.82, and the structure validity KMO is 0.89.

Piers-Harris Children's Self-concept Scale

The Piers-Harris Children's Self-concept Scale (PHCSS) was developed by American psychologist Piers-Harris in 1969 to evaluate children's self-concept (Wang et al. 1993). The PHCSS has 80 questions, which are divided into satisfaction and happiness, group participation, anxiety, physical appearance and attributes, intelligence and learning situation, and behavior. The higher the score, the higher the children's self-concept, and the higher the validity and reliability. Cronbach's alpha coefficient of the scale is 0.79, and the structure validity KMO is 0.86.

Statistical Analysis

SPSS22.0 was used for data analysis. Measurement data subject to normal distribution was described as ($\bar{x} \pm s$), and the comparison was performed using paired *T*-test (intra-group comparison) or group *T*-test (inter-group comparison). 2 test was performed for comparison of counting data, which had significant difference at $P<0.05$.

RESULTS

Comparison of symptom improvement between the two groups before and after intervention

After intervention, attention deficit, hyperactivity, and total score of the two groups significantly decreased. The aforementioned symptoms in the observation group improved significantly at $P<0.05$. Table 1 presents the results.

Comparison of T-scores in the EPQ scale between the two groups before and after intervention

After intervention, T-scores of the P- and N-scales in the EPQ scale in the two groups significantly decreased, while the T-scores of the E- and L-scales significantly increased. T-scores of the EPQ scale in the observation group improved significantly at $P<0.05$. Table 2 shows the results.

Comparison of CBCL scores between the two groups before and after intervention

After intervention, CBCL scores of children (boys) in the two groups significantly decreased in the aspects of discipline violation, hostility, compulsion, imamturity, bad communication, schizoid, and physical complaints. Meanwhile, CBCL scores of children in the observation group decreased significantly at $P<0.05$. Table 3 presents the results. CBCL scores of children (girls) in the two groups significantly decreased in the aspects of cruelty, aggressiveness, immaturity, depressive withdrawal, schizoid, physical complaint, and anxiety compulsion. Meanwhile, CBCL scores of children in the observation group decreesed significantly at $P<0.05$. Table 4 presents the results.

Comparison of sensory integration ability between the two groups before and after intervention

After intervention, scores of children in the two groups increased significantly in the aspects of vestibular balance, proprioception, tactile defense, and learning ability. Meanwhile, sensory integration ability of children in the observation group increased significantly at $P<0.05$. Table 5 presents the results.

Table 1. Comparison of symptom improvement between the two groups before and after intervention ($\bar{x} \pm s$, score)

Groups	Time	Attention Deficit	Hyperactivity	Total Score
Control group	Before intervention	21.25±3.26	14.96±2.25	35.58±4.16
(*n*=90)	After intervention	15.18±2.65[a]	10.28±2.06[a]	25.49±3.28[a]
Observation group	Before intervention	21.19±3.18	14.87±2.31	35.63±4.05
(*n*=90)	After intervention	9.12±2.08[a,b]	6.42±1.87[a,b]	16.23±2.49[a,b]

Note: After intervention, [a]$P<0.05$; Compared with the control group after intervention, [b]$P<0.05$

Table 2. Comparison of T-scores in the EPQ scale between the two groups before and after intervention ($\bar{x} \pm s$, score)

	Control group (*n*=90)		Observation group (*n*=90)	
	Before intervention	After intervention	Before intervention	After intervention
P	47.56±3.58	45.02±2.95[a]	47.49±3.67	41.69±2.49[a,b]
E	47.98±5.66	49.12±5.52[a]	47.92±5.61	52.68±5.69[a,b]
N	51.59±5.43	48.74±5.28[a]	51.62±5.71	44.39±4.20[a,b]
L	49.23±5.36	52.05±5.14[a]	49.18±5.24	55.84±5.33[a,b]

Note: After intervention, [a]*P*<0.05; Compared with the control group after intervention, [b]*P*<0.05

Table 3. Comparison of CBCL scores of children (boys) between the two groups before and after intervention ($\bar{x} \pm s$, score)

	Control group (*n*=47)		Observation group (*n*=47)	
	Before intervention	After intervention	Before intervention	After intervention
Hyperactivity	3.53±0.36	3.49±0.33	3.59±0.31	3.38±0.26
Aggressiveness	4.78±0.41	4.73±0.35	4.81±0.39	4.52±0.31
Discipline violation	1.98±0.26	1.78±0.25[a]	2.02±0.25	1.42±0.23[a,b]
Hostility	2.75±0.26	2.52±0.23[a]	2.76±0.23	2.25±0.18[a,b]
Compulsion	1.08±0.06	0.91±0.05[a]	1.11±0.08	0.72±0.04[a,b]
Immaturity	1.35±0.22	1.14±0.18[a]	1.38±0.21	0.96±0.16[a,b]
Bad communication	2.76±0.31	2.45±0.26[a]	2.79±0.28	2.11±0.23[a,b]
Schizoid	1.38±0.21	1.13±0.15[a]	1.40±0.19	0.95±0.12[a,b]
Physical complaint	1.53±0.16	1.32±0.12[a]	1.55±0.14	1.05±0.09[a,b]

Note: After intervention, [a]*P*<0.05; Compared with the control group after intervention, [b]*P*<0.05

Table 4. Comparison of CBCL scores of children (girls) between the two groups before and after intervention ($\bar{x} \pm s$, score)

	Control group (*n*=43)		Observation group (*n*=43)	
	Before intervention	After intervention	Before intervention	After intervention
Cruelty	0.42±0.06	0.32±0.04[a]	0.45±0.05	0.21±0.03[a,b]
Aggressiveness	3.69±0.26	3.32±0.21[a]	3.72±0.28	2.58±0.15[a,b]
Discipline violation	2.89±0.28	2.85±0.24	2.91±0.25	2.93±0.26
Immaturity	2.35±0.23	2.11±0.18[a]	2.31±0.25	1.23±0.15[a,b]
Depressive withdrawal	2.91±0.38	2.65±0.35[a]	2.93±0.35	2.18±0.26[a,b]
Schizoid	0.69±0.09	0.51±0.06[a]	0.72±0.08	0.35±0.04[a,b]
Physical complaint	1.49±0.08	1.31±0.06[a]	1.53±0.09	1.07±0.05[a,b]
Anxiety compulsion	2.54±0.28	2.31±0.25[a]	2.58±0.31	1.46±0.21[a,b]

Note: After intervention, [a]*P*<0.05; Compared with the control group after intervention, [b]*P*<0.05

Table 5. Comparison of sensory integration ability between the two groups before and after intervention ($\bar{x} \pm s$, score)

	Control group (*n*=90)		Observation group (*n*=90)	
	Before intervention	After intervention	Before intervention	After intervention
Vestibular balance	39.65±5.43	43.52±6.25[a]	39.61±5.49	53.16±7.49[a,b]
Proprioception	42.03±6.49	45.07±6.31[a]	42.08±6.84	52.45±7.35[a,b]
Tactile defense	42.59±6.41	46.25±5.87[a]	42.52±6.33	54.67±7.20[a,b]
Learning ability	42.85±7.45	48.69±7.16[a]	42.64±7.21	55.23±4.26[a,b]

Note: After intervention, [a]*P*<0.05; Compared with the control group after intervention, [b]*P*<0.05

Comparison of PHCSS scores between the two groups before and after intervention

After intervention, scores in the aspects of behavior, intelligence and school situation, body and appearance, social participation, happiness, and satisfaction; and total score of children in the two groups significantly increased. Meanwhile, score of anxiety significantly decreased, and PHCSS score of children in the observation group significantly improved at *P*<0.05. Table 6 presents the results.

Table 6. Comparison of PHCSS scores between the two groups before and after intervention

	Control group (*n*=90)		Observation group (*n*=90)	
	Before intervention	After intervention	Before intervention	After intervention
Behavior	11.16±2.41	12.69±2.74[a]	11.19±2.43	13.95±2.86[a,b]
Intelligence and school situation	9.10±2.36	10.15±2.42[a]	9.06±2.29	12.43±2.23[a,b]
Body and appearance	7.11±1.69	8.02±1.85 [a]	7.05±1.61	9.31±1.96[a,b]
Anxiety	5.75±1.28	5.01±1.02 [a]	5.71±1.21	4.15±0.86[a,b]
Social participation	8.02±2.06	8.85±2.16 [a]	8.05±2.01	9.69±2.28[a,b]
Happiness and satisfaction	7.55±1.25	7.96±1.31 [a]	7.51±1.13	8.51±1.63[a,b]
Total score	48.67±6.59	52.16±6.86 [a]	48.75±6.65	58.62±6.87[a,b]

Note: After intervention, [a]$P<0.05$; Compared with the control group after intervention, [b]$P<0.05$

DISCUSSION

We have shown that attention deficit, hyperactivity, and impulsiveness and the total score of children in the observation group were lower than those in the control group after intervention. This result indicates that theme building block game can effectively improve the symptoms of children with ADHD. This outcome was similar to the report possibly because the theme building block game can promote the comprehensive use of various sports and organs. During the game, children will concentrate, carefully observe the characteristics of the samples, and memorize, process, and extract the representations of the objects. The process also requires children to maintain a high degree of concentration and use various construction concepts and skills to build blocks, thereby improving their clinical symptoms. In this paper, combined with psychological behavior structure of the children, the theme building block game was designed according to their block building level and age, and group games were performed as will. Peer interaction has been proven to possibly produce superior learning efficiency, and group games could provide an interactive environment for children with ADHD (Akers et al. 2018). In addition, peer learning theory suggested that "peer differences" and "positive language communication" are important factors in promoting children's behavior and cognitive changes. Studies have shown that (Stutey et al. 2020) the intervention of building block game could provide children with a natural and relaxed social atmosphere, avoid the generation of bad emotions, help them build the concept of "peer" or even "friend," and improve their clinical symptoms, such as attention defects, hyperactivity, and impulsivity.

In addition, it was shown that T-score of the P- and N-scales in the EPQ scale of children in the observation group was lower than those in the control group after intervention. Meanwhile, T-score of the E- and L-scales in the observation group was higher than those in the control group, indicating that theme building block game could effectively improve the symptoms of children with ADHD. The possible reason is that the theme building block game could provide an interactive environment for children with 2 to 3 children per group. During the game, children in groups could communicate and discuss with each other, and their peers could ask accurate questions and propose solutions to enhance the confidence of children with ADHD, improving such characteristics as unsocial, cold, do-not-like stimulation, anxiety, and tension. Song et al. (2018) found that the intervention of theme building block game can improve their anxiety, depression, and other negative emotions. These findings are consistent, indicating that theme building block game could help promote the formation of children's personality characteristics. Tables 3 and 4 show that scores of children (boys) in the observation group after intervention in the aspects of discipline violation, hostility, compulsion, immaturity, bad communication, schizoid, and physical complaint are significantly lower than those in the control group. Meanwhile, scores of children (girls) in the observation group after intervention in the aspects of cruelty, aggressiveness, immaturity, depressive withdrawal, schizoid, physical complaint, and anxiety compulsion are significantly lower than those in the control group. These results indicate that the theme building block games could effectively improve the behavioral problems of children with ADHD, which is similar to the report. The possible reason is that children's behavior obstacle are mostly a result of their instinct of excessive satisfaction and restriction. Moreover, indulgence and beatings are the main performance of excessive satisfaction and restriction in the education of children, often leading to capricious impulse, lack of self-confidence, retreat, melancholy, contradiction, and other related problems. Cai et al. (2018) demonstrated that adverse behaviors, such as hostility, compulsion, depressive withdrawal, schizoid, physical complaint, and anxiety, of 60 children with ADHD relatively improved after receiving intervention using the theme building block game. In this paper, the theme building block game could effectively promote and support balanced development of children's various psychological behaviors. Such a balanced development could be achieved through simple instructions and story instructions and flexible selection of appropriate instructions according to different construction skills and structures. In addition, theme building block game could enhance the appearance characteristics of building objects through vivid pictures and stories. Hence, children could have a sense of achievement and pleasure when completing building blocks, thereby enhancing their

confidence. Several studies have confirmed that peer and teacher–children interactions could have positive effects on peer communication and behavior change.

Further, the scores of vestibular balance, proprioception, tactile defense, and learning ability in the observation group are higher than those in the control group. This result suggests that theme building block games could improve the sensory integration ability of children with ADHD, similar to the result of Lampropoulou et al. (2022). The possible reason is that children with ADHD fail to respond effectively to external input stimuli owing to the dysfunction of sensory integration of the body, proprioception, vestibular sense, touch, and other organs. Consequently, this condition leads to the body's poor ability to adapt to the external environment and certain disorder in the brain's executive function. Estrada-Plana et al. (2019) found that the intervention of games for children with ADHD can make adaptive response to various stimuli; enhance their balance and coordination, concentration, and learning abilities; and improve their clinical symptoms. These findings are consistent, indicating that theme building block game could improve children's sensory integration. In this paper, theme building block game can further induce the development of executive and cognitive functions of children under the condition that they have certain autonomy, improve their cognitive ability, promote their social behaviors through group games, improve sensory integration ability, and promote the development of their brain and body.

Finally, the scores of behavior, intelligence and school situation, body and appearance, social participation, happiness, and satisfaction, as well as total score, of children in the observation group after intervention are significantly higher than those in the control group. Meanwhile, score of anxiety in the observation group is lower than that in the control group. These results indicate that theme building block games could improve the level of self-concept of children with ADHD, similar to the result in Melegaria et al. (2018). The possible reason is the attention deficit of children with ADHD, preventing them from concentrating on learning with relatively poor academic performance. Their hyperactivity, impulsivity, and other behavior problems influence the positive evaluation of parents and teachers. Poor relationship with partners and poor ability to communicate with peers are detrimental to self-evaluation. Some studies have confirmed that school age is a period of rapid development of children's self-concept. Moreover, the occurrence and development of their self-concept are closely related to the school environment, family environment, and their own ability. If they are affected by adverse external factors, then their self-concept would develop negatively, which would have a negative impact on their social ability, learning, and behavior. Koh et al. (2012) demonstrated that the intervention of theme building block game for children with ADHD could improve their scores in the aspects of behavior, intelligence, school situation, social participation, happiness, and satisfaction. These findings are consistent, indicating that theme building block game could improve children's self-concept level. However, the building block game in this paper started from the children's ability and the school environment. During the game, the instructors gave corresponding instructions and played building block games in groups to improve the children's social communication ability and the relationship between them and their classmates and teachers; build confidence, sense of achievement, and self-orientation in building block games; improve happiness and satisfaction; and enhance the level of self-concept.

CONCLUSION

Theme building block games can effectively improve symptoms of children with ADHD; help promote their sensory integration ability, self-concept, and personality development; and improve their psychological and behavioral status. Sand table game therapy enables children to have relaxed and pleasant game time while undergoing tedious rehabilitation treatment, which is easily recognized and accepted. Accordingly, this rehabilitation intervention method is worth promoting.

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Dongmei Li: conception and design, analysis, planning and designing data collection.

Juan Guo: material preparation, statistical analysis, Draft preparation, approval of the final version.

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