Original Article

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Effect of Board Games on the Social Skills Development of At-Risk Children with Attention Deficit Hyperactivity Disorder (ADHD) in Upper Elementary Schools in Thailand

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Abstract:

Objective: This study investigated the impact of board games on social skills development among at-risk children diagnosed with attention deficit hyperactivity disorder (ADHD) in upper elementary schools in Thailand.

Material and Methods: This quasi-experimental study involved at-risk students with ADHD from Wat Tham Nava School and Wat Puech Nimit School. Each group consisted of 44 students, selected based on the Student Behavior Assessment Scale. The sample size was calculated using G*Power software, with participants purposefully assigned to either the control group or the experimental group. The primary intervention was a board game program specifically designed to enhance social skills. Outcome evaluation tools included a social skills questionnaire and a social behavior interview. Data analysis was conducted using descriptive statistics, paired sample t-tests, and independent sample t-tests to assess the effectiveness of the intervention.

Results: The experimental group demonstrated significantly higher social skills scores compared to the control group (p-value<0.001), with mean scores of 39.66±3.227 and 7.36±3.596, respectively, indicating the effectiveness of the board game program in enhancing the social skills of at-risk children with ADHD.

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Conclusion: These findings suggest that board game programs can effectively promote and cultivate social skills in children, providing schools and teachers with a valuable intervention strategy.

Keywords: attention deficit hyperactivity disorder, board games, social skills

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by abnormalities in brain function that impair attention control and behavioral regulation. Symptoms typically appear in children between the ages of 3 and 6 years and are often diagnosed between 6 and 12 years old[1]. The worldwide prevalence of ADHD ranges from approximately 5.29 to 7.2%, with significant variations between countries. For instance, in the United States, the prevalence is 15.5%, with the combined type being the most common (63.4%), whereas in China, the inattentive type is predominant at 6.26%[2]. In Thailand, the prevalence of ADHD is estimated to be between 5 and 8%, indicating that in a classroom of 40 children, approximately 2 or 3 may have ADHD. Boys often exhibit symptoms of hyperactivity, impulsivity, and disruptive behavior in the classroom, while girls may display symptoms such as being easily distracted, daydreaming, and slower task completion[3].

ADHD symptoms are categorized into 3 groups: (1) Inattention: Easily distracted, not paying attention, incomplete or sloppy work, forgetfulness, and difficulty in organizing tasks and managing time. (2) Hyperactivity: Excessive fidgeting, difficulty staying seated, excessive talking, or disrupting others in class. (3) Impulsivity: Acting without thinking, interrupting conversations, and answering questions before they are fully asked[4].

Consequently, children with ADHD often struggle with social interactions. They may lack emotional control, exhibit poor communication, engage in rough play, tease others, and disregard group rules, leading to conflict[5]. These behavioral issues can negatively impact their self-image and social skills, potentially leading to antisocial behavior, isolation, and dissatisfaction with life. Such impacts can further affect their mental well-being, possibly resulting in depression, self-harm, or even suicidal tendencies[6].

In the classroom setting, many children with ADHD face peer-related challenges, such as teasing, bullying, and difficulty in non-verbal communication, hindering their ability to maintain relationships and interact appropriately[7]. Social skills are fundamental for leading a fulfilling life and working harmoniously with others. Therefore, enhancing social skills in children with ADHD is essential for their development and adaptation to social environments[8].

Various treatment methods exist for children with ADHD. Medication helps improve attention and reduce hyperactivity, but is insufficient alone. A combined approach involving medication, behavioral therapy, and socio-psychological treatment is most effective[9]. Comprehensive treatment includes medication, behavioral adjustments, environmental factors, and continuous treatment planning. Parents' involvement, as well as coordination with teachers and schools, plays a crucial role in improving treatment outcomes[10]. Schools, as primary social environments, should focus on developing social skills alongside intellectual skills through activities that promote fun and teamwork, such as play therapy and games[11].

Games are effective instructional tools that enhance learning through experiential activities. They promote collaborative learning, improve motor skills, and enhance physical, emotional, social, and intellectual development[12]. Board games, in particular, create a stimulating and enjoyable learning atmosphere[11,13]. They encourage critical

thinking, problem-solving, and teamwork, making them suitable for developing social skills in children[14]. By engaging in board games, children can practice decision-making, planning, and communication, which are essential for reducing inappropriate behaviors and fostering a positive learning environment[15].

In 2023, a study in Pathum Thani and Ayutthaya provinces highlighted the increasing incidence of ADHD among school-age children, particularly those aged 9–12 years[16]. The study identified children at risk of ADHD using the Swanson, Nolan, and Pelham IV Scale (SNAP-IV) student behavior assessment form, emphasizing the importance of addressing their needs both in and out of school. Board games were utilized to develop social skills in these children, proving effective in promoting learning, teamwork, and appropriate behavior. This approach helps children at risk of ADHD grow into well-adjusted individuals, contributing positively to society.

Material and Methods

Methodology and data collection procedure

This study employed a quasi-experimental design with a two-group pretest-posttest approach. The design included both an experimental group, which received a board game intervention, and a control group. The sample consisted of 88 children identified as being at risk for ADHD, with 44 children from Wat Puech Nimit School and another 44 from Wat Thammawattana School. For sampling purposes, Wat Puech Nimit School was purposively assigned to the experimental group, and Wat Thammawattana School was assigned to the control group. The sample size was calculated using G*Power software, with parameters set to an effect size of 0.8[17], α=0.05, and power (1-β err prob) =0.95.

The inclusion criteria for participants were as follows: (1) upper primary school students scoring above the teacher-defined cutoff on the Child Behavior Checklist (SNAP-IV), (2) absence of psychiatric or other medical conditions, such as asthma, epilepsy, or diabetes, (3) proficiency in reading and writing Thai, and (4) willingness to participate and cooperate in the research. Exclusion criteria included children with health issues that could interfere with activity participation or who tend to fall ill during activities, as well as those in the sample group who chose not to participate in program activities or did not complete the required number of sessions (5).

Research instruments

1) Participant selection: Children at risk for ADHD were selected from schools located in Pathum Thani and Ayutthaya provinces. The assessment tool utilized was the Thai version of the Swanson, Nolan, and Pelham-IV Scale (SNAP-IV), developed by Natthar Pithayaratsathian et al. This scale comprises 26 items, rated on a four-point Likert scale from "Never" (0) to "Very Often" (3). Score interpretation followed cutoff points established by teachers: for the inattention domain (nine items), a score of ≥18 points; for the hyperactivity/impulsivity domain (nine items), a score of ≥11 points; and for the oppositional defiant domain (eight items), a score of ≥8 points. Additionally, demographic factors such as sex, age, and education level were examined in the assessment.

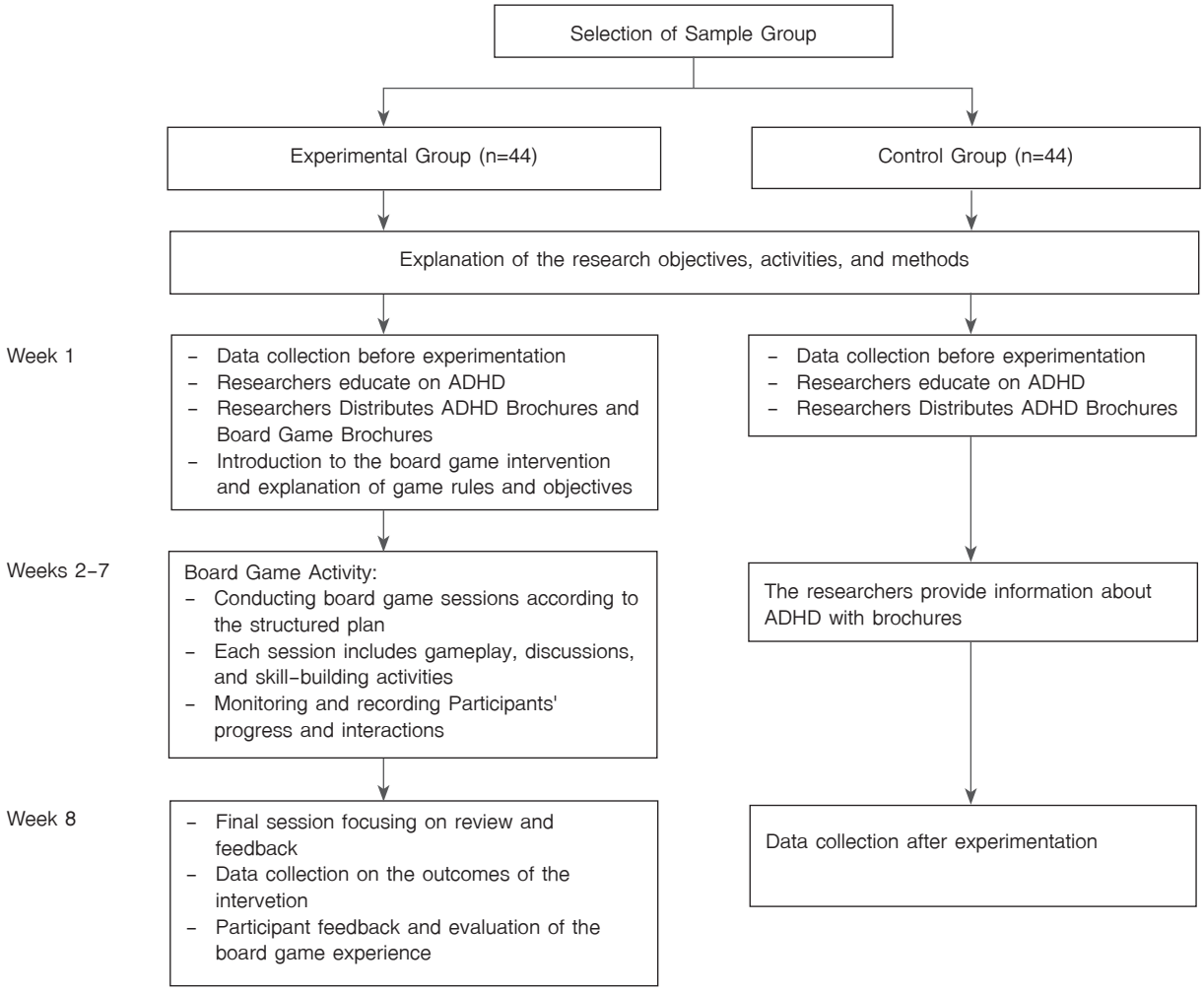
2) Activity implementation (board game): The intervention was conducted over 8 weeks, with sessions held twice a week, each lasting 2 hours. The intervention was provided only to the experimental group. The details of each game are shown in Figure 1 and the process flowchart is presented in Figure 2.

3) Outcome measurement: The questionnaire used to measure social skills was developed based on Social Competence Theory[18]. It consists of 15 items, divided into 3 domains: (1) Conflict Management Skills (5 items), (2) Interpersonal Skills (5 items), and (3) Classroom Work Skills (5 items). Responses are rated on a four-point scale

Remark:

	Picture Guessing Game	Activity Description: Each team collaborates with two to three members from other teams. The team performs poses based on a prepared picture (without using sound) provided by the activity facilitator. The other teams guess the correct pose corresponding to the picture. There are 15 pictures in total, and the activity is timed for two minutes.
	Stand Firm Game	Activity Description: Each person in the team stands on a piece of paper provided by the activity facilitator. The facilitator times the activity for 15 seconds.
	Ball Passing Game	Activity Description: Within the team, participants pass a ball under their legs until it reaches the last person while being timed for 15 seconds.
	Ping Pong Spoon Relay	Activity Description: Within the team, participants carry a ping pong ball on a spoon and place it into a bucket. Five balls are prepared by the activity facilitator. The activity is timed for three minutes.
	Charades Guessing Game	Activity Description: Each team collaborates with two to three members from other teams. The team members mime actions (without using sound) based on clues provided by the activity facilitator. Other teams guess the correct actions corresponding to the clues. There are seven clues in total, with a time limit of two minutes per clue, and a total of 15 clues prepared.
	Jigsaw Square Geometry	Activity Description: Within the team, members assemble jigsaw pieces into various square-shaped geometric patterns provided by the activity facilitator. The activity is timed for three minutes.
	Three-legged Balloon Race	Activity Description: Each team collaborates with five members from another team. The teams pair up with each other, and both members of the pair hold a balloon between their heads and race to a designated spot marked by the activity facilitator. The activity is timed for one minute.
	Word Relay Game	Activity Description: The researchers provide a word to the first person in a team. This word is then passed along the line, and the last person must say the word exactly as it was given to the first person.
	Spot the Difference Game	Activity Description: The researchers prepare two images. The first image is complete, while the second image has some missing parts. The team's task is to find the differences within three minutes.
	What's Your Name	Activity Description: Each team must greet and introduce themselves to another team. They must then remember the names of the members of that team within five minutes.
	Move the Object Game	Activity Description: Each team uses the equipment provided by the facilitator to move a water bottle to a designated spot within five minutes.
	Draw on the Back Game	Activity Description: Each team must draw a picture based on a word provided by the facilitator. Team members line up and draw the picture on each other's backs. The last person in the line must guess what the drawing is within two minutes.

Figure 1 Board games for the experimental group



ADHD=attention deficit hyperactivity disorder

Figure 2 Process flowchart of intervention in weeks 1–8

ranging from "Often" (3) to "Never" (0), with higher average scores indicating greater levels of social competence. The instrument demonstrated high validity, with an Index of Item-Objective Congruence (IOC) of 1.000, and excellent reliability, evidenced by a Cronbach's Alpha coefficient of 0.989. Additionally, a social behavior interview was conducted with both teachers and 6 selected students from each school in the program, using a five-question format developed by the researchers.

Data analysis

Data analysis involved using descriptive and inferential statistics, such as the paired sample t-tests and independent sample t-tests to evaluate the impact of the board game activities on social skills and learning development. The significance of the intervention's impact was determined based on the results of these statistical tests.

Results

Characteristics of the study samples

The study included participants who were predominantly male. Specifically, the experimental group consisted of 59.1% males, while the control group had 70.5% males. The average age of participants in the experimental group was 10.16 years (S.D.=0.888), and the control group had an average age of 10.39 years (S.D.=0.813). Both groups comprised students in upper elementary Grade 4.

To evaluate the differences in general information about children at risk of ADHD between the experimental and control groups, a Chi-square statistical test was used. The results indicated no statistically significant difference (p-value<0.05) between the 2 groups in the general characteristics (age, gender, and educational level) of children at risk of ADHD. This suggests that both the experimental and control groups exhibited similar general characteristics (Table 1).

Level of social skills among At-Risk children with ADHD

The study assessed the impact of an intervention on social skills among at-risk children with ADHD, comparing the results between the experimental and control groups. The experimental group demonstrated a notable improvement in overall social skills following the intervention, achieving an average score of 39.66±3.227. Among the different dimensions of social skills, teamwork skill showed the most significant improvement (13.66±1.539). In contrast, the control group experienced a decline in overall social skills compared to their pre-intervention scores, with an average score of 7.36±3.596. Notably, conflict management skills had the lowest average score within the dimensions of teamwork skill, at 2.29±1.608 (Table 2).

These findings suggest that the intervention, particularly the board game program, positively impacted the social skills development of at-risk children with ADHD in the experimental group compared to the control group.

Comparison of average social skills scores within groups

To assess the effectiveness of the intervention on social skills, a paired sample t-test was conducted to compare the average scores within both the experimental and control groups. The paired sample t-test results indicated statistically significant improvements in all the dimensions of social skills within the experimental group (p-value<0.001). Specifically, participants showed significant enhancements in conflict management skills, interpersonal skills, and classroom work skills following the intervention. Similarly, the paired sample t-test revealed significant differences in all the dimensions of social skills within the control group (p-value<0.001). However, the changes observed indicated a decrease in social skills scores compared to the baseline measures (Table 3).

These findings underscore the positive impact of the intervention, particularly the board game program, on enhancing social skills among at-risk children with ADHD in the experimental group, highlighting significant improvements across various dimensions of social competence.

Comparison of the average social skills scores between groups

An independent sample t-test was conducted to compare the average social skills scores between the experimental and control groups, both before and after the intervention. Before the intervention (board game program), the initial comparison using the t-test revealed no statistically significant difference in social skills scores between the experimental and control groups (p-value>0.05). The experimental group exhibited higher baseline social skills scores compared to the control group.

Table 1 Percentage characteristics of the study samples

Characteristics	Group		χ^2-test	p-value
	Experimental (n=44)	Control (n=44)		
Sex			1.245	0.265
Male	26 (59.1)	31 (70.5)		
Female	18 (40.9)	13 (29.5)		
Age			-1.252	0.214
9 years old	11 (25.0)	6 (13.6)	(t-test)	
10 years old	18 (40.9)	18 (40.9)		
11 years old	12 (27.3)	17 (38.6)		
12 years old	3 (6.8)	3 (6.8)		
Mean±S.D.	10.16±0.888	10.39±0.813		
Education level			0.000	1.000
Grade 4	22 (50.0)	22 (50.0)		
Grade 5	19 (43.2)	19 (43.2)		
Grade 6	3 (6.8)	3 (6.8)		

Table 2 Social skills of samples in each group

Social skills	Group	Mean±S.D.	
		Before Exp.	After Exp.
Overall social skills	Experimental	7.30±3.770	39.66±3.227
	Control	7.82±3.817	7.36±3.596
Dimensions of social skills:			
Conflict management skill	Experimental	2.27±2.266	12.91±1.695
	Control	2.70±2.257	2.61±2.254
Interpersonal skill	Experimental	2.77±2.056	13.09±1.611
	Control	2.64±2.024	2.45±1.823
Teamwork skill	Experimental	2.25±1.601	13.66±1.539
	Control	2.48±1.745	2.29±1.608

Exp.=experimental

Table 3 Comparison of the average social skills scores between the groups

Social skills	Group	Mean difference	95% Confidence interval		t	p-value
			Lower	Upper		
Overall social skills	Experimental	32.36±4.956	30.857	33.870	43.316	<0.001***
	Control	-0.45±0.848	-0.712	-0.196	-3.556	0.001**
Dimensions of social skills:						
Conflict management skill	Experimental	10.64±2.829	9.776	11.496	24.938	<0.001***
	Control	-0.09±0.520	-0.249	0.067	-1.159	0.253
Interpersonal skill	Experimental	10.32±2.604	9.526	11.109	26.285	<0.001***
	Control	-0.182±0.724	-0.402	0.038	-1.666	0.103
Teamwork skill	Experimental	11.41±2.234	10.729	12.088	33.873	<0.001***
	Control	-0.182±0.540	-0.346	-0.018	-2.233	0.031*

*p-value<0.05, **p-value<0.01, ***p-value<0.001

Following the eight-week intervention period, another independent sample t-test was performed to assess the post-intervention social skills scores between the groups. The results showed a significant difference (p-value<0.001), with the experimental group demonstrating significantly higher social skills scores compared to the control group. This indicates that the board game program effectively enhanced the social skills of at-risk children with ADHD in the experimental group, resulting in notable improvements relative to the control group (Table 4).

These findings underscore the efficacy of the board game intervention in promoting social skills development among children at risk of ADHD, highlighting substantial improvements in interpersonal interactions, conflict management, and teamwork skills within the experimental group compared to the control group.

Discussion

This study aimed to evaluate the effectiveness of a board game program in enhancing social skills among children at risk of ADHD. The findings indicate significant improvements in social skills within both the experimental and control groups following the intervention, with notable distinctions favoring the experimental group.

Before discussing the impact of the board game program, it is crucial to note that the experimental and control groups exhibited similar general characteristics in terms of age, gender distribution, and educational level. This similarity is advantageous since it minimizes potential confounding variables, ensuring that observed changes in social skills can be attributed to the intervention rather than demographic or baseline differences between the groups.

The experimental group showed a substantial increase in average social skills scores after participating in the board game program (p-value<0.001). This improvement underscores the program's efficacy in fostering skills such as conflict management, interpersonal interactions, and teamwork skills. These findings are consistent with prior research by Apai and Wannawichai (2018), which similarly highlighted improvements in social skills among children with ADHD following play-based interventions[8].

Interestingly, the control group also exhibited significant improvements in social skills scores after participating in their respective program activities (p-value<0.001). This aligns with the findings of Yuenyong and Yunibhand (2019)[20], suggesting that structured activities, even without the specific board game intervention, can positively impact social skills among children with ADHD.

Table 4 Comparison of the average social skills scores between the groups

	Social skills	Mean difference	95% Confidence interval		t	p-value
			Lower	Upper		
Before Exp.	Overall social skills	-0.52±0.801	-2.131	1.085	-0.646	0.520
	Dimensions of social skills:					
	Conflict management skill	-0.43±0.482	-1.390	0.527	-0.896	0.373
	Interpersonal skill	0.14±0.435	-0.728	1.001	0.314	0.755
	Teamwork skill	-0.23±0.357	-0.937	0.483	-0.636	0.526
After Exp.	Overall social skills	32.29±0.728	30.847	33.744	44.332	<0.001***
	Dimensions of social skills:					
	Conflict management skill	10.29±0.425	9.450	11.141	24.213	<0.001***
	Interpersonal skill	10.64±0.367	9.907	11.365	28.998	<0.001***
	Teamwork skill	11.36±0.336	10.696	12.031	33.86	<0.001***

Exp.=experimental, ***p-value<0.001

A key finding of this study is the significant difference in post-intervention social skills scores between the experimental and control groups (p-value<0.001). Specifically, the experimental group demonstrated markedly higher average scores (39.66±3.227) compared to the control group (7.36±3.596). This difference underscores the unique benefits of the board game program in enhancing social skills beyond those achieved through standard educational interventions.

The findings indicate that board game activities designed to foster collaboration, communication, and teamwork can effectively enhance social skills in children at risk for ADHD. Implementing such programs within educational settings may offer valuable support in addressing the social challenges frequently associated with ADHD. This aligns with the study by Pfeifer et al. (2011), which explored play preferences in children with ADHD compared to typically developing children in Brazil through a pilot study examining each group's preferred play activities. The study found that children with ADHD tend to select activities with greater physical stimulation, emphasizing movement and challenges, while typically developing children showed interest in a broader variety of activities[21]. These insights provide a foundation for designing appropriate play activities for children with ADHD, aiming to promote social development and self-regulation skills.

However, it is acknowledged that the study has limitations regarding the duration of the intervention and the lack of long-term follow-up to assess the sustainable benefits. Future research could explore extended intervention periods and involve more comprehensive measures to evaluate the enduring impact on social interactions in the school environment.

In conclusion, the board game program proved effective in improving social skills among children at risk of ADHD, highlighting its potential as a practical and engaging intervention in the educational context. By addressing social skill deficits early on, such programs contribute to fostering positive peer relationships and academic success among children with ADHD.

Conclusion

This study convincingly demonstrates that the board game program is highly effective in improving social skills among children at risk of ADHD, specifically in areas such as conflict management, teamwork, and interpersonal interactions. The findings underscore the program's potential as a valuable tool for schools and teachers seeking to enhance these critical skills among students. By implementing the board game program, schools can actively support children to adapt and thrive within the school environment. Moving forward, integrating such structured and engaging activities into educational curricula can significantly benefit children with ADHD, helping them to develop the essential social competencies vital for their academic and personal growth. Further research and implementation efforts should continue to explore and expand the application of board game programs in the educational setting, aiming to provide comprehensive support for children's social and emotional development. Ultimately, the board game program stands as a promising approach to nurturing social skills in children at risk of ADHD, contributing positively to their overall well-being and success in school.

Ethics approval

Approval was granted by Valaya Alongkorn Rajabhat University under the Royal Patronage Ethics Committee of Human Research: 0027/2566.

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Conflict of interest

The authors declare no conflict of interest.

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