

# Review Article: Effects of Occupational Therapy Interventions on Improving Play Performance in Children With Attention-Deficit/Hyperactivity Disorder (ADHD): A Systematic Review



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## ABSTRACT

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**Objectives:** Attention-Deficit/Hyperactivity Disorder (ADHD) is a common disorder among neurodevelopmental disorders. Children with ADHD have serious difficulties in their playing patterns. This review aims at seeing occupational therapy interventions using to improve play among children with ADHD.

**Methods:** Four databases (PubMed, Web of Science, Scopus, and Elsevier) were searched. Rayyan QCRI online application was used for managing and screening the obtained data. The included articles were reviewed for their quality based on the Centre of Evidence-Based Medicine, research pyramid, CONSORT (CONsolidated Standards Of Reporting Trials), and STARD (Standards for Reporting Diagnostic Accuracy) statement.

**Results:** A total of 104 articles were found after the search. After the screening and review process, six articles were included for the main review. Data extraction was done for these six articles (two randomized trial control and four non-randomized trial control studies).

**Discussion:** Play-based interventions could be effective for improving social play in ADHD when delivered by a therapist. For parent-delivered interventions, more studies with larger sample sizes are required.

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## Highlights

- Play is an essential occupation in a child's life with less attention on its improvement.
- Children with ADHD have problems in their playing patterns and should receive occupational therapy services to improve their participation in their playing.
- Therapies delivered by therapists can be more influential than therapies done by family members.

## Plain Language Summary

Play is the primary occupation of a child's daily life. Children with ADHD have difficulties in their playing participation and therefore experience negative feelings among their peers. Occupational therapists have to address these difficulties and provide interventions to improve these skills. This systematic review has found few studies in this area that confirm the low participation of children with ADHD in play. These studies are limited but show improvement in children's playing patterns due to occupational therapy services.

### 1. Introduction

**A**ttention-deficit/hyperactivity disorder (ADHD) is highly prevalent among childhood behavioral disorders worldwide [1, 2]. This illness is a neurodevelopmental disorder diagnosed by three main characteristics: Inattention, hyperactivity, and impulsivity. These characteristics are the core symptoms of this neurodevelopmental disorder [3]. This disorder is not confined to childhood, and its impairments can last through life with an effect on educational performance [4], work [5], and other life domains [6]. It also leads to a lower quality of life than other peers [7, 8]. Children with ADHD also have difficulties in their playing patterns, especially their social play [9-11].

Play is a primary occupation for a child that is not only necessary for academic learning and cognitive skills but also is crucial for the child's development [12, 13]. The play has enormous benefits for a child's development [14, 15]. It relates to all developmental dimensions such as cognitive [16], emotional [17], language [18], social [19], and motor skills [20]. It is common to use play as an intervention to improve other skills such as executive functions, learning, or social skills [21-23]. Couch and Deitz reported that most occupational therapists address play as an essential concept in a child's life, but they rarely put objectives and goals to improve one's play. Instead, they usually benefit from play as a means and medium to do their interventions or used it as a reinforcement for a child [24]. Although this paper was published in 1998, the concept of "play for the sake of play" did not enter much literature, as we can see in the NICE

(the National Institute for Health and Care Excellence) newest guideline for ADHD [25].

Children with ADHD have severe problems in their social participation, especially in their playing [26]. "Social play" is greatly affected in these children [27]. About 56% of children with ADHD have no friend, as 32% of typically developed children do not have a friend [9], while "pretend play" is a building block for making personal interactions and communications [28]. Although sometimes play therapy improves ADHD signs like hyperactivity and attention deficit [29], there are some problems in play patterns for children with ADHD, and interventions are needed to improve this area [30-32].

Play interventions have a fixed position in occupational therapy interventions for children with ADHD [31, 33]. The play has been reviewed as an outcome in other studies, and a systematic review was done in children with autism spectrum disorder children to check the effective interventions which can facilitate and improve social play in the children [34]. Having a review of the ADHD population will help the occupational therapist to access better evidence and will improve their evidence-based practice [35]. As mentioned earlier, play may be used to improve other skills, but in this study, we see play as the primary outcome.

### 2. Materials and Methods

#### Search strategy

These four databases were searched from inception to March 2020: PubMed, Web of Science, Scopus, and El-

sevier. The used keywords in MeSH terms were “occupational therapy,” “play and playthings,” and “child mental disorders.” Based on MeSH definitions, ADHD is a subcategory of mental disorders, the wider concept (child mental disorders) searched not to miss any studies. The search was done among English and Persian written articles (peer-reviews) only. No other limitation was made in the search process. The article’s references were reviewed to find potential studies to include in the study. The whole process of searching and sampling took four months.

### Study selection

The mentioned databases were searched by all authors independently. All search results were imported to the Rayyan QCRI online application. The first and second authors reviewed titles and abstracts in the application independently while the blind mode was on, so the other authors could not see the first one’s decisions. Where disagreement was seen for including an article, the third author made the decision. The inclusion criteria were as follows: 1) participants should be aged 2-12 years (MeSH term definition of a child, PubMed), 2) diagnosis of ADHD, 3) play should be mentioned as the outcome of the study and be a dependent variable using an assessment tool to be measured, 4) any occupational therapy intervention is included, 5) articles should be in English or Persian only, 6) non-full-text and non-peer-reviewed articles are not included, 6) all experimental studies are welcomed. Non-experimental studies will not enter the study because they cannot show the effect of interventions.

After reviewing articles and deciding about their inclusion, the full text of the articles was studied. Then, some of the articles were excluded. All authors extracted the final included articles. A form was made to organize articles data regarding the participants’ information like their diagnosis, age, and gender, the intervention features like the frequency, duration, and follow-up, and the used assessment tools for playing.

### Quality assessment

Firstly, the level of evidence was estimated based on the Centre of Evidence-Based Medicine (2009) definition, which is related to the study design. We also used the research pyramid. This new research pyramid critic the traditional single-hierarchy evidence model (Arbesman-2008).

Preferred Reporting Item for Systematic Review and A meta-analysis (PRISMA) statement (Appendix A) was

used in the next step. A protocol was registered on the Prospero database (CRD42020172447).

### 3. Results

First, we extracted 103 articles. One extra article was added from other sources. After removing duplicates, 83 remained that 2 of which were not English or Persian. Fifty-one studies were excluded based on their titles and abstracts. Thirty articles were selected to be read in their full text which 6 of them remained because of meeting the mentioned inclusion and exclusion criteria. Figure 1 demonstrates the process that we passed to get these 6 articles. The included articles are shown in Table 1. We coded all the studies in Table 1 to ease mentioning them in this paper. More details of play intervention efficiencies are illustrated in Table 2.

All of these 6 studies had mentioned “play” as their primary outcome; however, some of them had other outcomes as well. The assessment tool used for monitoring play was the test of playfulness (TOP) in all of the included studies [36]. There are other tools for the evaluation of play in children, such as child-initiated pretend play assessment (ChIPPA) [37], play history [38], Knox play scale [39], and other scales. These scales could be used for play, but they have some variations in their age group and the area of play that can assess.

For eligibility to attend the study, all studies should have an ADHD diagnosis based on a pediatric physician, but they also used other scales to check if children have common ADHD difficulties. All studies used Conner’s Comprehensive Behavior Rating Scales (CCBRS) to allow children included in the study. Only one study did not use this scale, although, in that study, two other tools were used. Conner’s Parent Rating Scale-the third edition (CPRS-3) and the child Behavior Checklist (CBCL) were used in that study [33].

The core theory of all the studies, regardless of their design, was Cordier’s theory. Cordier published his model of play-based intervention for ADHD children in 2009. Cordier mentioned three main features that should be addressed in play-based interventions for ADHD children. Children’s motivation, lack of empathy in this population, and including playmates in the interventional process are these three main cores [40].

These studies used play-based interventions to improve play, but only two had Randomized Control Trial (RCT) design [41, 42]. The other four studies had not randomized sampling, and all of them mentioned it as a limita-

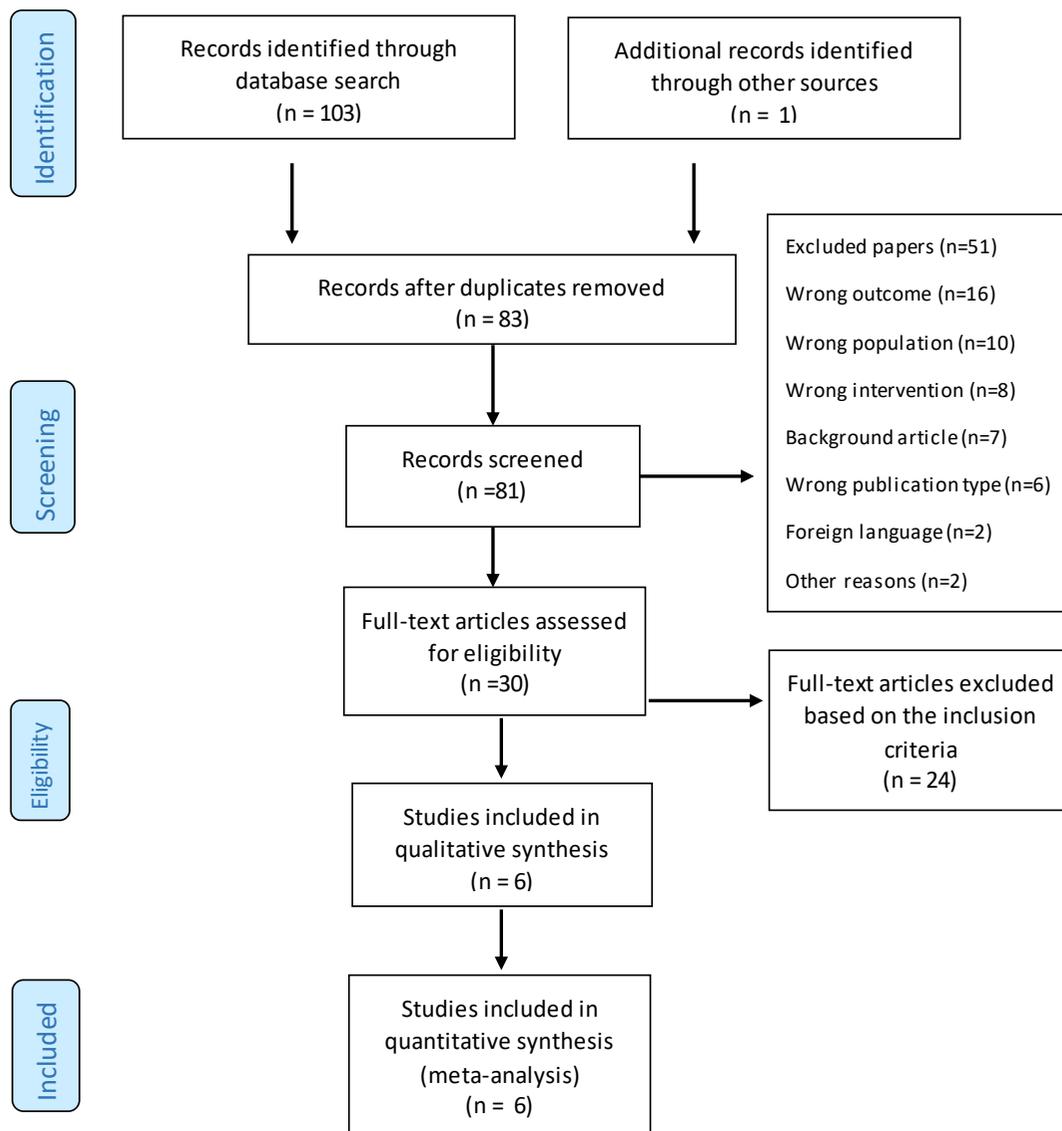


Figure 1. PRISMA 2009 flow diagram

tion to their studies. The quality assessment of non-randomized studies was done by the TREND (Transparent Reporting of Evaluations with Nonrandomized Designs) statement checklist. TREND statement is a checklist for non-randomized trial control studies that claim to evaluate behavioral and public health interventions [43]. This checklist has been used to review articles in the rehabilitation context before [44-46] the RCT studies were appraised by the CONSORT (CONsolidated Standards Of Reporting Trials) checklist (Table 1). CONSORT statement was established to guide randomized control trial studies to enable researchers to report these studies in a useful way [47].

### Study design and methodological quality

Two included studies used the RCT design. The other four studies had a non-randomized control trial design. One of the studies met all the CONSORT criteria [42], and the others had somehow blur descriptions in criteria such as blinding and the whole protocol [41]. In this study, the researcher used the same sample as their past study. Therefore, by referring to that paper, some details on allocation and sampling were not mentioned. The CONSORT table is filled for these two studies. The four residual studies have a lower rate of value according to the center of evidence-based medicine.

Table 1. Included studies

Title	Author	Year	Design
The social play, social skills, and parent-child relationships of children with attention-deficit/hyperactivity disorder (ADHD), 12 months following a randomized controlled trial (RCT) of a play-based intervention	Gabrielle Barnes, Sarah Wilkes-Gillan, Anita Bundy, Reinie Cordier	2017	RCT2
An RCT of a play-based intervention to improve the social play skills of children with ADHD	Sarah Wilkes-Gillan, Anita Bundy, Reinie Cordier, Michelle Lincoln, Yu-Wei Chen	2015	RCT1
An 18-month follow-up of a pilot parent-delivered play-based intervention to improve the social play skills of children with ADHD and their playmates	Alycia Cantrill, Sarah Wilkes-Gillan, Anita Bundy, Reinie Cordier, Nathan J. Wilson	2015	Non-RCT1 (NRCT1)
Evaluation of a pilot parent-delivered play-based intervention for children with ADHD	Sarah Wilkes-Gillan, Anita Bundy, Reinie Cordier, Michelle Lincoln	2014	NRCT2
Eighteen-month follow-up of a play-based intervention to improve the social play skills of children with ADHD	Sarah Wilkes-Gillan, Anita Bundy, Reinie Cordier, Michelle Lincoln	2014	NRCT3
A play-based intervention for children with ADHD: A pilot study	Sarah Wilkes, Reinie Cordier, Anita Bundy, Kimberley Docking, Natalie Munro	2011	NRCT4

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### Used interventions

The interventions varied in their protocol and the settings; however, they were play-based interventions to improve social play. These interventions were parallel to some instructions and interviews with parents in 3 studies out of these 6. These three studies were not randomized control studies (Not RCTs [NRCTs]) that had an interview part that followed a thematic analysis and grounded theory based on Straus and Corbin's view. The extracted themes from these parts of the studies are presented in Table 1. Play-based intervention details are prepared in this table, too.

### Study participants

The age range of the participants was 5 to 13 years. None of the participants had other major disorders like Autism Spectrum Disorder (ASD), but some related minor disorders like language difficulties were not excluded from the study. The sample size is shown in Table 2. In addition, all studies had typically developed children as match groups who were invited by the ADHD sample group. This action was done to decrease the problem of social interactions with an unknown peer. All studies had ADHD's parents in the process of study, as well.

## 4. Discussion

The main purpose of this review was to find out whether different studies have used occupational therapy interventions for improving play. We did not find any prior review study with this purpose. Overall findings indicated play-

based intervention effects on social play skills in ADHD children. The level of accessible evidence is almost low (Centre of Evidence-Based Medicine). However, the newest research pyramid for evidence-based practices lacks a hierarchical process like what was common before. According to this pyramid, the included studies in the current review have higher internal validity.

In this review, two studies used RCT designs while the others had NRCT designs. A common limitation in all NRCTs is the small non-randomized sample size which has decreased the generalization of the results to the other ADHD populations. For decreasing bias, all studies tried to be blinded in their designs, whereas the TOP rater was unaware of the study purpose in all studies except one (NRCT 4). In this study, the authors claim that this is a limitation that they could not prevent. One of the studies (NRCT1) claims that they obviously cannot omit the influence of maturity from their samples. This fact is mentioned because no comparison was made after the intervention between Typically Developed (TD) children and ADHD groups. In NRCT4, we can see that TOP had an increase not only in the ADHD group but also in TD. It may show that play-based intervention has a noticeable influence on social play skills in children, even if they do not have difficulty in this area. As most studies show, a play-based intervention can be effective in children's play skills; however, because of the small sample size, it is hard to confirm this result so far.

Because of the small size of samples, researchers had to use Wilcoxon single rank for their statistics in NRCT1,

Table 2. Intervention details

Study	Content	Delivery	Number of Participants	Setting	Duration/Frequency	Follow-up	Results	Extracted Themes
NRCT1	Play in the clinic and home, All the sessions recorded TOP measured in 4 time points	Therapist and parents	5	Clinic and home	Two weeks (they had 10 weeks of intervention before the study)	Eighteen months	No difference in the home setting, Improvement in a clinic setting (not significant)	New parenting tool Social shift Adaptation strategies The next developmental challenge
NRCT2	Playing with therapist + training parents with DVD and website, The model of play prescribed for each child regarding the problems	Therapist	5	Clinic and home	Seven weeks	One month	No difference between pre and post-intervention, Significant positive change after follow-up	The clinic plays as a sanctuary Parents barriers for performing interventions Tools for repeating learned lessons
NRCT3	Playing with therapist + interviewing with parents (Actually, no new intervention)	Therapist	5	One week and	18 months follow-up		Pre-post showed positive changes, No significant change in the follow-up	An enjoyable intervention A common language for play Improving relationships Need of support for refreshing what is learned
NRCT4	Play modes prescribed according to recorded videos of child's play, Self-modeling from therapist + consultation with parents	Therapist	14	Playroom	Seven weeks	No follow-up	Play and empathy increased after intervention in ADHD and TD group	
RCT1	Play-based intervention	Therapist	31	Clinic and home	Ten weeks	One month		
RCT2			29	Following RCT1				

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NRCT2, and NRCT3. In NRCT4 and RCT2, paired sample t-test was used. RCT1 used repeated-measures ANOVA for its analysis.

Study duration was between 6 to 10 weeks in these studies, except for those with a follow-up design from previous studies. NRCT1 and NRCT2 did not show a significant change in the post-intervention TOP scale, but the follow-up in NRCT2 showed a significant positive change. All other studies showed an increase in the TOP scale after the intervention. Since all participants were 5 to 13 years old with no extra analysis in their age sub-groups, we cannot conclude any age-related statement in this review [48, 49].

The delivery method of interventions indicates that when therapists delivered interventions, they were more

helpful than when parents delivered them. Although the authors' justification is that parent-delivered intervention lacked an immediate influence, it showed a rise of TOP scores in the follow-up, which means that educating parents may have long-term effects on children's social play. Again, the small sample size makes it impossible to generalize this statement to the whole population (NRCT1). Other studies suggest that parent-delivered interventions are effective (NRCT2, NRCT3, NRCT1). The feasibility of interventions was questioned in NRCT3 while it was proved in NRCT2 [32, 48, 49].

All the studies used valid and reliable tools and suitable designs for their aim. In this study, we suggest that play-based interventions in different protocols based on Cordier Model (focusing on peer playing, empathy, and motivation) are feasible and effective, especially when

carried out by a therapist [27]. For parent-delivered interventions, training with different strategies should be addressed, and long-term results might be expected.

According to Cordier, all studies should focus on enhancing empathy, motivation, and playing with others as these three factors are affected in children's playing and the main reason for the poor performance of playing in children with ADHD [31]. In one of these studies, children could reach the normal scores (like their peers within an appropriate range regards to their developmental stage) after receiving interventions (RCT2) [27]. Also, RCT1 shows improvement in playing skills and TOP scores not only after intervention but also after follow-up comparing to pretest evaluations [50]. All other studies showed relative improvement in social play; however, it was not sometimes significant (Table 2).

One limitation of this review article is that four studies out of these six used samples from a previous study. We can assume that not many studies are done to improve play for the sake of play. In all studies we talked about, the play was an outcome, a representation of social skills rather than a prior occupation for a child that needs to be improved. The majority of these studies have the same research group that reveals that few researchers have done studies in this area. In addition, this may create a bias in choosing assessment tools and theoretical frameworks. However, these factors made this review easier because the comparison between studies seems more feasible and tangible. While the thing that makes the comparing process difficult is that all studies did not follow the same design in intervention duration, frequency, or even research design. As there is no prior review in this area, we cannot compare our study to others. The only studies about play for the sake of play for children with ADHD are these six articles discussed. This finding might be an essential concept of this paper. There is a wide gap in the study of children with ADHD play skills for the value of play. More focus on this area is needed.

## 5. Conclusion

There is a limited number of studies arguing the value of play interventions for the sake of play. Play-based interventions are not only appropriate to enhance developmental skills in children but also influential in improving their play skills. Although play-based interventions for improving play skills are not used in many studies, these interventions could improve social play in children with ADHD, according to what was reviewed. The cognitive aspect of play is not focused on and studied in any of the research studies. Play-based intervention could be

delivered either by parents or therapists; however, it was more effective when delivered by a therapist. For parent-delivered interventions, more studies with larger sample sizes are required. A wide gap is seen in studies assessing play-based intervention to improve play skills in both (social and cognitive) dimensions.

## Ethical Considerations

### Compliance with ethical guidelines

This article is a meta-analysis with no human or animal sample.

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### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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