JURNAL UPI

Cakrawala Dini:

Jurnal Pendidikan Anak Usia Dini

Journal homepage: https://ejournal.upi.edu/index.php/cakrawaladini

# Improving Concentration in ADHD Children with Bowling Game

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## ABSTRACT

This research is based on the results of an initial survey conducted at a kindergarten educational institution which found students with a diagnosis of ADHD in the mild category who have difficulty concentrating. The purpose of this study is to improve the concentration of ADHD children through bowling games. This study used an experimental quantitative method with Single-Subject Research Design (SSRD) technique with A-B-A design. The intervention used is sensory integration therapy with bowling. The data collection method used observation and visual graphs for data analysis. The results showed that there is an increase in concentration in ADHD children after applying bowling games. It indicates that the game is effective in improving concentration in ADHD children. Based on the results of this study, researchers are advised to provide treatment with bowling play therapy for ADHD children.



## ARTICLEINFO

***Article History:***
*Submitted/Received 21 Jun 2024*
*First Revised 07 Jul 2024*
*Accepted 05 Aug 2024*
*First Available online 09 Aug 2024*
*Publication Date 01 Nov 2024*

***Keyword:***
*Attention deficit hyperactivity disorder,*
*Bowling,*
*Concentration,*
*Play therapy.*

## 1. INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a neurobehavioral developmental disorder characterized by an inability to focus/hyperactivity as well as poor impulse regulation and control and is often found in children (Aghaei et al., 2019). ADHD is a condition that can be caused by biological disorders in the brain over a long period of time. The disorder is considered to affect the development of children related to cognitive, behavioural, social, and also in communication (Esalini & Lesmana, 2019). Inattention in ADHD children is a difficulty in focusing attention, so that it is easy to be distracted by stimuli received by their sensory organs. Meanwhile, impulsivity is a behaviour that is shown by activities that are carried out repeatedly without thinking about the consequences. In addition, hyperactivity that appears in ADHD children is excessive and tireless behaviour (Wakhaj & Rofiah, 2018).

The worldwide prevalence finding of ADHD is 5% (Song et al., 2021). The prevalence of ADHD in 2020-2022 shows that ADHD children based on gender are 14.5% is a boys and 8.0% is a girls aged 5-17 years (Reuben & Elgaddal, 2024). In addition, the prevalence based on age shows that the age of 3-12 years is 7.6%, while at the age of 12-18 years it is 5.6% (Salari et al., 2023). In Indonesia, cases of children with ADHD are increasing from year to year with a prevalence of 2.4% (De Lorient et al., 2023).

Individuals with ADHD symptoms will have several deficiencies in cognitive parts including visuospatial and verbal memory, inhibitory control, planning, vigilance, and also reward regulation (Mechler et al., 2022). As for children with ADHD, symptoms that appear in preschool, including children who cannot calmly follow lessons, look restless, noisy, and disturb their friends in class, often causes them to get punishment and also unsatisfactory academic grades (Mohr-Jensen et al., 2019). ADHD children are also characterized by developmentally inappropriate levels of inattention. This indicates neurological dysfunction due to mild damage to the nervous system, as a result ADHD children are difficult to control and the concentration span becomes very short (Young et al., 2020).

ADHD children can also be categorized based on their severity, namely mild, moderate, and severe. If the symptoms only slightly interfere with little disruption to social life and occupational tasks, they are considered mild cases of ADHD. ADHD in children is usually diagnosed when the child is around 6 years old by showing several symptoms, namely the inability to pay attention or focus, as well as a tendency to hyperactivity and impulsiveness (Braithwaite et al., 2020).

Judarwanto states that children with ADHD usually have a low ability to concentrate, meaning that they have difficulty in maintaining their attention on something. As a result, these children are considered uncooperative and naughty. When given instructions, ADHD children act differently from their peers. This is due to their tendency to lose focus when completing tasks and activities (Marliana et al., 2017). Several criteria must be checked for children to be diagnosed with ADHD according to DSM V, including the inability to focus, tendency to hyperactivity and impulsivity, and those symptoms must appear before the age of 12 years or for at least 6 months have interfered with social, and academic life (Drechsler et al., 2020).

Concentration is a person's ability to focus attention with changes in behaviour in the form of mastery of an object or something learned (Febriani et al., 2019). In addition, someone can be said not to concentrate when they often feel bored with something, always change places, do not listen, often chat, and disturb friends around them (Winata, 2021). The general principle of concentration is that individuals are able to control thoughts and feelings. This ability is useful so that individuals can focus most of their attention on something that is lived

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

(Noor & Sari, 2022). ADHD in children can also cause problems in the academic field where children with ADHD will have lower academic achievement when compared to children who do not have ADHD (Arnold et al., 2020). ADHD can also affect social life such as rejection from peers, conflict with family, to maladaptive behaviour such as drug use, depression, and suicidal ideation (Masrum et al., 2023). Therefore, interventions are needed that can help appropriately optimize the concentration of children with ADHD.

There are several interventions that are considered to improve children's concentration, one of which is play therapy (Ratri et al., 2023). Games that can be applied to support the learning process of early childhood, such as using the Montessori method conducted by Noor & Sari (2022), flash cards applied by Wahyuni (2024), and guessing games language games applied in the research of Wibowo dan Suyadi (2021).

Play therapy is considered effective in the treatment of children with ADHD because it is proven to be very useful for helping children learn about abstract reasoning and verbal abilities, and can activate several things ranging from feelings, thoughts, social skills, creative problem solving, and optimal behaviour formation (Pamungkas & Nesi, 2022). Another study stated that play therapy can improve children's concentration, reduce hyperactivity, impulsivity, and disruptive behaviour in ADHD children (Ningrum et al., 2022).

There is a link between the relationship between play therapy and concentration in ADHD children, namely the emergence of therapeutic effects in the game (Doulou & Drigas, 2022). Play is a representation of one's own abilities, personality, and problem solving. In addition, play therapy can also be a therapy that can improve pre-social skills as well as and reduce some of the problems in everyday life due to ADHD, thus strengthening emotional and behavioral abilities (Zanjani et al., 2020).

One of the play therapies that is considered effective in treating ADHD is the sensory integration technique from Jean Ayres in 1972. According to Ayres' theory, sensory integration occurs due to the influence of sensory input, namely hearing, seeing, vestibular, tactile, and proprioceptive sensations (Anggraeni et al., 2022). The process begins in the womb, allowing the development of adaptive responses as the basis for the development of more complex skills, such as motor skills, emotional control, social skills, and various behaviours. Sensory processing will be impaired if basic skills are also impaired. As a result, there will be functional problems in performing higher skills (Camarata et al., 2020).

Sensory integration therapy can be stated as a type of intervention that encourages children to improve their physical skills and abilities. An effective way is the use of toys, because by playing children will become more motivated, excited, and concentrated. The therapeutic effect of sensory integration therapy is necessary because it can cause a need to encourage ADHD children in self-control, such as learning to sit still and pay attention to something. Children with ADHD are also synonymous with difficulty processing sensory stimuli which sensory integration therapy can help relieve (Watari et al., 2021). According to Zimmer & Desch, sensory activities such as hearing, vision, swing, touch, and other equipment, such as balls, are widely used by occupational therapists and other therapists because they have proven effective for the treatment of children with developmental and behavioural disorders (Azkiya, 2021).

Bowling is one of the games that uses sensory integration therapy, so this game is considered to help children concentrate. Bowling is a type of sport that is carried out by rolling a ball to knock down a number of pins in a row, then arranged as before. It is useful in developing gross motor skills and exploring themselves in concentrating through the game.

The research from Wardana (2017) on “Peningkatan Kemampuan Konsentrasi Melalui Permainan Bowling Pada Anak Autis” (“Increasing Concentration Ability Through Bowling in

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

Autistic Children") shows that the game can help autistic children significantly improve their concentration skills. In addition, research conducted by Prima et al. (2022) on "Pengaruh Permainan Lempar Tangkap Bola Terhadap Koordinasi Mata dan Tangan Anak Kelompok B TK Anggrek Palembang Tahun 2021" ("The Effect of Throwing and Catching the Ball Game on Eye and Hand Coordination in Group B Children at Anggrek Palembang Kindergarten in 2021") suggests that throwing and catching the ball has a significant effect in training concentration and reflex movements in children's eyes and hands.

Based on the dynamics of the problems described above, the purpose of this study is to improve the concentration of ADHD children with bowling games. The benefits obtained directly from this research can help ADHD children improve their concentration skills and abilities, making it easier for them to better control themselves to focus on their activities. In addition to this, another benefit is to add to the repertoire of knowledge in the field of developmental and clinical psychology as a curative effort to improve the concentration of ADHD children. This research also fills the void of previous research, where the focus of this research is more specifically carried out for ADHD children in the mild category.

## 2. METHODS

This study uses experimental quantitative techniques with a Single-Subject Research Design (SSRD) design with an A-B-A design. The purpose of the SSRD design is to observe changes in the subject's response after being given an intervention (Marliana et al., 2017). There are three stages in this measurement, namely the baseline phase (A1), which is a phase to measure target behaviour before a certain treatment is given. Then, the treatment or intervention phase (B), which is the phase to measure the target behaviour during treatment. And finally, the baseline phase (A2), which is the phase to measure target behaviour after treatment (Fitra & Sopandi, 2024).

The subject in this study is a 6-year-old kindergarten B student with a diagnosis of attention deficit hyperactivity disorder (ADHD) in the mild category who has difficulty concentrating. This diagnosis has been confirmed through the results of a child growth and development doctor's assessment that was conducted when the child was 5 years old. Furthermore, the data analysis chosen is using visual graphs. Visual graph analysis is a data analysis technique by describing data into a graph, then analysed according to the components of each condition. The goal is to determine the functional relationship between the intervention and the desired behaviour change (Ledford et al., 2018).

There are several points that researchers focus on in analyzing changes that occur in children's concentration in playing bowling. The analysis used includes analysis within and between conditions. Analysis within conditions is an analysis of data changes to determine changes that occur within a condition, for example in baseline conditions and treatment conditions. The components used are determining the length of the condition, estimating directional trends, stability trends, data trace trends, stability levels and ranges, and data changes. Meanwhile, the analysis between conditions is an analysis of data changes to determine changes that occur between conditions, for example in baseline conditions to treatment conditions. The components used are determining the number of variables changed, changes in directional trends and their effects, changes in stability trends, changes in levels, and the percentage of overlap (Gustiani et al., 2022).

The implementation procedure in this study is at the baseline stage (A1), which is the initial condition of children's concentration before treatment. Children are given a natural task, for example playing a bowling game with a certain duration and several trials, to measure the child's initial concentration level. At this stage it is repeated 4 times a meeting.

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

In the treatment stage (B), bowling games are given with duration and several trials, as well as certain targets. At this stage the child is asked to roll the ball towards 10 arranged bowling pins, so that later the bowling pins will fall after being hit by the rolled ball. The rule in this game is that the child must successfully drop at least 5 bowling pins. This stage lasted 8 meetings.

The baseline stage (A2) aims to review whether the treatment or intervention provided lasts long enough and has a positive influence on children's concentration. In this stage, the child is asked to play the bowling game according to the duration and several specific trials. This stage lasted for 4 meetings.

The bowling game in this study has been adapted and modified according to the abilities of ADHD children. Can be seen in **Figure 1** is a picture of the track, pin design, and baseball used in the bowling game. The adjusted change is a field with a track length of 2 meters and a width of 0.5 meters (Wardana, 2017). To make bowling pins safer, this design uses used bottles with attractive colours, and uses a baseball that is adjusted to the track (Azizah et al., 2022). Bowling games with used materials can develop three aspects, namely cognitive, affective, and psychomotor aspects. On the other hand, it also encourages reasoning skills so that children can learn to solve problems (Fara et al., 2020).

**Figure 1**. Track, pin, and ball design.

Data was collected during observation of the game. Observation is a technique used to obtain data related to the object under study (Khaatimah & Wibawa, 2017). The data collection was carried out by recording the number of pins that fell during the bowling game. The research instruments used are timers (stopwatch/clock), pen, and assessment forms (Syukria & Rahmahtrisilvia, 2022). The table of research instruments used in this study can be seen in **Table 1** as follows.

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

**Table 1.** Assessment form.

| No | Observation Day | Amount of Pins |
|---|---|---|
| 1 | First day | .... |
| 2 | Second day | .... |
| 3 | Third day | .... |
| 4 | Fourth day | .... |

## 3. RESULTS AND DISCUSSION

The results of the experimental research that has been carried out, obtained data on children's concentration on bowling games by dropping pins as in **Table 2** for the baseline phase (A1), **Table 3** for the treatment phase (B), and **Table 4** for the baseline phase (A2).

**Table 2.** Data of dropping pins during the baseline phase (A1).

| No | Observation Day | Amount of Pins |
|---|---|---|
| 1 | Monday, 5 February 2024 | 1 |
| 2 | Tuesday, 6 February 2024 | 1 |
| 3 | Wednesday, 7 February 2024 | 1 |
| 4 | Thursday, 9 February 2024 | 1 |

In **Table 2**, the results of recording the pins at meeting 1 to meeting 4 with each duration of 4 minutes and 4 trials, obtained that there was 1 pin that fell. Children were still distracted by external factors, such as seeing lizards on the wall, fearing red ants passing in front of the track, and often the energy exerted was too strong that the ball dis not roll towards the target pin, intstead it bounced off the wall. In addition, the child became grumpy and yelled if they failed to knock down the pins. In bowling games of this phase, children's concentration were still not optimal, but the number of pins dropped was stable at each meeting.

**Table 3.** Data of dropping pins during the baseline phase (B).

| No | Observation Day | Amount of Pins |
|---|---|---|
| 1 | Monday, 12 February 2024 | 7 |
| 2 | Tuesday, 13 February 2024 | 7 |
| 3 | Thursday, 15 February 2024 | 8 |
| 4 | Friday, 16 February 2024 | 8 |
| 5 | Monday, 19 February 2024 | 8 |
| 6 | Tuesday, 20 February 2024 | 9 |
| 7 | Wednesday, 21 February 2024 | 9 |
| 8 | Thursday, 22 February 2024 | 12 |

In **Table 3** during the treatment phase (B), children were given certain targets in the bowling game, namely being able to drop at least 5 bowling pins. The time and trials given were increased to 7 minutes with 7 trials because in the baseline phase (A1) the number of pins falling was stable in each meeting. In this phase, the child tried several sessions and was

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

able to knock down as many as 7 pins, then the child began to be able to knock down at most 12 pins. In this condition, there was an increase and interest in playing the bowling game. The child began to be excited to try to knock down the pins. Seen in several attempts, the child did not get angry or yell if he/she failed to knock down the pins.

**Table 4.** Data of dropping pins during the baseline phase (A2).

| No | Observation Day | Amount of pins |
|---|---|---|
| 1 | Friday, 23 February 2024 | 34 |
| 2 | Monday, 26 February 2024 | 22 |
| 3 | Tuesday, 27 February 2024 | 18 |
| 4 | Wednesday, 28 February 2024 | 45 |

In the treatment phase (B) there was an increase in children's concentration, so in this baseline phase (A2), the time and trials were increased to 10 minutes with 10 trials at each meeting. It can be seen in **Table 4**, children's concentration in playing bowling games has increased even though in sessions two and three it has decreased. The decrease was due to the energy expended by the children being too small. In addition, children also lacked concentration because they were in an unhealthy physical condition. Despite the decline, the subject still wanted to try to try to knock down bowling pins. The child's performance in playing the bowling game was good without any assistance. The highest number of pins obtained in this phase was 45 pins.

In **Table 5**, the results of the in-condition analysis in the baseline phase (A1) with the length of the condition or the number of observations of four meetings, found that the trend of data traces is flat, meaning that there has been no change in data in these conditions. It can also be seen in the first session to the fourth session that the acquisition of bowling pins dropped by children is 1. The stability level and range are obtained from the smallest number and the largest number in each condition. Where in the baseline phase (A1) the range obtained is 1-1. It suggested that the child's ability to concentrate in bowling games is fixed, even though the level of stability is stable. Meanwhile, to get the results of level changes is to calculate the difference between the first data and the last data. The level of change in children's concentration data in bowling games is 1-1 = 0, meaning that there is no change in level or fixed.

In the treatment phase (B) with the length of the condition or the number of observations of eight meetings, it was found that the trend of trace data was upward, meaning that in this phase there was an increase in children's concentration on bowling games. It can also be seen that from the first session to the eighth session the acquisition of bowling pins dropped by children tends to increase. The level of stability shows instability (variable). This is because the acquisition of data on children's concentration playing bowling varied. However, the resulting data has increased with a range of 7-12. The level of change in the level of data on children's concentration in bowling games is 7-12 = +5, meaning that bowling games have a good effect on children's concentration abilities because the level change obtained is 5.

In the baseline phase (A2) with the length of the condition or the number of observations of four meetings, it was found that the trend of trace data was upward, meaning that in this phase there was an increase in children's concentration in bowling games. It can also be seen that in the first session to the fourth session the acquisition of bowling pins dropped by children tends to increase. The level of stability shows stability with a range of 18-45. In

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

addition, the level of change in the data level of children's concentration in bowling games is 45-34 = +11, meaning that bowling games have a good effect on children's concentration abilities because the level change obtained is 11.

**Table 5.** Results of in-condition analysis.

| Condition | Baseline (A1) | Treatment (B) | Baseline (A2) |
|---|---|---|---|
| Condition Length | 4 | 8 | 4 |
| Estimation of Directional Tendency | (=) | (+) | (+) |
| Stability Tendency | 100% (Stable) | 37,5 % (Not stable) | 100% (Stable) |
| Data Trace Tendency | (=) | (+) | (+) |
| Stability and Range Level | Stablel (1-1) | Variable (7-12) | Stable (18-45) |
| Level Change | 1-1 (0) | 12-7 (+5) | 45-34 (+11) |

**Figure 2** shows the estimation of directional tendency which aims to describe the pattern of child behavior being studied. The directional tendency is divided into 3 types, namely horizontal, upward, and downward (Putri et al., 2021). In the baseline phase (A1) the directional trend is flat or fixed. These results mean that in the baseline phase (A1) the child's ability to concentrate on dropping bowling pins has not changed. Meanwhile, in the treatment phase (B) the direction trend is upward. From these results, there is a change or increase in the ability to concentrate on dropping bowling pins. Furthermore, in the baseline phase (A2) the directional trend is upward. It can be interpreted that the ability to concentrate children in playing bowling games has increased.

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

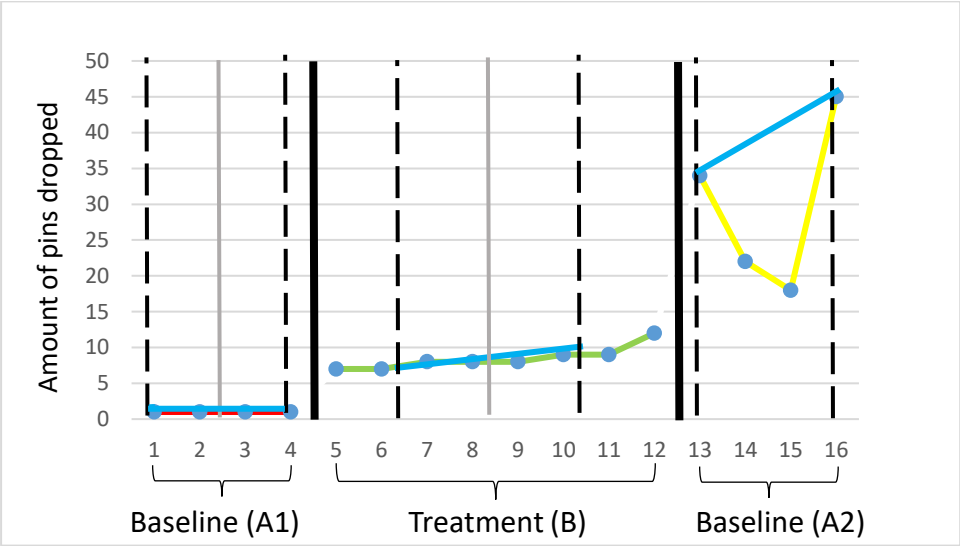



**Figure 2.** Estimation of directional tendency.

Notes:

| | | | |
|---|---|---|---|
| Mid Rate Line: | – – – – | Baseline Condition (A1) : | ——— |
| Mid Date Line: | ——— | Treatment Condition(B) : | ——— |
| Phase Change Line: | ——— | Baseline Condition (A2) : | ——— |

As in **Figure 3**, it shows the stability trend which aims to describe the homogeneity of a data. Data is said to be stable if it is at a percentage of 85-90%. Below that, percentage the data is said to be unstable (Taufan et al., 2020). In the baseline condition (A1), the results obtained stability range = 0.15; mean level = 1.0; upper limit = 1.1; and lower limit = 0.9. So, a stability tendency of 100% is obtained, meaning that the data in this condition shows stability. In the treatment phase (B), the results obtained stability range = 1.8; mean level = 8.5; upper limit = 9.4; and lower limit = 7.6. A stability tendency of 37.5% is obtained, meaning that the data in this condition shows instability (variable). While in the baseline condition (A2), the results obtained stability range = 6.75; mean level = 29.8; upper limit = 33.2; and lower limit = 26.4. So that the results of the stability tendency of 100% are obtained, which means that the data in this condition shows stability.

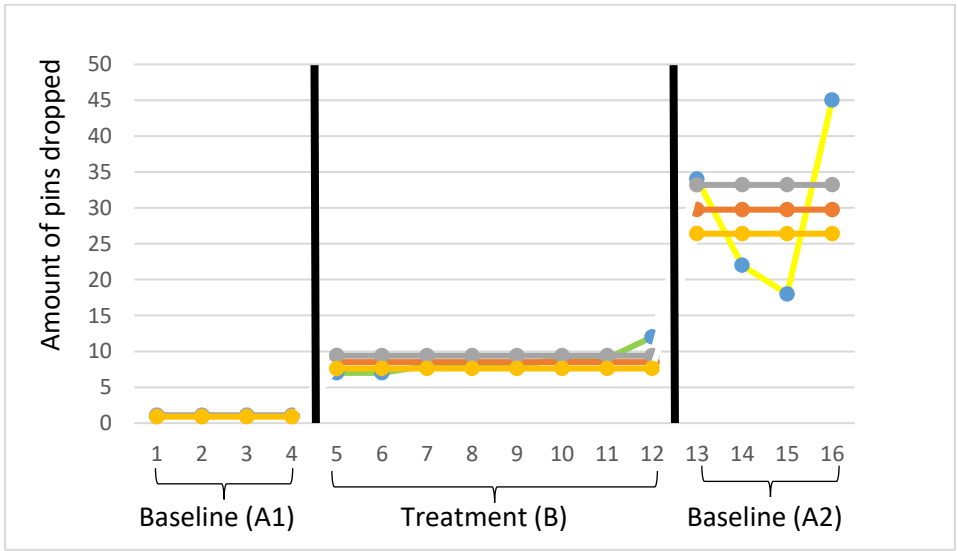
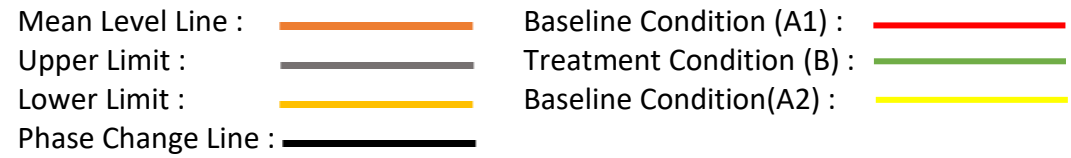



**Figure 3.** Stability tendency.

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

Notes :




Can be seen in **Table 6** is the result of the analysis between conditions, where the number of variables changed is one, namely the ability to concentrate on ADHD children. The results of changes in directional trends and effects on conditions between baseline (A1) and treatment conditions (B) are flat to upward. The change in condition is worth + which means that there is an increase in children's concentration by applying bowling games. Meanwhile, in the treatment condition (B) with the baseline condition (A2) there was a change in condition, namely upward to upward. The change in condition is worth + which means that the child's concentration condition is getting better.

In changes in stability trends, the comparison between baseline conditions (A1) and treatment conditions (B) is stable to variable, meaning that the data in the baseline condition (A1) shows stability, while in the treatment condition (B) does not show stability. The acquisition of data instability in the treatment condition (B) is due to the acquisition of varied data. In addition, the comparison between the treatment condition (B) and the baseline condition (A2) is variable to stable, meaning that after doing the treatment phase (B) the subject's concentration shows stability so that there is an optimal change in children's concentration by applying bowling games.

As for the acquisition of level changes from baseline conditions (A1) to treatment conditions (B), it shows an increase or improvement with the acquisition of a level change of +6. Furthermore, the treatment condition (B) to the baseline condition (A2) shows an increase or improvement with the acquisition of a level change of +22. These results indicate that there is a good effect of the application of bowling games on children's concentration. The percentage of overlap obtained in the baseline condition (A1) with the treatment condition (B) is 0%, while in the treatment condition (B) with the baseline condition (A2) is 0%. Thus, these results indicate that there is no overlapping data. The smaller the overlap percentage, the better the treatment effect on the target behavior (Halimah, 2019).

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

**Table 6.** Results of analysis between conditions.

| Condition Comparison | A1/B | B/A2 |
|---|---|---|
| Amount of Variable Changed | 1 | 1 |
| Changes in Directional Trends and Their Effects | (=) (+) | (+) (+) |
| Changes in Stability Tendency | Stable to Variable | Stable to Variable |
| Level of Chance | 1-7 (+6) | 12-34 (+22) |
| Overlap Percentage | 0% | 0% |

In connection with the results of data analysis that has been carried out, it shows that bowling games are proven to improve concentration in children with ADHD. In line with that, there is research that states that interventions in the form of sensory integration can overcome motor circuit disorders. Disorders in the motor circuit are what cause problems with motor function and attention (McLeod et al., 2014). Thus, integrated sensory therapy with bowling can be used as an intervention to improve the concentration of children with ADHD.

The results of this study are in line with the results of previous research, where there is research from Rahmaniah et al. (2021) which states that apart from being able to introduce number symbols to children, bowling games can also help in improving children's concentration and motor skills. Another study conducted by Abadiah & Sidik (2022) stated that bowling games were proven to be effective in improving children's comprehension instructions. In addition, the game can also train concentration in children because the technique of playing bowling requires concentration when rolling the pin.

In some conditions in this bowling game, children repeatedly try to roll the ball in an effort to drop the pin on target. The formation of behaviour that is raised by the child is the result of a trial-and-error learning process. This is in line with Thorndike's theory which has the view that the process occurs through a series of experiments formed due to the connection of stimulus and response, so as to be able to provide manifestations in the form of behaviour. Where the behaviour that children bring up can solve the problems they face (Hermansyah, 2020).

Thorndike metioned there are three laws of learning, namely the law of readiness, the law of exercise, and the law of effect (Maryani et al., 2023). In the law of readiness, the more ready to strive for behaviour change, the resulting behaviour will produce a satisfying response in the individual (Abdurakhman & Rusli, 2017). This is proven when the child succeeds in concentrating on playing the game of bowling without distractions, then the child is able to drop the pin which ultimately results in satisfaction in the form of happy feelings, such as smiling and laughing.

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

This is evident when the child manages to concentrate on playing the bowling game without distraction, then the child can knock down the pin which ultimately causes satisfaction in the form of feelings of pleasure, such as smiling and laughing.

Thorndike's second law of learning is the law of practice, if the more often the behavior is repeated or trained, the stronger the behavior will be repeated (Hidayat & Malihah, 2023). When concentrating on rolling the ball towards the pin, children repeatedly practice to do this. Thus, the more repeated throwing exercises to roll the ball, the more the child masters the target or target direction. In addition, in the third law of learning, namely the law of consequences, if the response stimulus is strengthened, the result will be pleasant. However, a weakened response stimulus will result in unpleasant effects (Nurliasari & Gumiandari, 2020). During the bowling game, children get a response in the form of praise when they hit the target in dropping the pins, so that the behaviour that is raised by the child wants to continue to concentrate on playing the game so that it hits the target.

This game helps children channel their feelings and understand the rules of the game. In line with that, play therapy teaches children to negotiate to control their energy to understand certain rules and targets, so that they can provide optimal results in playing. In addition, play therapy can help children understand their needs. Play therapy can significantly aid children in gaining a deeper understanding of their own needs, emotions, and personal experiences. Play therapy can provide children with a valuable opportunity to explore and articulate their feelings, desires, and needs in a safe and supportive environment. By engaging in creative and expressive activities, children can gain insights into their own emotional experiences and develop a better understanding of what they need for their well-being and development. Through these play activities, children will gain understanding so that they can develop the abilities that exist in themselves (Sulistyaningtyas, 2019).

In this game, although there was an increase in concentration, it also decreased during the evaluation phase. This is due to a decrease in health so that the energy expended by children in rolling the ball is too small. Children's concentration can be influenced by two factors, namely external factors and internal factors External factors are factors that exist outside the individual, such as a relatively calm learning environment, sufficient lighting so that the environment is comfortability and support from the surrounding environment. Meanwhile, internal factors are factors that exist within the individual, such as a healthy physical condition, a healthy and nutritious diet, no serious problems, and not easily discouraged in learning (Winata, 2021).

Bowling games themselves for early childhood can be useful for increasing the fine and gross motor sensitivity of children. That's because as these activities require a range of coordinated movements that help enhance their ability to perform precise actions with their hands and fingers, as well as larger movements involving their arms, legs, and overall body coordination. Through regular participation in such games, children can improve their hand-eye coordination, balance, and spatial awareness, which are crucial for their overall physical development and can positively impact their ability to engage in other activities and daily tasks with greater ease and proficiency. Furthermore, bowling games can also improve cognitive abilities with concentration, help train eye and hand coordination, maintain body position, and teach children patience and cooperation when bowling games are played in groups (Swasthi et al., 2024).

The efforts of these fun learning activities are expected to improve children's ability to enter further education. Children need to prepare in order to mature themselves. There are two important things that are interconnected to prepare children to enter advanced school levels, namely school maturity and school readiness. The maturity is related to aspects of

DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321

physical growth, while school readiness is related to children's skills in maturity and the learning process (Mariyati, 2019). Therefore, to finalize school readiness in children with ADHD, fun learning efforts in the form of play activities such as bowling need to be applied to finalize the skills of children, especially in the aspect of concentration.

## 4. CONCLUSION

This study shows that bowling games can be recommended to treat concentration barriers in mild category ADHD children. Increased concentration is an important factor to facilitate ADHD children in the academic learning process at school. The limitation of this study is that it is one case subject with a diagnosis of mild ADHD, so further research can be focused on several research subjects such as mild, moderate, and severe ADHD. The method used in addition to quantitative experiments, can also use literature review. In addition to this, future researchers can also develop research with the one group experimental design method on subjects who experience concentration barriers such as ADHD, autism, and tunagrahita by considering IQ and severity.

The suggestion for teachers is that this research can be used as an alternative activity to substitute the learning process at school in addition to other games such as jumping, running, and throwing the ball. Furthermore, for parents, the results of this study can be used as additional information in parental assistance with bowling games to improve children's concentration when at home.

## 5. ACKNOWLEDGMENT

The authors would like to thank the school and related parties who have helped in conducting this research. The researcher also thanks the subject and the subject's parents who have been cooperative and participated in the implementation of this study. In addition, the researcher is also grateful to the supervisor who has provided direction, so that this research can be carried out as well as possible.

## 6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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DOI: http://dx.doi.org/10.17509/cd.v15i2.71379
p-ISSN 2087-1317 e-ISSN 2621-8321