



Online Behavior Modification Therapy: A Case Study on Enhancing Task Initiation in a Child with ADHD

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Abstract

Children with attention-deficit/hyperactivity disorder (ADHD) often experience difficulties in maintaining attention on tasks, display impulsive behaviors, and show signs of hyperactivity. Therefore, interventions are needed to help children manage ADHD symptoms. This study specifically aimed to examine the effectiveness of online behavior modification therapy using the response cost technique in enhancing task initiation in a child with ADHD. The study employed a single-case design. The participant was a 10-year-old child ($n=1$) who exhibited ADHD symptoms, including difficulties sustaining attention, impulsivity, and hyperactivity. Assessments were conducted through observation, interviews, and psychological testing. ADHD symptoms were measured using the Indonesian Attention-Deficit Hyperactivity Disorder Rating Scale (IARS). The intervention lasted for 5 weeks. Baseline psychological conditions were assessed to guide the intervention plan. Following the intervention, several improvements were observed, including a reduction in IARS scores (from 69 to 61), increased initiative in task completions, greater attentiveness during conversations, and a decrease in impulsive behaviors. However, as this study used a single-case design, the findings cannot be generalized, and further research is needed to better understand the effectiveness of this intervention for other children with ADHD. This study may serve as a reference for mental health professionals in managing ADHD cases in children.

Keywords: attention-deficit hyperactivity disorder (ADHD); children; online behavior modification therapy; response cost

Attention deficit/hyperactivity disorder (ADHD) is a neurocognitive condition that causes executive function deficits and impacts one's academic, social, and emotional aspects (Barkley, 2014). ADHD can be detected in childhood and becomes more apparent in adulthood (Mastoras et al., 2015). Therefore, it is important to identify children with ADHD symptoms so that they can receive treatment and care as early as possible, for optimal development according to their developmental stage.

The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) defines ADHD as a neurodevelopmental disorder with symptoms like inability to focus, hyperactivity, and impulsivity that are not appropriate for the child's developmental age (American Psychiatric Association, 2013). ADHD symptoms can be observed before the age of 12 and must appear in at least two settings, e.g., school and home. ADHD is one of the developmental disorders in childhood that has a poor prognosis when not treated or managed effectively (van der Oord & Tripp, 2020).

Factors causing ADHD encompass neurological, genetic, and environmental factors. Neurological factors include weak nerve structures, such as brain damage and/or delayed maturation of the central nervous system (Aprilia, 2020). This condition may cause an inability to control consciousness and filter stimuli in children, making it difficult for them to concentrate, manage their behavior, and maintain their attention. Meanwhile, genetic factors in individuals cannot be observed directly.

The chromosomes that might be responsible for ADHD could be passed down. Then, environmental factors include poor parenting management and children living in unhealthy environments, e.g., having parents who smoke (Hanifah et al., 2024).

The prevalence of ADHD worldwide ranges from 2% to 7%, with an average of 5% occurring in children, affecting their ability to perform activities and pay attention, leading to impulsive behaviors (Sayal et al., 2018). There is no data explaining the overall prevalence of children with ADHD in Indonesia. However, there have been several studies on children with ADHD in Indonesia. One of them, a study by Putri and Widiastuti (2019), examined how positive reinforcement through play could help improve concentration in children with ADHD. In addition to research on children with ADHD, research on parents raising children with ADHD is also very much needed. Maulinda and Lubis (2024) explained that parents should understand the needs and challenges of caring for children with ADHD. They need to know what kinds of support their children need.

In their study, Barbaresi et al. (2018) estimated that approximately 6-60% of children with ADHD continue to have ADHD symptoms well into adulthood. Meanwhile, Sibley et al. (2017) evaluated 36 research participants to determine the persistence of ADHD symptoms in adulthood. The research data were supported by self-reports and parent reports, revealing that the persistence of ADHD symptoms from childhood to young adulthood

was around 60%. Treatment and care from childhood is important to control ADHD symptoms that may affect further growth and development.

Several interventions that can be carried out to manage ADHD in children are pharmacotherapy and psychotherapy. While medication is widely used to treat children with ADHD, it is not entirely effective in children and has side effects (Baumeister et al., 2018). Harstad et al. (2016) found that only about 44% of children with ADHD aged 6 years or older have received psychotherapy. Meanwhile, Walls et al. (2018) recommended that children with ADHD receive both drug therapy and psychotherapy, such as behavioral therapy. It is important to understand the variations in treatment and intervention to optimize care for children with ADHD. The focus of care for children with ADHD is usually related to reducing symptoms and improving the child's ability to perform daily activities. In this context, behavioral therapy aims to minimize inappropriate behavior and teach children to be independent (Esalini & Lesmana, 2019). Based on this explanation, this study aimed to determine the effectiveness of behavioral therapy using response cost techniques in reducing ADHD symptoms in children.

1. Methods

1.1 Research Design

This study was a single case study. In a single case study, the effects of the intervention can be determined by observing the changes before and after the intervention (Dinakaramani, 2024). According to Kazdin (2021), a single case study can evaluate individuals, schools, communities, social policies, and interventions.

1.2 Case Description

The participant's parents brought their child to receive professional treatment for their psychological condition. The participant was a 10-year-old 5th grader. The child had not received pharmacotherapy or psychotherapy from a professional. Reports on the child's cognitive and social development were based on interviews with parents regarding the progress seen in report cards and discussions with the homeroom teacher. Based on these reports, it was found that the participant was easily distracted and often made noises in the classroom. However, academically, the participant was still able to learn and understand the lessons taught. Before undergoing the intervention, the participant's parents received an explanation and gave their written consent for the intervention. This was done because the participant was under 18 years old, so consent was obtained from the parents as guardians.

This case study was not submitted for ethical committee review, given that the data source originated from a professional psychology practice. However, the principles of confidentiality and professional ethics were upheld by obscuring the participant's identity. This case study followed professional psychology ethical guidelines, with all procedures ensuring participant protection through the application of confidentiality and anonymization.

Based on assessment results, the participant experienced difficulty in concentrating, e.g., difficulty focusing on tasks, getting bored, and switching tasks easily, lacking task initiative, having trouble following rules at home,

and often failing to follow instructions. Meanwhile, in terms of hyperactivity, the child could not sit still, often moved their hands, had difficulty waiting for their turn, talked excessively regardless of the situation, and often interrupted others when talking. Ideally, 10-year-old children are at the developmental stage where they can distinguish right and wrong, understand norms or rules in the environment, and behave cooperatively in social situations (Dewi et al., 2020). Meanwhile, the participant's difficulty in paying attention and focusing made it difficult for him to behave cooperatively during assignments. Based on this assessment, the child urgently needed intervention to improve focus, task initiation, and a sense of discipline.

1.3 Intervention Stages

The intervention was carried out across several meetings, each meeting comprised of several sessions. An explanation of the intervention stages is presented in Table 1.

1.4 Behavior Modification Therapy Implementation Plan with Response Cost Techniques

Behavioral modification therapy is a type of therapy that aims to increase desired behaviors and reduce the intensity of undesirable behaviors. It has been applied in children with ADHD, resulting in improved behavior control, increased discipline and responsibility, compliance with orders, and enhanced social skills. Behavior modification therapy with response cost techniques is characterized by stopping reinforcement when undesirable behaviors occur (van der Oord & Tripp, 2020). In this study, parents would reduce gaming time if the child could not complete the agreed-upon challenges. The duration of video game or smartphone time was limited to 1 hour under the supervision of the participant's parents or older siblings. The agreed reinforcement was an addition to gaming time and a snack chosen by the participant. Reinforcement was given daily or weekly, depending on the agreement between the participant and the parents.

Behavior modification therapy in this study was conducted online via Zoom. The first meeting began with building trust with the participant. The child was given an explanation of the series of therapy activities that would be carried out. The participant was encouraged to reflect on his condition so that he understood the need for therapy. The psychologist guided the participant to write a story for the purpose. Then, the participant received an explanation about maladaptive and adaptive behaviors in their daily lives.

At the second meeting, the participant was asked to recall what was discussed at the first meeting. Next, the psychologist discussed the challenges to be completed, the rules of the challenges, the rewards to be received if successful, and the consequences for failing to complete these challenges with the child. The challenges were taking the initiative to do schoolwork without being reminded by parents, sweeping and tidying up the bedroom, and controlling the mobile gaming schedule. The agreed challenges were influenced by the participant's lack of discipline and task understanding, as well as maintaining focus on one task, for example, exhibited by the participant playing mobile games while doing something else.

Table 1
Intervention Stages

Meeting	Activity	Objective
I/1	Introduction and therapy objectives	Building trust and proximity with the participant; explaining the series of therapy activities that would be conducted.
I/2	Story writing; Problem formulation	Encouraging the participant to reflect on their condition; explaining the participant's problems and their dynamics.
I/3	Explanation of maladaptive and adaptive behaviors; Closing	Informing the child that interrupting others, not taking initiative in completing tasks, and not completing tasks properly are maladaptive behaviors; identifying adaptive behaviors that can replace maladaptive behaviors; ending the first meeting and motivating participants to attend the second meeting.
II/1	Opening and review of the first meeting	Opening the second meeting and asking the child what was discussed at the first meeting.
II/2	Discussing the challenge to be tackled and the rules	Forming an agreement on challenges to be completed during the intervention; explaining the rules during the intervention process.
II/3	Discussing the consequences of certain behaviors in the challenge; Closing	Explaining the rewards the child would receive for expected behaviors, as well as the consequences for maladaptive behaviors; informing the child that parents and siblings will also play a role in the intervention; concluding the second meeting and motivating the participant to attend the third meeting.
III/1	Opening and review of the second meeting	Opening the third meeting and asking the child what was discussed at the second meeting.
III/2	Challenge evaluation	Checking the child's progress based on the results of previous sessions and evaluations of challenges.
III/3	Watching an educational video on adaptive behaviors; Closing	Watching an animated video about ADHD and discussing it; discussing adaptive behaviors that can be applied in daily life; concluding the third meeting and motivating the participant to attend the fourth meeting.
IV/1	Opening and review of the third meeting	Opening the fourth meeting and asking the child what was discussed at the third meeting.
IV/2	Challenge evaluation; Kangaroo couldn't sit still + worksheet	Checking the child's progress based on the results of previous sessions and evaluations of challenges; telling a story about a kangaroo that could sit still, and talking with the participant about encountering such a situation in daily life.
IV/3	Breathing relaxation; Closing	The participant was taught a breathing relaxation technique; concluding the fourth meeting and motivating the participant to attend the fifth meeting.
V/1	Opening and review of the fourth meeting	Opening the fifth meeting and asking the child what was discussed at the fourth meeting.
V/2	Focus training game—Guessing pictures; Therapy evaluation	Guiding the participant to play a game that trained his focus by guessing the differences between two similar images (the participant's highest score was 50 points); evaluating the therapy and asking the participant about what they gained during the intervention; explaining that skills learned during the intervention could be applied in the participant's daily life.
V/3	Discussing participant's responses on rewards and consequences; Termination	Explaining that rewards and consequences were used as tools to help participants develop the desired adaptive behaviors; ending the intervention and expressing hope that the child would continue to exhibit adaptive behaviors in his daily life.

Explaining rewards and consequences to the child raised awareness that every behavior has consequences. Rewards would be given for desirable behaviors, and consequences would be given for violating the established rules. The consequences referred to were reducing or eliminating things that the participant enjoyed.

The response cost in the intervention was delivered by cutting the child's gaming time if he could not complete the agreed challenge. However, if he succeeded, he would receive rewards, such as being allowed to buy snacks on day-offs and play with friends outside. The participant reviewed the challenges during the first week of the intervention at the third meeting. He was also guided to share the difficulties while partaking in the challenges. After that, the participant received an education about concentration difficulties and hyperactive behaviors through an animated video. The participant then evaluated whether the content of the video matched his expectations.

In the fourth meeting, the participant reviewed the second week of challenges. He was guided to assess whether there had been any changes and difficulties experienced during the challenges. The psychologist delivered a story about a kangaroo that cannot sit still. The child then analyzed the story and identified whether the conditions described in that story matched his situation. The participant was also guided to practice breathing exercises to help him relax when feeling restless.

The participant then reviewed the third week of the challenges at the fifth meeting. A game-based training was delivered via a video to help improve the child's focus and concentration. He was tasked to find the differences between two images. There were a total of five questions. Then, the participant was asked to evaluate all intervention sessions as a whole. The final session was the termination, which marked the end of the intervention. The psychologist reviewed all resources that were delivered to the participant and motivated him to apply them in his daily life.

1.5 Assessment

The assessment tool used in the study was the Indonesian ADHD Rating Scale (IARS), which was filled out by the parent. A score above 30 indicates a high risk of ADHD (Juniar & Setiawati, 2014). The results showed that the child was at a high risk. Examples of items in the IARS were 'overactive or excessive activity' and 'frequent failure to complete tasks'.

In addition, data collection was also carried out through observation, interviews, CBCL (Child Behavior Checklist), FSCT (Forer Sentence Completion Test), and graphic tests. The CBCL results indicated that the child had problems with focus and attention as well as aggressiveness. In addition, the participant was also rated to have a risk in social life and thought patterns. The FSCT results showed that the child would feel sad when teased, yelled at, or scolded by others. Meanwhile, the child reported feeling happy when doing something or playing with friends.

Such findings were supported by the results of the graphic test, which indicated the child's interest in socializing with peers. However, the participant tended to control others when in a group. The most prominent fig-

ure in the participant's life was his mother. He talked to his mother more often than to his father.

1.6 Data Analysis

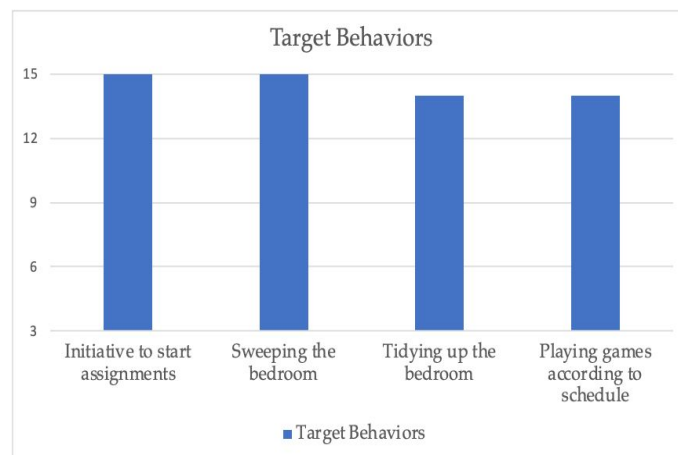
In this study, researchers analyzed data to determine the effectiveness of the intervention given to the participant. The effectiveness of the intervention was measured by observing how many challenges participants successfully completed during the intervention process. Assessment using the Indonesian ADHD Rating Scale (IARS) done by the parent was also used as a benchmark for behavioral changes observed in this study.

2. Results

There was a decrease in the IARS score before and after the participants were given the intervention. The IARS was filled out by the participant's mother. The IARS score before the intervention was 69, which means that the participant was at high risk of ADHD. Meanwhile, after the intervention, the score decreased to 61. These results indicated behavioral changes in the participants.

Declines were observed in several behaviors representing attention, impulsivity, and hyperactivity. Changes in attention behaviors include paying attention when spoken to and a decreased need for full guidance in tasks. Then, changes in impulsive behavior include a decrease in hasty answers and careflessness in completing tasks. The participant was able to control his desire to interrupt or cut off others during conversations. He also began to understand the importance of thoroughness in completing a task. Meanwhile, changes in hyperactivity behaviors included a decrease in alertness or activity levels that seemed mechanical. This illustrates that the participant had improvements in movement control and understanding suitable behaviors according to the situations. In this study, changes in the participant were only monitored for 15 days. Therefore, monitoring over a longer period of time was needed to prove the effectiveness of the therapy.

Figure 1
Behavioral Change Targets



There were several behavioral changes targeted by the intervention (see Figure 1). These behavioral changes

were the four main tasks that the participant agreed to partake in during the intervention. The four agreed-upon tasks were monitored for 15 days. The participant completed the first task, which was taking the initiative to start homework on their own, so that the mother no longer had to remind them. The participant successfully exhibited adaptive behaviors, e.g., listing tasks that needed to be completed in a notebook.

The participant also successfully completed the second task, which was to sweep the room every day. A symptom of ADHD is difficulty in recalling daily activities. Before the intervention, sweeping the bedroom was one of the participant's household chores. The participant's mother often reminded the child to sweep and tidy up his own room. The child often forgot to carry out these chores. Before the intervention, there were no consequences for the participant when failing to do household chores. However, during the intervention, the participant was able to sweep his room without help or reminders from his mother or older sibling.

For the third task, which was tidying up the room and bed, the participant managed to complete the task for 2 weeks. The participant forgot to tidy up his room and bed on the fifth day. The fourth task was to play mobile games without exceeding the predetermined schedule. The participant succeeded in doing this for 14 days and failed on the first day because he did not remember that this activity was included in the challenge.

The 14-day challenge period was set so that the researchers could compare the behavioral changes between Week 1 and Week 2, when the challenge rules were enforced. According to Ogundele and Ayyash (2023), behavioral therapy is a form of psychosocial therapy with a duration tailored to the participant's needs. In this study, the participant received intervention and support for 5 weeks.

3. Discussion

This study found changes in the participant's behaviors, specifically improved task initiation and reduced ADHD symptoms. Behavioral modification therapy with the response cost technique was provided to increase target behaviors and monitor unwanted negative behaviors. In this study, the participant was taught to understand which behaviors are desirable and which ones should be controlled. This helps the participant perform better socially and increase a sense of responsibility. One of the benefits of behavioral therapy for children with ADHD is helping them understand how to respond to their environment and teach them appropriate behaviors so that they are able to distinguish various stimuli (Amalia, 2018).

This study used a cost-response technique aimed at giving participants an understanding that their actions can influence the consequences. When the participant successfully exhibited the expected behavior, he received a predetermined reward. Meanwhile, if the participant failed, he faced predetermined consequences. The consequences given are behaviors that can help children to be more responsible for their tasks. Response cost can be applied in daily life, like by taking away something that children like, e.g., reducing playtime. Response cost can push children to fulfill their tasks and improve their

abilities in cognitive tasks (Furukawa et al., 2019).

The response cost intervention delivered to the participant had a positive impact on his daily behavior. He understood the need to show initiative and consistency to achieve the desired goals. The consequences of failing to complete agreed-upon tasks led to a greater sense of responsibility. This condition is supported by research conducted by van der Oord and Tripp (2020), which found that children with ADHD exhibit emotional changes following an intervention like response cost behavior management. After receiving a response cost intervention, the participant also showed changes in the ability to manage emotions, which reduced impulsive and hyperactive behaviors. The participant listened more attentively to others, did not interrupt or cut off conversations, and worked more carefully. The use of response cost in this study improved the participant's sense of responsibility, ensuring that he completed tasks according to the instructions and rules.

In this study, there were changes in the participant's ability to pay attention. Participants started displaying the ability to maintain his attention when communicating with others and complete tasks according to the rules. The participant no longer interrupted others during conversations and instead waited for the other person to finish speaking. In addition, he could complete tasks without the help of others because he understood the tasks at hand. The changes in the participant were supported by research conducted by Prabawati and Ditasari (2018), who found that children with ADHD could see an increase in attention span through intervention, as shown by their ability to pay attention to someone's explanation, mimic others' facial expressions as a form of attentive response, and complete tasks as instructed without leaving their seats.

A decrease in impulsive behavior was also observed in the participant, e.g., being able to control speech instead of asking questions or making statements in a rush. The reduction in impulsive behavior allowed the child to listen and wait for the other person to finish speaking. Another decrease in impulsive behavior was demonstrated by the diligent completion of tasks or activities. This condition shows that the participant could adjust to his daily activities. The therapeutic function of behavioral therapy shows that it can help children control responses to auditory stimuli (Moreno-García et al., 2019).

In addition, a decrease in hyperactive behavior was shown by the participant's ability to control movements, such as when being asked to sit still. The behavioral changes in participants were in line with the main objective of treatment for children with ADHD, which is to improve their daily behaviors. Such interventions help children to control themselves and develop better adaptive skills in accordance with their development stage (Susanto & Sengkey, 2016).

Putri and Widiastuti (2019) explained how positive reinforcement can encourage children with ADHD to complete tasks. Positive reinforcement can be delivered via a response cost when children succeed in carrying out their tasks. Positive reinforcement aims to reinforce desirable behaviors that have been exhibited by the children. In this study, the participant received positive reinforcement

such as positive affirmations and agreed-upon rewards.

The importance of affirmations is supported by Chan et al. (2022), who found that to increase motivation and participation in children with ADHD, affirmations and positive encouragement from parents and other family members are needed. Some examples of affirmations that can be given are “you can complete the task well” and “you can be responsible for your own tasks.” The research by Furukawa et al. (2019) concluded that children with ADHD need positive affirmations and attention for successful adaptive behaviors. Punishments or point deductions from behavioral therapy are considered necessary, but their behavioral and emotional impacts are also important to be monitored by parents and professionals who treat children with ADHD.

Behavioral therapy for children with ADHD requires the assistance of parents or teachers. Parents or teachers are usually instructed to provide continuous reinforcement so that the expected adaptive behaviors emerge. Research by Meyer et al. (2019) showed that children with ADHD acquire new adaptive behaviors more quickly when reinforcement is given gradually. Children will learn and begin to exhibit adaptive behaviors gradually so that these behaviors become habits.

Harjana (2000) explained that positive discipline could be used in interventions for children with ADHD. Positive discipline-based behavior modification is a systematic method of learning to change the behavior of children with ADHD by promoting the principles of positive discipline. In this study, psychoeducation was also provided to parents so that they would understand the importance of teaching and encouraging good behaviors. Parents can help children by setting a good example in managing bad behavior without having to hurt the child verbally or physically. This method also encourages parents and teachers to respect children's rights, but does not encourage them to spoil their children.

In addition to interventions for children with ADHD, it is important to provide psychoeducation to caregivers, such as parents and close relatives. This can help caregivers who play a role in providing routine care for children with ADHD in their daily lives. An intervention that can be provided to caregivers of children with ADHD is psychoeducation. Psychoeducation for parents of children with ADHD makes them more empowered and confident in choosing the best treatment for their children (Dahl et al., 2020). Psychoeducation provided includes introducing the symptoms of ADHD, raising awareness of the importance of firmness so that children can develop discipline, and educating families that each family member is very important in supporting children with ADHD at home and at school.

Psychoeducation raises awareness of the importance of preventive measures in helping children with ADHD thrive at every stage of their development. According to research by Chronis-Tuscano et al. (2016), it is important to provide both pharmacotherapy and psychotherapy for these children. The success of children with ADHD in living their future lives is influenced by their parents' awareness that children with ADHD need clinical care so they can carry out tasks appropriate to their stage of development.

During the intervention, parents did not fully appreciate all task completions. This was because parents often forgot and were not accustomed to praising positive behaviors exhibited by the participant. It is expected that parents will give positive feedback on desirable behaviors so that the child will be motivated to behave positively. In line with this, Emser and Christiansen (2021) asserted that social support serves as a protective factor for children with ADHD. Social support can reduce the negative impact when children with ADHD experience difficulties or certain adverse situations, e.g., challenges in learning or socializing. Parents and other family members can help children with ADHD develop skills, complete tasks, socialize with others, and find activities that interest the child.

4. Conclusion

In this study, behavioral modification therapy using the response cost technique was able to improve task initiation in children with ADHD. Changes observed in the child included increased initiative in performing daily tasks that usually required constant reminders from parents. Other behavioral changes that emerged included compliance with agreed-upon rules, improved discipline, and understanding of appropriate communication methods. Behavior modification therapy helped the participant determine simple tasks that could be done routinely and served as a means for participants to learn to remain proactive in task completion without involving others. Based on the assessment, it was suggested that the participant requires pharmacotherapy, and parents needed to consult with experts about their child's condition so that they could provide an adequate long-term treatment for him.

This study had several limitations. First, there was only one participant ($n=1$), so no comparison could be made. Second, the measurement of task initiation was done based on parents' reports, so there was potential for assessment bias. Third, this study did not involve independent observers who could provide additional validation. Fourth, the follow-up period was relatively short, so the long-term effects could not be ascertained. Based on these limitations, the results of this study cannot be generalized to the wider population.

4.1 Recommendation

Online behavioral modification therapy using the response cost technique shows potential in enhancing task initiation and related behaviors in children with ADHD. Therefore, further studies with stronger designs, e.g., a multiple baseline design, A-B-A-B design, or randomized controlled trials (RCTs), are highly recommended to test the effectiveness of the intervention in greater depth. Future research should also include larger and more diverse samples, independent observers, and longer follow-up periods to evaluate the long-term outcomes.

5. Declaration

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5.3 Author Contributions

The first author contributed to the design and implementation of the study and the writing of the manuscript. The second author contributed by providing supervision during the research process and reviewing the manuscript.

5.4 Conflict of Interest

The researchers declare that there is no conflict of interest in this research, manuscript writing, or publication.

5.5 Declaration of Generative AI in Scientific Writing

The authors declare that they used a generative AI tool (ChatGPT) to assist in brainstorming for the manuscript. The AI was not used to generate scientific content or conduct data analysis. All ideas, interpretations, and final revisions are the sole responsibility of the authors, who carefully reviewed and verified the accuracy of the manuscript.

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