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Structured Water Play and Courage Development in Children with ADHD During Swimming Instruction

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Abstract

This study aimed to examine the effect of structured water play on improving courage in children with ADHD during swimming instruction. The study employed a Single Subject Research (SSR) design with an A1–B–A2 withdrawal model. The participant was a six-year-old boy diagnosed with ADHD, selected using a case study approach. The intervention was conducted over 12 sessions consisting of baseline (A1), intervention (B), and follow-up (A2) phases. Data were collected through systematic observation of courage-related behaviors and pre-test and post-test questionnaires measuring aquatic fear levels. The instruments included an observation sheet adapted from SNAP-IV, Conners, and ADHD RS-5, as well as a fear-level questionnaire. Data were analyzed using SSR visual analysis techniques, including trend direction, level changes, stability, and Percentage of Non-Overlapping Data (PND). The findings demonstrated a consistent increase in courage during the intervention phase, which was maintained during the follow-up phase. In the shallow pool condition, the PND value reached 66%, indicating a moderate effect, while in the deep pool condition the PND value reached 100%, indicating a strong effect. Questionnaire results also showed a reduction in aquatic fear. These findings indicate that structured water play is an effective adaptive pedagogical strategy for enhancing courage and emotional readiness in children with ADHD during swimming instruction and supports the implementation of inclusive physical education practices.

Keywords: water play, courage, ADHD, swimming lessons, single subject research.

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A. Introduction

Swimming is a water-based physical activity that contributes significantly to children's physical, motor, cognitive, and psychological development. Swimming activities involve whole-body coordination, breathing control, balance, and emotional adjustment in an aquatic environment, which differs substantially from movement activities on land. In physical education, swimming instruction is not only directed toward mastery of fundamental techniques such as floating, gliding, and kicking, but also toward the development of cardiovascular fitness, muscular strength, flexibility, self-regulation, and emotional adaptation. International physical activity guidelines emphasize that structured physical activities for school-aged children contribute positively to physical health, psychological well-being, and cognitive performance (Bull et al., 2020). Furthermore, the aquatic environment provides unique sensory characteristics, including buoyancy and hydrostatic pressure, which can create a safer, calmer, and more enjoyable learning atmosphere for children. Structured aquatic programs have also been reported to improve motor coordination, engagement, and emotional participation in learning activities (Basso & Pellegrini, 2023). Therefore, swimming instruction for children should be pedagogically designed through enjoyable, adaptive, and play-oriented approaches.

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder commonly experienced by school-aged children and characterized by inattention, hyperactivity, and impulsive behavior. These characteristics often affect children's participation and learning processes in physical education settings, including swimming instruction. Children with ADHD frequently experience difficulties in emotional regulation, behavioral control, sensory adaptation, and task persistence, particularly when facing unfamiliar or challenging environments such as water. Previous studies indicate that physical activity interventions positively influence executive functioning, attention control, and behavioral regulation in children with ADHD (Li et al., 2023; Zheng et al., 2025). In addition, aquatic activities have been found to reduce hyperactivity symptoms and improve concentration through multisensory stimulation and calming hydrostatic pressure (Tang et al., 2022; Zhu et al., 2023). Play-based learning approaches also contribute positively to children's intrinsic motivation, emotional engagement, and social interaction during physical activity (Fauzi et al., 2022). Therefore, structured water play may provide a meaningful pedagogical strategy to support both emotional and behavioral adaptation among children with ADHD during swimming instruction.

In swimming instruction, children with ADHD may experience anxiety, fear, and hesitation when interacting with aquatic environments. Water-based activities require sensory adjustment, balance control, emotional readiness, and confidence, which may become challenging for children who demonstrate impulsivity and emotional dysregulation. Fear of water can manifest in avoidance behavior, muscle tension, crying, or resistance when entering the pool, thereby limiting participation and reducing learning effectiveness. Previous studies have identified fear and anxiety in aquatic settings as major barriers to successful swimming participation among children (Coelho et al., 2025; Roche et al., 2022). Moreover, instructional approaches that fail to address children's emotional needs may intensify feelings of insecurity in aquatic environments. Consequently, swimming instruction requires adaptive, gradual, and enjoyable learning strategies that support emotional comfort and positive engagement with water (Alkasasbeh et al., 2024).

The concept of courage in swimming learning is closely associated with children's emotional readiness, self-confidence, and willingness to engage in challenging situations despite feelings of

fear or uncertainty. From an educational psychology perspective, courage is not merely the absence of fear but the ability to act adaptively in the presence of fear. This concept aligns with Bandura's self-efficacy theory, which explains that individuals' beliefs in their abilities strongly influence their motivation, emotional responses, and persistence when facing difficult tasks (Bandura, 1997). Children with high self-efficacy are more likely to approach challenging situations with confidence and resilience, whereas children with low self-efficacy tend to avoid unfamiliar environments and demonstrate higher anxiety levels. In swimming instruction, self-efficacy plays an important role in helping children believe that they can safely interact with water and successfully perform aquatic tasks. Positive mastery experiences, gradual success, encouragement, and enjoyable learning environments are I portant sources of self-efficacy development for children with ADHD.

In addition to self-efficacy theory, the affective learning perspective also supports the importance of emotional development in physical education. Affective learning emphasizes emotional responses, attitudes, confidence, motivation, and feelings of safety during the learning process. Within aquatic learning, positive affective experiences can reduce fear and enhance children's willingness to participate actively. Structured water play creates enjoyable and non-threatening learning situations that allow children to gradually develop emotional comfort and courage in the water. Through repetitive positive experiences, children can build emotional readiness and confidence to participate in increasingly complex swimming activities.

The implementation of structured water play is also supported by play therapy and sensory integration theories. Play therapy views play activities as a natural medium through which children express emotions, reduce anxiety, and develop adaptive coping skills. In children with ADHD, structured play activities may improve emotional regulation and behavioral adaptation because they provide opportunities for exploration and controlled interaction in a supportive environment. Furthermore, sensory integration theory explains that controlled sensory stimulation helps children organize sensory input more effectively and respond adaptively to environmental demands. The aquatic environment provides multisensory stimulation through water pressure, movement resistance, and body support, which may help children with ADHD achieve greater sensory regulation and emotional calmness during swimming activities.

Although previous studies have examined the benefits of physical activity and aquatic therapy for children with ADHD, most studies have focused primarily on motor development, cognitive function, or symptom reduction. Research specifically addressing the affective dimension, particularly courage development during swimming instruction, remains limited. In addition, few studies have integrated structured water play as a pedagogical intervention aimed at increasing courage and emotional readiness among children with ADHD. This gap highlights the need for further empirical investigation regarding adaptive instructional strategies that support emotional development in aquatic learning contexts (Cheng et al., 2025; Martín-Rodríguez & Herrero-Roldán, 2025).

Therefore, this study aims to analyze the effect of structured water play on increasing courage in children with ADHD during swimming instruction using a Single Subject Research (SSR) design. Specifically, this study examines the effectiveness of structured water play interventions in improving children's courage, emotional readiness, and confidence compared with learning conditions without intervention.

B. Methods

Research Design

This study employed a quantitative approach using the Single Subject Research (SSR) method with an A1–B–A2 withdrawal design. This design was used to analyze changes in the courageous behavior of a child with ADHD before, during, and after the implementation of a structured water play intervention in swimming instruction. The research process consisted of three phases. The baseline phase (A1) aimed to identify the participant's initial level of courage and emotional readiness in aquatic activities without intervention. The intervention phase (B) involved the implementation of a structured water play program integrated into swimming instruction. The follow-up baseline phase (A2) was conducted to evaluate whether changes in courageous behavior were maintained after the intervention was withdrawn. The A1–B–A2 design was selected to control external variables and to strengthen the interpretation that behavioral changes resulted from the intervention.

The study was conducted over 12 sessions consisting of 3 baseline sessions (A1), 6 intervention sessions (B), and 3 follow-up sessions (A2). Each session lasted approximately 45–60 minutes and was conducted individually in a club swimming pool environment to ensure safety, focus, and consistency of treatment. Every session included three stages: (1) warm-up and adaptation activities (10–15 minutes), (2) core structured water play activities (25–35 minutes), and (3) cooling down and evaluation (5–10 minutes).

The structured water play intervention was implemented progressively across sessions. Initial sessions focused on water familiarization activities, such as splashing water, walking in shallow water, and playing with floating toys. Intermediate sessions introduced more challenging activities, including blowing bubbles, floating with assistance, retrieving objects in water, and moving independently in the pool. Advanced sessions involved confidence-building activities in deeper water, such as jumping into the pool with assistance, gliding, and participating in simple aquatic games requiring independent movement. The intervention was designed based on principles of gradual exposure, play therapy, and positive reinforcement to enhance emotional comfort and courage in aquatic settings.

Each session was guided by a swimming coach who also acted as the primary observer during data collection. To minimize observer bias, several procedures were implemented. First, the observation indicators and scoring procedures were standardized prior to the study through observer training sessions. Second, behavioral observations were conducted using structured observation guidelines with operational definitions for each indicator to maintain consistency across sessions. Third, field notes and video recordings were used to support observational accuracy and allow repeated review of participant behavior when necessary. In addition, scoring was conducted immediately after each session to reduce recall bias and maintain objectivity in behavioral assessment.

Participant

The participant was a six-year-old boy diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) who had not yet entered formal education. The participant was assigned the code S1 to protect confidentiality and identity. The study was conducted at a swimming club facility with consideration for a structured, safe, and supportive environment suitable for individualized intervention. Prior to data collection, informed consent was obtained from the participant's parents, including approval for observation and participation in aquatic intervention activities.

Research Instruments

This study used two types of instruments: observation sheets and questionnaires. The observation instrument was developed by adapting several

standardized scales, including SNAP-IV (Swanson, Nolan, & Pelham, 2001), the Conners Rating Scale (Conners, 2008), and the ADHD Rating Scale-5 (DuPaul, Power, Anastopoulos, & Reid, 2016). In addition, indicators related to persistence and self-regulation were adapted from Barkley's self-regulation theory (Barkley, 1997). The instrument adaptation process involved adjusting behavioral indicators to the context of swimming instruction and the characteristics of children with ADHD.

The observation sheet consisted of eight indicators of courageous behavior in aquatic environments, including willingness to enter the pool, interaction with water, participation in aquatic games, emotional responses during activities, and ability to perform tasks independently. Each indicator was scored using a 5-point scale ranging from strong refusal and fear responses to independent participation without signs of anxiety. Observations were conducted in both shallow and deeper pool conditions during every session.

In addition, a fear-level questionnaire was administered before and after the intervention to measure changes in aquatic anxiety and emotional readiness. The questionnaire complemented observational data by providing additional information regarding the participant's emotional responses toward swimming activities. Data were analyzed using SSR visual analysis techniques, including trend direction, stability, level changes, overlap analysis, and Percentage of Non-Overlapping Data (PND).

Table 1. Observation Sheet

Observation Sheet For The Structured Water Play Program	
Child's Name	:
Age	:
Session Date	:
Diagnosis	:

Table 2. Instrument Test

No	Source	Indicators	Description of observed behavior	Score (1-5) Shallow Pool	Score (1-5) Deep Pool
1.	SNAP – IV (avoidance /resistance)	Initial courage toward water	The child wants to touch and play with splashing water.		
2.	Conners (response to novelty)	Adaptation of the face in water	The child wants to dip their face in the water or blow bubbles in the water.		
3.	SNAP – IV (avoidance /resistance)	Participation in play	The child actively participates in simple games in a shallow pool.		
4.	ADHD RS-5 (emotional regulation)	Floating with assistance	The child is willing to float with assistance while their body is supported.		
5.	Task Persistence (SNAP - IV)	Moving the legs and arms in the water	The child actively moves their legs and arms while swimming.		
6.	Conners (emotional control)	Emotional expression	The child appears happy and does not show fear when playing in the water.		
7.	ADHD	Compliance	The child follows the		

No	Source	Indicators	Description of observed behavior	Score (1-5) Shallow Pool	Score (1-5) Deep Pool
	Rating Scale- 5 (attention/co compliance)	with instructions	instructor's instructions calmly without excessive anxiety.		
8.	Conners (overall behavior regulation)	Overall courage	The child is brave enough to be in the deep end of the pool without direct assistance.		

Supporting instruments such as questionnaires were used to assess the level of fear of the aquatic environment as a pre-test and post-test. The questionnaire was designed based on the concepts of aquatic readiness and water competence (Langendorfer, S. J., & Bruya, 1995; Stallman et al., 2017), which were adapted to the needs of the study. The questionnaire consisted of 18 statements covering five aspects, namely social context, previous experience, attitude towards water, environment and equipment, and self-competence. The questionnaire used a four-point Likert scale. The questionnaire was filled out by parents, observers, and previous coaches to obtain an overview of behavioral changes from various perspectives. The content validity of the instrument was determined through expert assessment involving adaptive physical education experts and specialists in swimming instruction. The reliability of the observation instrument was maintained by using uniform assessment guidelines in each observation session, while the reliability of the questionnaire was tested through internal consistency.

The research was conducted using a Single Subject Research (SSR) design model A1–B–A2 consisting of three phases, namely initial baseline (A1), intervention (B), and final baseline (A2). Phase A1 aimed to obtain an overview of the initial condition of children's courage in an aquatic environment without intervention, which was conducted over 3 sessions. Phase B was the implementation of regular water play in the swimming learning process, which was carried out over 6 sessions. In the intervention phase (B), water play activities were arranged gradually and in accordance with the characteristics of children with ADHD. The activities included picking up floats from the water surface, throwing and catching floats, walking in shallow areas while carrying aids, and playing games of placing objects in baskets in the water. The activities were implemented using play-based methods that provided positive reinforcement to increase the children's involvement and self-confidence. Phase A2 was carried out to observe behavioral changes after the intervention was stopped as a control for the effects of the treatment carried out over 3 sessions. Each stage is carried out through several sessions conducted sequentially. A session lasts for 30–45 minutes and is conducted several times a week based on the training schedule at the club's swimming pool. Observations are carried out in each session using a structured assessment guide to systematically record the children's courage behavior scores.

Data analysis applies visual analysis techniques that are often used in Single Subject Research (SSR) design. The analysis is carried out in two stages, namely within-condition analysis and between-condition analysis. Within-condition analysis includes trend, data stability, level change, and score range in each phase (A1, B, and A2). Data stability is determined if at least 80% of the data is within ±15% of the median value of that phase. Level change is calculated by comparing the last score in a phase to the first score in the next phase.

Between-condition analysis is conducted to compare behavioral shifts

between phases A1 and B, and between phases B and A2. In addition to monitoring changes in trend direction and level shifts, the impact of the intervention is also evaluated using the percentage of non-overlapping data (PND) to determine the extent of the water play's influence on increasing children's courage. Pre-test and post-test questionnaire data were analyzed using descriptive statistics by calculating total scores and percentage changes in scores as supporting data for the observation results. This study focused on a single subject, so the results are specific and cannot be applied generally. The SSR design emphasizes the evaluation of individual behavioral changes and does not apply inferential statistical tests. In addition, the trainer, who also functions as an observer, may produce bias in the assessment, even though structured observation guidelines and consistent assessment criteria have been used to reduce subjectivity.

C. Result and Discussion

Results

The results of the Single Subject Research (SSR) analysis demonstrated progressive improvements in the participant's courage during swimming instruction following the implementation of structured water play activities. The analysis was conducted using standard SSR visual analysis procedures, including trend direction, level changes, mean comparison between phases, stability analysis, and Percentage of Non-Overlapping Data (PND). Visual presentation of the data should include standard SSR graphs consisting of phase change lines, mean lines for each phase, trend lines, and stability envelopes to strengthen interpretation of behavioral changes across conditions.

In the shallow pool condition, the initial baseline phase (A1) showed courage scores ranging from 15 to 20, with a mean score of 17. The data pattern during this phase indicated relatively stable but low courage levels, suggesting that the participant still demonstrated hesitation and dependency when engaging in aquatic activities. During the intervention phase (B), courage scores increased progressively from 18 to 27, with a mean score of 22. Visual SSR analysis showed a positive trend line and an upward shift in behavioral level compared to the baseline phase. Four out of six intervention data points exceeded the highest score in phase A1, resulting in a Percentage of Non-Overlapping Data (PND) value of 66%, which indicates a moderate intervention effect.

In the follow-up baseline phase (A2), courage scores increased further, ranging from 28 to 32 with a mean score of 30.3. The trend line remained positive and stable, and all data points were higher than those recorded during phase A1. The stability envelope analysis also showed that the data in phase A2 were relatively stable with minimal variability, indicating that the participant maintained improved courage levels even after the intervention was withdrawn.

Table 1. Courage Scores Across 12 Sessions in Shallow Pool and Deep Pool

Session	Shallow Pool	Deep Pool
1	15	9
2	16	9
3	20	12
4	18	14
5	19	14
6	21	15
7	21	15
8	26	21
9	27	23
10	28	24

Session	Shallow Pool	Deep Pool
11	32	28
12	31	28

Table 1 presents the courage scores obtained during 12 observation sessions conducted in shallow and deep pool conditions. In the initial baseline phase (A1), scores in the shallow pool ranged from 15 to 20, while scores in the deep pool ranged from 9 to 12. These findings indicate that the participant initially experienced fear and limited confidence, particularly in deeper aquatic settings.

During the intervention phase (B), a gradual increase in courage scores was observed in both conditions. In the shallow pool, scores increased from 18 to 27, whereas in the deep pool, scores increased from 14 to 23. The visual trend line in both conditions showed a clear upward direction, indicating that structured water play activities positively influenced the participant's willingness to engage in aquatic tasks. Stability analysis also demonstrated reduced variability during later intervention sessions, suggesting increasing emotional adaptation and behavioral consistency.

At the final baseline phase (A2), courage scores remained consistently higher than in the initial baseline phase. In the shallow pool, scores ranged from 28 to 32, while in the deep pool, scores ranged from 24 to 28. Mean phase lines in both conditions demonstrated clear differences between baseline and post-intervention phases. In addition, the stability envelope indicated that most data points fell within the stability range, reflecting stable maintenance of courageous behavior after the intervention ended.

In the deep pool condition, the baseline phase (A1) showed courage scores ranging from 9 to 12, with a mean score of 10. During the intervention phase (B), scores increased substantially to 14–23, with a mean score of 17. All intervention data points exceeded the highest baseline score, resulting in a PND value of 100%, indicating a strong intervention effect. Visual analysis demonstrated a substantial upward level change and positive trend direction during the intervention phase.

In the follow-up phase (A2), courage scores ranged from 24 to 28 with a mean score of 26.7. The trend line remained stable and above the previous phases, while the stability envelope showed relatively consistent data distribution with low fluctuation. These findings suggest that the participant maintained increased confidence and emotional readiness in deep-water conditions after structured water play intervention.

Table 2. Pre-test and Post-test Results of the Courage Questionnaire

Rater	Pre-test	Post-test	Δ Score	% Change	Pre-test Category	Post-test Category
Parents	49	49	0	0%	Low	Low
Observer	61	37	-24	-26.70%	Medium	Low
Previous Coach	60	41	-19	-21.10%	Medium	Low

Based on Table 2, the questionnaire completed by the participant's parents showed no change between the pre-test and post-test scores, both remaining at 49. However, the observer and previous coach evaluations showed decreases in fear-related scores. The observer's score decreased from 61 to 37, while the previous coach's score decreased from 60 to 41. Since lower questionnaire scores indicate

lower levels of aquatic fear and anxiety, these findings suggest that the participant experienced improvements in emotional adaptation and confidence following the intervention.

The visual SSR findings and questionnaire results consistently demonstrate that structured water play contributed positively to courage development and reduced fear responses in swimming instruction for children with ADHD.

Discussion

The results of this study indicate that structured water play had a positive effect on increasing courage in a child with ADHD during swimming instruction. The stable increase in courage scores during the intervention phase (B), followed by consistently high scores during the follow-up phase (A2), demonstrates functional behavioral changes associated with the implementation of the intervention. In the Single Subject Research (SSR) A1–B–A2 design, the upward trend direction, level changes, and stability of scores strengthen the assumption of a causal relationship between structured water play and the improvement of courageous behavior in aquatic environments.

The increase in courage following the intervention can be understood through the interaction between the neuropsychological characteristics of children with ADHD and the adaptive learning methods applied in structured water play. Children with ADHD commonly experience difficulties in executive functioning, emotional regulation, impulse inhibition, and sensory processing. These conditions may increase anxiety and avoidance behaviors when children are exposed to unfamiliar or challenging situations such as swimming activities. Neuropsychologically, ADHD is associated with dysregulation in the prefrontal cortex and deficits in attentional control and emotional modulation, which may contribute to heightened emotional reactivity and fear responses. Consequently, aquatic environments can initially become overwhelming for children with ADHD due to the simultaneous sensory, motor, and emotional demands involved in swimming activities.

Structured water play appears to reduce these difficulties by providing gradual exposure, repetitive positive experiences, and emotionally supportive learning situations. The play-based structure minimizes performance pressure and allows children to interact with water in a more relaxed and enjoyable manner. In addition, the sensory properties of water, including buoyancy, hydrostatic pressure, and rhythmic movement, may contribute to sensory regulation and emotional calming. From a neuropsychological perspective, hydrostatic pressure and repetitive aquatic movement may help modulate arousal levels and improve body awareness, thereby reducing anxiety and enhancing emotional stability in children with ADHD.

These findings are also consistent with emotional regulation theory, which emphasizes the importance of adaptive strategies in managing emotional responses to challenging situations. Emotional regulation refers to the processes through which individuals monitor, manage, and modify emotional reactions in order to achieve adaptive behavior. Children with ADHD often struggle to regulate fear, frustration, and impulsive responses, especially in novel environments. Through structured water play, the participant was gradually exposed to manageable aquatic challenges within a safe and enjoyable context. This process likely supported emotional regulation by reducing fear responses and increasing feelings of safety, control, and predictability. As emotional regulation improved, the participant demonstrated greater willingness to engage in swimming activities and reduced avoidance behavior.

The findings can also be explained through Bandura's self-efficacy theory.

According to Bandura, repeated mastery experiences are the strongest source of self-efficacy development. In this study, structured water play provided opportunities for the participant to achieve small but meaningful successes in the water, such as entering the pool independently, interacting with floating objects, and participating in aquatic games. These repeated successes gradually strengthened the participant's belief in his ability to manage aquatic situations safely. Increased self-efficacy likely contributed to the observed improvement in courage and emotional readiness during swimming instruction.

Comparatively, the findings of this study are consistent with previous studies reporting that aquatic activities can improve behavioral regulation, emotional comfort, and participation among children with ADHD. Previous research has primarily focused on reductions in hyperactivity symptoms, attention improvement, and motor coordination enhancement through aquatic interventions. However, this study extends existing literature by specifically examining the affective dimension of courage during swimming instruction. Unlike prior studies that emphasized physical or cognitive outcomes, the present findings demonstrate that structured water play may also facilitate emotional adaptation and confidence-building in challenging aquatic contexts.

The finding that greater improvements occurred in deep pool conditions compared to shallow pool conditions is particularly significant. Pedagogically, deep pools represent a more challenging and anxiety-provoking environment for children with limited swimming confidence. Therefore, the substantial increase in courage scores in deep water indicates that the intervention not only improved basic familiarity with water but also enhanced the participant's ability to cope with more demanding aquatic situations. This finding suggests the transfer and generalization of courage across different levels of environmental difficulty.

From a sensory integration perspective, the aquatic environment may have contributed substantially to the participant's emotional adaptation. Sensory integration theory explains that structured sensory experiences help children organize and process sensory information more effectively. Water provides multisensory stimulation through pressure, resistance, movement, and tactile input, which may help children with ADHD achieve better sensory modulation and emotional calmness. When combined with play-oriented learning activities, these sensory experiences become more meaningful and less threatening, thereby supporting adaptive emotional responses and increased participation.

The questionnaire results also showed variations among raters. The decreases in fear-related scores reported by observers and the previous coach indicate reductions in aquatic anxiety and improvements in emotional adaptation, shifting from moderate to low fear categories. Meanwhile, the parent ratings remained stable within the low category. These differences may be explained by variations in observation contexts. Observers and coaches evaluated the child directly during structured swimming sessions, where behavioral changes were more visible, while parents may have based their evaluations on broader daily experiences outside the aquatic setting.

Methodologically, the findings demonstrate consistency between SSR observational data and supporting questionnaire data. Both sources indicate improvements in emotional readiness and reductions in fear following the intervention. Importantly, no increase in fear or negative emotional responses was observed after the intervention, suggesting that structured water play is psychologically safe and potentially beneficial for children with ADHD. Thus, structured water play may be considered

not only as a method for teaching swimming skills but also as an adaptive psychopedagogical intervention that supports affective development in inclusive physical education contexts.

The findings have important pedagogical implications. Swimming instruction for children with ADHD should not focus solely on technical skill acquisition but should also consider emotional readiness, self-confidence, and psychological comfort. Gradual, play-based aquatic instruction can create a safe and supportive learning environment that accommodates the emotional and behavioral characteristics of children with ADHD. Physical education teachers and swimming coaches may therefore incorporate structured water play into adaptive aquatic learning programs to enhance both emotional engagement and active participation.

This study contributes empirically to the development of adaptive swimming instruction for children with ADHD, particularly in relation to affective outcomes such as courage and emotional readiness, which remain underexplored in previous literature. The study also expands the application of SSR methodology within inclusive physical education research and demonstrates the value of combining behavioral observation data with fear-related questionnaire measures as a form of methodological triangulation.

Nevertheless, several limitations should be acknowledged. First, the study involved only one participant, limiting the generalizability of the findings. Second, the SSR design did not include a control group, so conclusions regarding intervention effectiveness rely primarily on visual analysis and behavioral trends. Third, potential observer subjectivity may have occurred because the swimming coach also functioned as an observer, despite efforts to standardize observation procedures. In addition, the relatively short intervention duration limited understanding of the long-term sustainability of the observed behavioral changes.

Future research should involve larger samples using multiple-baseline or quasi-experimental designs to strengthen external validity. Further studies could also explore the effects of structured water play on additional variables such as emotional regulation, executive functioning, social interaction, concentration, or swimming skill acquisition. Longitudinal investigations are needed to determine whether increases in courage and emotional adaptation persist over time following intervention completion. The inclusion of independent assessors and physiological measures of emotional regulation may also improve the objectivity and depth of future research findings.

D. Conclusion

This study aimed to analyze the effect of structured water play on increasing courage in a child with Attention Deficit Hyperactivity Disorder (ADHD) during swimming instruction. Based on the analysis using the Single Subject Research (SSR) A1–B–A2 design, the findings demonstrated a consistent increase in courage scores during the intervention phase, followed by stable and higher scores during the follow-up baseline phase. These results indicate that structured water play contributed positively to the participant's emotional readiness, confidence, and willingness to engage in aquatic activities. The consistency between observational findings and questionnaire results further strengthens the conclusion that structured water play reduced fear responses and improved courage in swimming learning contexts.

The findings suggest that gradually designed and play-oriented aquatic activities provide an effective adaptive learning approach for children with ADHD. Through enjoyable, repetitive, and supportive experiences, children were able to reduce anxiety toward water environments and develop greater self-

confidence during swimming instruction. Therefore, structured water play should not be viewed solely as a strategy for teaching technical swimming skills but also as a psychopedagogical intervention that supports affective development, emotional regulation, and participation among children with special needs.

This study also has practical implications for swimming teachers and coaches. Swimming instruction for children with ADHD should emphasize emotional adaptation and psychological comfort in addition to technical skill mastery. Teachers and coaches are encouraged to implement gradual, game-based aquatic activities that provide positive reinforcement, flexible task progression, and safe learning environments. Adaptive instructional strategies such as the use of floating games, guided exploration, sensory-based activities, and individualized pacing may help children with ADHD feel more secure and actively engaged during swimming lessons.

Furthermore, the findings support the development of an adaptive aquatic curriculum within inclusive physical education settings. Adaptive swimming curricula should incorporate affective learning goals, emotional readiness indicators, and sensory-responsive teaching methods alongside motor skill objectives. Structured water play may serve as a foundational component of inclusive aquatic programs designed for children with neurodevelopmental conditions such as ADHD. Schools and swimming institutions can integrate adaptive play-based aquatic activities into physical education programs to promote equal participation opportunities and improve students' emotional and social development.

For inclusive schools, this study highlights the importance of collaboration among physical education teachers, swimming coaches, parents, and support professionals in designing individualized aquatic learning experiences. Inclusive schools are encouraged to provide supportive aquatic environments, flexible instructional modifications, and teacher training related to emotional regulation and adaptive physical education. In addition, schools should consider implementing smaller instructional groups, gradual exposure strategies, and structured routines to improve comfort and participation for students with ADHD during swimming activities.

Despite these promising findings, this study has several limitations, including the involvement of only one participant and the relatively short intervention duration. Therefore, future studies should involve larger samples and more comprehensive research designs, such as multiple-baseline or quasi-experimental approaches, to strengthen the validity and generalizability of findings. Further research is also recommended to explore the long-term effects of structured water play on emotional regulation, social interaction, executive functioning, and aquatic motor skill development among children with ADHD within inclusive educational contexts.

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F. Conflict of Interest

The authors declare that there is no conflict of interest.

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