

# Games for the to familiarize before to the initiation of the handball in the age school

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## ABSTRACT

This study aimed to design and validate a system of games for familiarization with handball initiation in five-year-old preschool children from the Mella-Jayama district of Camagüey municipality. The research was structured in three phases: diagnosis, design, and practical validation. The diagnosis phase, conducted using an adapted TGMD-3 battery, assessed a population of 32 children (from a total of 58) and revealed significant deficits in object manipulation skills (catching and throwing) and their integration (0% success rate in precision and space adaptation indicators), despite adequate development of locomotor skills. This finding justified the need for a specific intervention. The design phase was based on the principles of play-based learning and the Teaching Games for Understanding (TGfU) model, resulting in a structured system of games focused on sensory-motor familiarization with the ball, basic technical actions, and simplified game situations. The validation phase, based on implementation by educators and perceived utility surveys (Likert scale 1-5), showed an exceptional consensus among practitioners. The system received median scores of 5/5 in clarity, age-appropriateness, children's enjoyment, and perceived contribution to motor development, and 4.5/5 in practical feasibility. Qualitative analysis from a focus group highlighted high levels of child motivation and observable progress in initially deficient skills. The study concludes that the proposed game system is a pedagogically sound, effective, and highly motivating tool that addresses specific psychomotor needs in preschoolers, providing a solid foundation for inclusive and enjoyable handball initiation through play. It represents a practical and validated resource for early childhood physical education specialists.

**Keywords:** Physical education, Motor development, Preschool education, Play-based learning, Teaching Games for Understanding (TGfU), Psychomotricity.

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## INTRODUCTION

Since its origins, Physical Education has been a fundamental pillar in the holistic development of human beings, transcending its merely biological dimension to establish itself as a complex pedagogical discipline that impacts cognitive, social, affective, and motor domains. At the heart of its didactic evolution lies a historical and still ongoing debate: the role of sport as educational content. This debate is articulated between two seemingly antagonistic poles. On one side are those who defend its formative value, highlighting its potential for developing motor skills, social values, and healthy habits. On the other, critical voices warn of the risks of replacing the educational with the competitive, fostering aggressiveness, early selection, and exclusion, thereby distorting the aims of schooling (Castejón et al., 2003). This tension has given rise to a broad spectrum of teaching models, from the most technical and traditional to the most comprehensive and play-based, reflecting a constant search for a pedagogy that leverages the virtues of sport while mitigating its potential dysfunctions.

Handball, as a team sport, is not immune to this crossroads. Despite its recognized value for developing coordination, simple tactical decision-making, and cooperation, its institutional presence in the school setting has traditionally been lower compared to other team sports, relegating it to specific contexts where there is community roots and adequate infrastructure (Frias, 2016). Nevertheless, its dynamic and accessible essence makes it an invaluable pedagogical resource. The contemporary consensus in sports pedagogy advocates for stripping handball instruction of the rigid schemes of high performance and focusing it from an adapted, play-based perspective, where play stands as the primary vehicle for learning, allowing the practice to be tailored to the psycho-evolutionary characteristics of students (Salvador et al., 2021; Casáis, Domínguez & Lago, 2013).

However, this innovative approach encounters a scarcely explored frontier: the preschool stage (0-6 years). The discussion on sports initiation has historically focused on school age, with proposals that, even when advanced, place the start between 8 and 13 years (Antón, 1990; Román, 1989; cited in Gómez, 2015). Meanwhile, the International Handball Federation (IHF) boldly promotes familiarization from the age of five (Lund et al., n.d.), a horizon that formal educational practice rarely reaches systematically. This gap is particularly serious considering that early childhood represents the most sensitive and critical period for human development. It is during this stage that the foundations of personality, intelligence, and motor skills are built through interaction with the environment and bodily experience (Anchía-Umaña, 2024; Orona et al., 2021).

The importance of intervening in this period with quality proposals is, therefore, paramount. Scientific evidence is conclusive: well-structured Physical Education in the preschool stage produces multifaceted benefits. At the motor level, it is crucial for the development of fundamental motor skills (locomotion, jumps, turns, throws, receptions), coordination, balance, and body awareness (Bernate, 2021; Piña et al., 2020). Cognitively, it stimulates executive functions such as attention, memory, and problem-solving, while enriching language and the understanding of spatial and temporal concepts (Arufe et al., 2021). Socio-affectively, rule-based and cooperative play becomes an ideal scenario for learning to manage emotions, follow rules, respect turns, work in teams, and build a positive self-image (Miraflores y Rojas, 2023; Muentes Llerena & Vásquez Solórzano, 2023). Ignoring this potential is to waste a unique opportunity to positively impact an individual's life trajectory.

It is here that the fundamental challenge of this study emerges: to bridge the gap between the recognized potential of adapted handball and its real application in the preschool classroom. The challenge is not trivial.

It involves moving from mere motor recreation or the sporadic application of generic pre-sport games towards the design of a specific, rigorous, and evolutionary pedagogical system for familiarization with handball. This system must answer crucial questions: How to transform the structural elements of handball (the ball, the goal, the space, the basic rules) into meaningful and comprehensible experiences for a 3 to 5-year-old child? How to do this by prioritizing symbolic play, sensory exploration, and cooperation over technical execution and competition? How to ensure it is a tool for educational inclusion, attending to the diversity of developmental paces and abilities, and not just another mechanism for early selection? (Arufe, 2020; Espoz-Lazo et al., 2023).

Answering these questions requires a proposal that draws from the sources of psychomotricity, the pedagogy of play, and specific didactics, creating a sequence of activities that, in a progressive and fun way, allow the child to "*inhabit*" the universe of handball. The goal is not to create little athletes, but rather motor-competent children who are confident, socialized, and have a positive attitude towards physical activity (Arufe et al., 2021).

Therefore, this article aims to design and substantiate a System of Games for familiarization with handball initiation in preschool age. This research not only intends to fill a theoretical-practical vacuum but also to offer early childhood educators and Physical Education specialists a concrete instrument, grounded in the most current evidence, to enrich their daily practice. The ultimate goal is to contribute to preschool Physical Education fulfilling its maximum potential: to be the privileged space where the holistic development of childhood is driven through play, movement, and the excitement of discovering a sport, laying the foundations for an active, healthy, and socially enriched life.

## MATERIALS AND METHODS

The present study was structured around a methodological design of educational development and innovation, organized into three sequential and integrated stages: diagnosis, elaboration, and practical validation. The process was carried out with the complete population of 58 five-year-old children (32 females, 26 males) from the "*círculos infantiles*" (daycare centres) in the Mella-Jayama district of Camagüey, following obtaining informed consent from the institution and the guardians.

The first stage (diagnosis) was conducted between February and April 2024 with the objective of characterizing the current state of motor development and teaching practices. A mixed-methods approach was adopted for this purpose. Quantitatively, the level of development of fundamental motor skills precursors to handball (throwing, catching, lateral and multi-directional displacements, dynamic balance) was assessed using a contextualized adaptation of the TGMD-3 (Test of Gross Motor Development-3) battery. The test items were filmed and evaluated by two observers to ensure data reliability. Qualitatively, semi-structured interviews were conducted with the six educators from the "*círculos infantiles*", using a script designed to explore their conceptions, methodologies used, and perceptions regarding the feasibility of handball initiation in preschool. The interviews were transcribed and subjected to categorical content analysis to identify central themes and points of consensus or conflict.

The second stage (elaboration) took place from May to July 2024. Based on the diagnostic findings and grounded in the principles of play-based pedagogy (Huizinga) and the Teaching Games for Understanding (TGfU) model, the game system was designed. The creation process was guided by specific criteria of progressivity (from simple to complex), adaptation (safe and appropriately sized materials), inclusion (cooperative games with multiple challenge levels), and cultural pertinence. The final product was a didactic

manual containing a sequence of 25 games organized into three progressive modules: sensorimotor familiarization with the ball, basic collaboration-opposition games, and simplified target situations.

For the third stage (validation), an evaluation method focused on face validity and practical feasibility through pilot implementation and feedback from end-users was chosen, overcoming the limitations of a theoretical expert validation. During September 2024, the educators themselves implemented the game system in their regular motor activity sessions. After a four-week application period, the assessment was carried out using two complementary instruments. First, a focus group was organized with the educators to gather their qualitative perceptions regarding children's acceptance, ease of implementation, and encountered obstacles. Second, a perceived utility survey using a 1-5 Likert scale was administered, where the educators rated specific aspects such as clarity of instructions, age-appropriateness, children's enjoyment, and perceived contribution to motor development. The analysis of the quantitative survey data was performed by calculating medians and modes for each item, providing a robust measure of the central tendency of the practical assessment by the direct users of the proposal.

## RESULTS

The assessment of fundamental motor skills (FMS) development, conducted using an adapted version of the TGMD-3 battery, provided a precise profile of the capabilities and weaknesses within the study population. The results, broken down into isolated and combined skills, are presented below.

Table 1. Results of the assessment of fundamental motor skills performed in isolation (N = 32).

Basic skills	1			2			3			4			5			6			7		
	Stability			Range of motion			Alignment			Alternation			Direction			Control			Rhythm		
	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N	L	M	N
Throw	7	10	15	0	4	28	0	0	32	0	0	32	1	8	23	1	8	23	2	6	24
Jump	8	9	15	2	3	27	8	9	15	0	0	32	32	0	0	8	9	15	12	9	11
Run	32	0	0	21	10	1	21	10	1	32	0	0	32	0	0	21	10	1	21	10	1
Catch	0	2	30	1	2	29	0	2	30	0	2	30	32	0	0	0	2	30	0	2	30

Note. L: Achieved; M: Partially Achieved; N: Not Achieved. Note. The data are original to this study.

Analysis of Table 1 reveals a heterogeneous profile of motor development. The skill of running is fully consolidated, with 100% of children (N = 32) demonstrating complete mastery in stability, alternation, and direction indicators. This automated pattern constitutes a foundational strength upon which to support other learning.

Conversely, manipulative skills present serious difficulties. Catching is the most deficient skill, with over 90% of children (N = 30) in the "Not Achieved" category across nearly all indicators, highlighting a significant lack of hand-eye coordination and anticipation. Similarly, in throwing, while body stability (indicator 1) shows relative progress (21.9% achieved), key technical indicators such as body alignment (3) and arm-leg alternation (4) show a 100% rate of non-achievement, indicating that the movement is performed with a static body and without efficient technique. The results for skills performed in combination, which are crucial for sports practice, are presented in Table 2.

Table 2 provides the most compelling evidence from the diagnostic assessment. While the combination of running-jumping shows high success rates (above 78% across all indicators), confirming the solidity of locomotor skills, the combination of throwing-running-catching—which simulates the basic handball action of receiving a pass in motion and culminating with a throw—yields critical results. The 0% achievement rate in

Precision and Space Adaptation indicators, and only 6.3% in Fluid Transition, confirm that integrating these three skills into a complex motor sequence represents a nearly insurmountable difficulty for the vast majority of children.

Table 2. Assessment of achieved fundamental motor skills performed in combination.

Combined skills	No. of children	1		2		3		4		5	
		Global coordination		Object control		Fluid transition		Precision		Space adaptation	
		N	%	N	%	N	%	N	%	N	%
Throw-run-catch	32	1	3.1	1	3.1	2	6.3	0	0.0	0	0.0
Run-jump	32	28	87.5	25	78.1	27	84.4	26	81.3	32	100.0

Note. L: Number of children who Achieved the indicator; %: Percentage of achievement. The data are original to this study.

This diagnosis validates the urgent need for pedagogical intervention. The children possess an adequate motor foundation for locomotion but demonstrate severe deficits in manipulative skills and, most importantly, in their integration. Therefore, the proposed game system must prioritize the development of hand-eye coordination, basic throwing and receiving technique, and the gradual progression toward combining these skills within simplified play contexts, using play as the primary vehicle to address these deficiencies.

### **Games to promote familiarization with handball initiation in preschool age**

The game system comprises the theoretical foundation, general objective, the games themselves, and general guidelines for their application in physical education classes.

#### *Theoretical foundation*

Preschool age in Cuba is considered to be from three to six years. It is proposed that at this stage, motor activities delivered in physical education should be planned in a way that leads the child to constantly seek solutions to tasks and problems, showing initiative and creativity. These activities should emphasize group dynamics and, above all, require collaboration, self-regulation of behaviour, and the maintenance of appropriate relationships with peers.

This approach is based on the understanding that children between four and six years old are dynamic, spontaneous, and, as a product of their physical and mental activity, are capable of acquiring the necessary elements to gain knowledge and enhance their motor development.

In line with the above, a system of games has been developed to be implemented during the programmed activities of children attending the "círculo infantil" (daycare centre), who are five years old and enrolled in preschool at this institution.

General Objective: To enhance the development of fundamental motor skills that contribute to familiarization with handball initiation, through movement games, as a means of enjoyment in the systematic performance of activities and the demonstration of appropriate behaviour in daily activities.

#### Concrete games for familiarization with handball initiation

- Ball Handling Game.
- Game Name: Ball Handling.

Specific Objective: To handle the ball in a stationary position with coordination, maintaining body balance.

Development: A figure eight is drawn on the ground. The child stands inside the eight, with each foot on the outer edge of the eight. With legs shoulder-width apart and toes pointing forward, the child assumes a semi-squat position. The ball is placed on the ground, touching one foot, on the line that forms the eight. At the teacher's command, the child rolls the ball along the entire line through their legs, forming a figure eight.

Rules:

- Feet cannot be lifted off the ground or moved from their position.
- The ball cannot be rolled too forcefully.
- Hands must be alternated; meaning when the ball reaches the left foot, the left hand is used to carry the ball to the right leg, and vice versa.
- The ball must always remain on the line that forms the eight.

Game variant:

- Ball handling is performed by moving it from one foot to the other in a straight line.
- Game Name: The Journey.

Objective: To handle the ball while moving with coordination and spatial orientation, maintaining body balance.

Development: Three hoops are placed on the ground in a straight line, one meter apart. The child stands next to the first hoop with the ball on the ground touching the outer edge of the hoop. At the teacher's command, the child rolls the ball around the first hoop, describing a circle, then moves to the second hoop, describes a circle, and does the same at the third hoop.

Rules:

- The ball must always be rolled close to the hand.
- Hands must be alternated when making circles around the hoop, always using the hand closest to the hoop.
- One circle must be made to the right and the next to the left, or vice versa.

Game variant:

- Ball handling is performed using only one hoop.
- Game Name: The Little Car.

Objective: To handle the ball while moving with coordination, spatial orientation, and differentiation, maintaining body balance.

Development: A straight line (five centimetres wide) one meter long is drawn on the ground. The child is placed at the start of the line on all fours. The ball (the little car) is placed on the line. At the teacher's command, the child must roll the ball (the little car) along the line, keeping it close to their hands so it doesn't leave the line. Upon reaching the end of the line, they pick up the ball and bring it to their teammate.

**Rules:**

- The ball (little car) cannot leave the line.
- Upon reaching the end, they must grab the ball and hand it directly to their teammate's hand.
- They cannot start before the ball is placed in their hand.

**Game variant:**

- A line with two curves is drawn.
- Game for Ball Adaptation and Handling.

**Game Name: The Drawer.**

**Objective:** To correctly adapt the ball in the hand, regulating upper limb movements with coordination.

**Development:** A starting line is placed two meters from a wall. A ball is placed on the ground near the wall, inside a circle drawn on the ground or a hoop. At the teacher's signal, the child runs to the ball and picks it up with one hand (adaptation). They imitate drawing their preferred geometric shape (from those being taught in class) on the wall. Upon finishing the drawing, they must name the shape, place the ball back inside the circle, and run back.

**Rules:**

- They must start from behind the line.
- The next teammate starts when they are tapped on the shoulder after crossing the starting line.
- A minimum of two rounds must be performed to ensure the child alternates hands.
- The drawn shape must match the named shape.
- If the ball drops during the drawing, they must start the drawing over.

**Game variant:**

- The teacher specifies which shape to draw.

**Game Name: The Puppy.**

**Objective:** To correctly adapt the ball in the hand, regulating upper limb movements with coordination.

**Development:** Teams are formed, lining up facing each other one meter apart. Two balls are used. The child, on all fours, with a ball correctly adapted in each hand (resting on the ground), moves on all fours with the balls in hand towards their teammate one meter away. Upon arrival, they hand over the balls, and their teammate performs the exercise.

**Rules:**

- The child must correctly adapt the ball.
- The child cannot move on their knees.
- They must start from behind the line.
- The next teammate starts when tapped on the shoulder after crossing the starting line.

- A minimum of two rounds must be performed.

Game variant:

- Move, but around obstacles.

Game Name: The Wolf.

Objective: To correctly adapt the ball in the hand, regulating upper limb movements during coordinated handling.

Development: One ball is used per child. A circle is defined as the children's "home." The child must adapt the ball. One child is designated as the "wolf," whose task is to catch the other children.

Rules:

- The ball must be held naturally.
- No one can be caught inside the "home."
- The ball cannot be dropped.
- The wolf must touch another child with the ball.

Game variant:

- Multiple wolves are used.
- Games for Reception, Passing, Dribbling, Throwing

Game Name: Ball to the Goal.

Objective: To throw at the goal after dribbling, passing, and receiving with coordination, emphasizing segmental differentiation.

Development: A goal is placed four meters away. A hoop is placed on the ground two meters from the end line, which is one meter from the goal. Level with the hoop, 60 cm away, a rebound wall is placed. The group is organized into teams, lined up behind the starting line. At the teacher's signal, the first child in line, who has the ball, dribbles the ball moving towards the hoop, jumps on one foot into the hoop, upon landing, passes the ball against the rebound wall and receives it, dribbles to the end line, and throws towards the goal. The child must retrieve the ball after throwing and run it back to the line, handing it to the next teammate.

Rules:

- The end line cannot be stepped on; doing so nullifies the goal.
- The throw must be performed with one hand.
- The child cannot start before the ball is placed in their hand.

Game variant:

- The game is played by adding another hoop (i.e., with two hoops).

Game Name: The Throwing Cat.

Objective: To throw at the goal, demonstrating coordination, emphasizing segmental differentiation.

Development: A goal is placed at the end of the area, and a starting line is drawn five meters from the goal. A line is drawn one meter from the goal. A bench two or three meters long is placed one meter from the starting line. The group is organized into teams, formed in lines, each team with a ball. At the teacher's signal, the first child with the ball moves on all fours, with the ball adapted in one hand, until reaching the bench, bounces the ball on the bench, upon reaching the end of the bench, adapts the ball, dribbles to the end line, and performs the throw at the goal. They retrieve the ball and run back to the starting line, where they hand the ball to the next teammate.

Rules:

- The end line cannot be stepped on; doing so nullifies the goal.
- The throw must be performed with one hand.
- The child cannot start before the ball is placed in their hand.
- The ball cannot fall off the bench during the bounce.

Game variant:

- The bench is replaced by a 10 cm wide line painted on the ground.

Game Name: Shapes.

Objective: To throw at the goal, demonstrating coordination, emphasizing the coupling of the segments involved in the action.

Development: Different geometric shapes (painted or made of cardboard) are placed on the ground, distributed in a zigzag pattern towards the goal at the end of the area. At the end of the shape path, a semicircle is drawn on the ground one meter from the goal. The children line up behind a starting line. Teams are formed. At the teacher's signal, the first child in formation dribbles the ball towards the shape called out by the teacher. That is, the teacher calls out the shapes, and the child must dribble the ball to each shape. Upon reaching the semicircle, they throw at the goal, retrieve the ball, and run back with the ball adapted and hand it to the next teammate.

Rules:

- The final semicircle cannot be stepped on; doing so nullifies the goal.
- The throw must be performed with one hand.
- The child cannot start before the ball is placed in their hand.
- They must follow the path indicated by the teacher.

Game variant:

- Place objects on the ground describing a path in different directions.
- General Guidelines for Application in Physical Education Class

- The games are applied during the scheduled program activity.
- They can be applied on the two days of the week when the program activity takes place.
- Only two games should be used in one program activity and maintained for 15 days, modifying their conditions and complexity depending on the children's assimilation.
- The games are taught in the same order as described in this document.
- The number of repetitions for each game will depend on the development of the children's physical condition.
- A pleasant atmosphere should be fostered during the games.
- The teacher must allow children to be creative during play.
- Rule enforcement should be as flexible as possible, as the important thing is for the child to play while performing motor skills.
- The teacher must pay special attention to the level of coordination shown by the children in each game and, if necessary, modify the complexity so that they do not become discouraged if they cannot enjoy the game.
- Goals and other equipment needed to play should be made of soft material that does not harm the child's anatomy.
- The number of teams formed for each game will depend on the number of balls and equipment available. It is important to keep all children playing at the same time.
- The teacher should not overemphasize error correction; the important thing is for the child to play and create during the game.
- Game planning must allow children to play enough to satisfy their movement needs and practice the acquired motor skills.
- Games should be organized to promote collective work and mutual aid.
- When organizing games, optimal use of the available space must be considered.

Their direction initially involves adequate motivation and organization of the children, followed by a simple explanation of what is to be done. If the actions are considered complex, a demonstration with some children can be used; otherwise, proceed directly to playing.

The teacher must be attentive to the motivation shown by the children, and if a lack of motivation is detected, the game should be suspended.

During the organization of the play area, if possible, try to mark and enclose the area with boxes or similar objects to prevent balls from rolling into other areas.

During the organization of the play area, benches or other equipment should be placed; for example, mats or barrier tape can be used as dividers/demarcations of zone areas; bars that pose a danger should not be used.

### ***Results of the practical validation stage***

The pilot implementation of the game system over four weeks allowed for the collection of robust evidence regarding its face validity and practical feasibility through the perceptions of the educators and direct observation of its application. The results, both qualitative and quantitative, confirm the high potential of the proposal.

*Qualitative perception of the educators: Focus group*

Content analysis of the focus group session revealed four main emerging categories:

**High Motivation and Acceptance by the Children:** The educators unanimously highlighted the enjoyment and enthusiasm shown by the children during the sessions. They stated that "*the children constantly asked when they would play handball again*" and that "*games like 'The Wolf' and 'Ball to the Goal' became their favourites.*" This high motivation was identified as a key factor for active and persistent participation.

**Observable Motor Progression:** Significant improvements were reported in the initially deficient skills. The educators noticed a palpable improvement in the ability to catch ("*before the ball would hit their body, now they try to catch it with their hands*") and greater ease in handling and throwing the ball ("*they seemed more coordinated when rolling the ball in 'The Journey' and when throwing*").

**Feasibility and Clarity of the Proposal:** The users positively valued the clear structure of the games and the methodological guidelines. They considered the rules to be "*adapted to their age*" and the progressions (e.g., from 'Ball Handling' to 'The Journey') to be "*logical and easy to follow.*" The flexibility in rule enforcement, suggested in the guidelines, was noted as a success for maintaining the flow of the game.

**Difficulties and Recommendations:** The main difficulty reported was the management of space and materials when games were played with all children simultaneously. They suggested the need for more foam balls of different sizes and better demarcation of play areas to avoid collisions. They also recommended including more cooperative game variants for large groups.

**Survey results on perceived utility**

The six educators completed a 5-item survey using a Likert scale (1: Very Low, 5: Very High). The results, summarized in Table 3, show an exceptionally positive assessment.

Table 3. Survey results on perceived utility by educators (N = 6).

<b>Clarity of instructions</b>	<b>Median</b>	<b>Mode</b>	<b>Interquartile Range (IQR)</b>
1. Clarity of instructions	5	5	0
2. Age appropriateness (5 years old)	5	5	0
3. Children's Enjoyment and Motivation	5	5	0
4. Contribution to Motor Development	5	5	0
5. Practical Application Feasibility	4.5	5	0.5 (Q1 = 4.5, Q3 = 5)
Global score (Median of Medians)	5		

*Note. The data are original to this study.*

As shown in Table 3, the items related to the pedagogical quality of the proposal (clarity, appropriateness, enjoyment, and motor contribution) received the highest possible score (Median = 5, Mode = 5), with an Interquartile Range (IQR) of 0, indicating absolute consensus among all educators in their excellent assessment.

The item on practical feasibility received a slightly lower median score (4.5), although the mode remained at 5. The IQR of 0.5 reflects that, while the majority considered it very high, some educators noted—consistent with the focus group comments—minor logistical challenges that justified a score of 4 ("*High*") instead of 5. The triangulation of qualitative and quantitative data allows us to conclude that the proposed game system is highly effective, relevant, and feasible for implementation in the preschool context.

The quantitative evaluation demonstrates an overwhelmingly positive consensus on its core aspects, while the qualitative evaluation not only corroborates this excellent perception but also adds depth by explaining why it works: it generates high intrinsic motivation in children and produces observable progress in their motor development, particularly in the manipulation skills that the initial diagnosis identified as critical.

The only limitation noted, related to resource and space management, does not invalidate the proposal but instead offers a valuable recommendation for its future optimization (e.g., provision of more materials, detailed space planning).

In summary, the practical validation confirms that the game system far exceeds its goal of being a useful, fun, and effective tool for teachers, and a meaningful and motivating experience for children, playfully and inclusively laying the groundwork for familiarization with handball in preschool age.

## DISCUSSION

The main objective of this study was to design and validate a system of games for introducing handball to preschool-aged children. The results obtained in the three research phases (diagnostic, development, and validation) provide significant findings that deserve to be discussed in light of current scientific literature, highlighting both the convergences and original contributions of this proposal.

The results of the diagnostic phase, which revealed consolidated development of locomotion skills (running and jumping) compared to a severe deficit in manipulation skills (catching and throwing) and their integration, are consistent with literature indicating that motor development is not homogeneous and that object control skills often present greater challenges in early childhood (Orona et al., 2021; Bernate, 2021). The most critical finding—the nearly non-existent ability to integrate throwing, running, and catching into a fluid sequence—is particularly relevant. This result fully validates the warning from authors such as Arufe (2020) and Anchía-Umaña (2024) about the risk of introducing sports prematurely without a solid motor foundation and justifies the need for specific interventions like the one proposed here. Our findings support the stance of the IHF (Lund et al., n.d.) to begin familiarization at early ages but clarify that this should focus on addressing these specific deficiencies through play, rather than through formal technical instruction.

The developed game system aligns with the latest trends in early childhood Physical Education pedagogy and sports initiation. Its design, centred on play as a vehicle for learning, directly responds to the call by authors such as Arufe (2020) and Anchía-Umaña (2024) to prioritize playful experience, exploration, and fun over technical instruction and competition. The progression of the games—from sensorimotor familiarization with the ball ("*Handle the Ball*") to simplified situations integrating various elements ("*Ball to the Goal*")—is grounded in the principles of the Teaching Games for Understanding (TGfU) model (González-Villora, 2021) and Experiential Psychomotricity (Miraflores & Rojas, 2023), which advocate for meaningful learning contexts adapted to the child's cognitive and motor development.

This approach contrasts with more traditional and technical methodologies still present in sports initiation (Antón, 1997) and places itself at the forefront of proposals for preschool—an educational level where specialized Physical Education is still incipient (Arufe et al., 2021). By including methodological guidelines that prioritize flexibility, inclusion, and creativity over error correction, our proposal also stands as a tool for educational inclusion, as advocated by Muentes Llerena & Vásquez Solórzano (2023), allowing each child to participate according to their abilities.

The results of the validation phase are highly encouraging. The quantitative assessment showed absolute consensus (IQR = 0) among educators regarding the clarity, age-appropriateness, contribution to motor development, and crucially, the children's enjoyment. The latter point is essential, as intrinsic motivation is the main driver of learning and adherence to physical activity at this age (Piña et al., 2020).

Qualitatively, the observation of progress in specifically deficient skills (such as catching) suggests that the game system is not only fun but also effective. This corroborates the findings of previous research demonstrating that well-structured, play-based Physical Education programs have significant positive impacts on children's motor development (Arufe et al., 2021; Piña et al., 2020).

The only limitation noted, related to logistical management (space and materials), is not a flaw of the design itself but rather a reflection of a common reality in preschool educational contexts. This observation, far from weakening the proposal, offers valuable guidance for its optimal implementation and is consistent with the practical challenges reported in other studies (Arufe, 2020).

This study transcends the theoretical realm by offering a concrete and validated tool for educators. The game manual, with its clear structure and precise guidelines, addresses the need expressed by Espoz-Lazo et al. (2023) for specific didactic resources for teaching handball at early ages. Its success lies in the fact that it does not require handball specialists, but rather educators who are sensitive to the logic of play and child development.

A future direction derived from this research would be to measure the objective effectiveness of the system through a quasi-experimental design with pre-test and post-test, using standardized instruments such as the TGMD-3, to quantify the real impact on children's overall motor development. Likewise, it would be valuable to adapt and validate this proposal in other socio-educational contexts.

## CONCLUSION

In light of the discussed results, it can be concluded that this study achieved its main objective. A pedagogically sound, practical, and highly motivating game system for familiarizing preschool children with handball was successfully designed and validated.

The research demonstrated that:

- There is a real need for interventions that specifically address the deficit in manipulation and motor integration skills in preschoolers.
- A play-based approach, with a well-designed progression and focused on the child's experience, is not only viable but also profoundly effective in addressing these deficiencies.
- The proposal is perceived by educators as a highly useful, clear tool with great potential to enrich their teaching practice, successfully achieving the difficult balance between children's enjoyment and progress in motor development.

## AUTHOR CONTRIBUTIONS

Reidel Cordoves Peinado: original conception of the study; overall methodological design; coordination of the diagnosis, elaboration, and validation stages; initial drafting of the manuscript and critical revision of the final version. Luciano Mesa Sánchez: support in designing the instruments for motor assessment;

coordination of the application of the adapted TGMD-3; quantitative data analysis and inter-observer reliability validation. Beymer Aguilera Ramírez: development of the semi-structured interview guide; conducting interviews with educators; transcription, categorization, and qualitative content analysis. Antonio José Juárez López: participation in the pedagogical design of the game system; development of the didactic manual; organization of the progressive modules and criteria for adaptation and inclusion. Rusbelin Larios Núñez: coordination of the validation pilot with the educators; data collection during implementation; processing of the utility surveys and analysis of medians and modes. Daylanis Gutiérrez Cruzata: theoretical review on play pedagogy and the TGfU model; support in writing the conceptual framework and discussing the results; academic style editing of the manuscript. All authors participated in the review and approval of the final manuscript, as well as in ensuring the integrity and accuracy of the content presented.

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## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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