Articles

Impact of concentration on the effectiveness of physical activities in children aged 8 to 9 years

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Abstract: The present study analyzed the influence of a cognitively active physical activity program on concentration levels and motor efficiency in 37 children aged 8 to 9 at the FAE N-3 Taura Educational Unit. Using a pre-experimental design with a quantitative approach, variables such as initialization, focus maintenance, and response to change were evaluated through observation sheets and participation scales. Pre-test results revealed a structural weakness in focus maintenance with a mean of 1.75 (deficient level). After a 12-week intervention, the post-test showed a significant evolution toward an optimal level of 3.30, with 86.5% of thesample reaching "Good" to "Excellent" ranges. It is concluded that physical activity integrating executive demands eliminates attentional dispersion and enhances motor autonomy and proactive commitment in schoolchildren.

Keywords: Concentration, Cognitive Physical Activity, Motor Performance, Executive Functions, Basic Education.

Introduction

Concentration is an essential cognitive process that allows children to focus their attention sustainably on a specific task, ignoring internal and external distractions, which favors both academic learning and the effective execution of physical activities. This process not only involves paying attention but also regulating emotional states and controlling factors such as anxiety and mental fatigue, which can limit optimal performance, Martínez et al., (2024). Attention and concentration are especially relevant in school-age children, where they face increasing demands both in the educational and sports fields.

Hillman et al. (2019) postulate that aerobic exercise optimizes cognitive control, although they are criticized for not differentiating the effects according to the type of sport. Diamond & Ling (2020) Wu, H., Wang, X., & Jin, Z. (2024). Martín et al., (2015). argue that only activity with high executive demand generates real benefits, questioning mechanical exercise programs Bidzan-Bluma & Lipowska (2018) associate sport with working memory, but face criticism for the low ecological validity of their tests in real school contexts). Finally, López-Sánchez et al., (2021). Dong, H., & Wang, S. (2025), validate that moderate intensity improves attention, although the lack of standardization in active rest times is criticized. Recent systematic reviews show that physically active activity positively influences attention and other executive functions in schoolchildren, although the optimal requirements of type, duration, and frequency still need further clarification. This implies that not only the quantity, but also the quality and type of activity are determining factors in producing benefits in attention and concentration (Alvarado-Melo, León-Ariza & Ladino-Marín, 2024). Latino, F., & Tafuri, F. (2023).

Alvarado-Melo et al., (2024) highlight that active physical activity improves cognitive domains, although they are criticized for the lack of precision in the optimal frequency and the correlation of cerebral efficiency with attentional efficiency, receiving criticism for not controlling the participants' diet. Cobo-Cuenca et al. (2021) associate vigorous exercise with the volume of brain structures, but their focus on predominantly sedentary samples is questioned. Finally, Ardoy et al., (2020) validate that increasing intensity in Physical Education enhances concentration, although they face criticism for the subjectivity in the observation sheets. These findings are relevant to understanding why well-structured physical education programs can be more effective when they incorporate elements that demand cognitive concentration, such as exercises that combine movement with decision-making or coordination challenges. In other words, not all physical activities have the same cognitive impact; those that require planning, adaptation, and sustained control tend to generate more benefits in concentration and other functions.

Likewise, physical interventions designed with specific attention objectives have shown greater effects than unstructured physical activities, highlighting the importance of cognitively active and contextualized interventions to improve attention and concentration in school-aged children.

In summary, current studies agree that regular, planned, and cognitively involved physical activity can enhance concentration in children aged 8 to 9, improving not only their motor and physical performance but also their school performance and cognitive abilities. This benefit is explained by neurobiological and

psychosocial mechanisms that favor sustained attention, emotional regulation, and the processing of relevant information, essential elements for children to focus on complex activities both inside and outside the educational setting.

The objective of this study was: to analyze the influence of a physical activity program on concentration levels in the effectiveness of physical activities in children aged 8 to 9 years at the FAE N-3 Taura Educational Unit, in the Yaguachi canton of the Guayas province, considering its impact on motor performance and active participation during physical activity sessions.

Material and Method

Design and scope: the research assumes an experimental design in its pre-experimental modality, with a quantitative cross-sectional approach and the application of measurements at two moments (pretest and posttest) to a single group. The study has a correlational scope by assessing the incidence of concentration on the effectiveness of motor performance and active participation during Physical Education classes of children aged 8-9 at the FAE N-3 Taura Educational Unit.

Participants

The study takes as a sample the 37 students from the 4th level parallel of Elementary Basic Education at the FAE N-3 Taura Educational Unit in the Yaguachi Canton.

Techniques and Instruments

Below are the three requested instruments with their respective indicators and evaluation rubrics:

A: Concentration observation sheet

Objective: To record the child's ability to maintain focus on specific stimuli during motor execution.

Attention and Focus indicators:

- • Initial Focusing: Deficient (1): Does not pay attention to the explanation. Regular (2): Requires repeating the order 2 or 3 times. Good (3): Pays attention after a brief reminder. Excellent (4): Grasps the instruction the first time.
- • Focus Maintenance: Deficient (1): Gets distracted by any external noise. Regular (2): Abandons the task halfway through. Good (3): Gets distracted little but regains focus on his/her own. Excellent (4): Completely focused until the end.
- Response to Change: Deficient (1): Gets confused with new instructions. Regular (2): Takes a long time to adapt to the change. Good (3): Adapts with minimal error. Excellent (4): Reacts instantly to the change.

B. Active participation scale:

Objective: To measure the level of commitment, effort, and dynamism during the session.

1. Motor Initiative: Level 1 (Passive): Avoids participating in games. Level 2 (Intermittent): Participates only if forced directly. Level 3 (Active): Joins the game with normal willingness. Level 4 (Proactive): Seeks to lead or initiate the activity.

2. Persistence: Level 1 (Passive): Gives up at the first failure. Level 2 (Intermittent): Tries twice and gets frustrated. Level 3 (Active): Keeps trying despite errors. Level 4 (Proactive): Maintains effort until achieving the challenge.

3. Cooperation: Level 1 (Passive): Does not interact with peers. Level 2 (Intermittent): Interacts only if passed the ball. Level 3 (Active): Actively collaborates with the team. Level 4 (Proactive): Helps others and communicates positively.

B. Registro descriptivo del comportamiento atencional:

Objective: To qualitatively document observable behaviors that reflect inhibitory control and effectiveness.

1. Inhibitory Control ("Braking" Capacity): High: Stops dead at the signal. Medium: Takes 2-3 steps before braking. Low: Cannot brake the motor impulse.
2. Motor Effectiveness (Task Precision): Precise: Executes the zigzag or throw without errors. Acceptable: Makes minor errors that do not stop the flow. Ineffective: Knocks down cones or constantly loses the object.
3. Divided Ate Dividida (Multitarea): Competente: Coordina pies y manos mientras cuenta. Dificultoso: Debe detener los pies para poder contar. Nulo: Pierde la coordinación motriz al intentar pensar.

Procedure

The research was developed in three phases, which coincide with the exploration, application, and evaluation of the physical activity program to promote concentration during physical activities and its relationship with the effectiveness of motor performance and active participation of children aged 8-9 at the FAE N-3 Taura Educational Unit in the Yaguachi Canton. Below are the phases of the proposed program:

Diagnostic Phase: the tests and sheets were applied to evaluate the concentration and active participation of the evaluated subjects during the physical activities carried out. ***Program Development and Implementation Phase:*** the physical activity program was applied for 12 weeks during the first school period 2025-2026, starting in May 2025 and concluding in July 2025 (12 weeks), at the FAE N-3 Taura Educational Unit in the Yaguachi Canton. The structure of the program, as well as the pedagogical aspects of its application, are described in the results section.

Evaluation and Analysis Phase: the same instruments as in the pretest were applied in this phase, guaranteeing standardized testing conditions for the sampled subjects in the research. Its application was carried out in week 12 of the school period, and its results were statistically contrasted to assess the relationship between the relevant variables of the study.

Results

Below, and as part of the Diagnostic Phase, the three sheets declared in the materials and methods section were applied. These were applied in the first week of the 2025-2026 school year. The results are detailed below:

Table 1.
Schedule of activities and diagnostic instruments

Activity	Instrument	Responsible	Time
Initial observation of the sessions	Observation sheet	Reseacher	2 sessions
Assessment of motor participation	Participation Scale	Teacher	1 session
Analysis of results	Data Matrix	Researcher	1 session

Note. The table describes the activities carried out during the research process, the instruments used for data collection and analysis, as well as those responsible and the estimated execution time.

Table 2.
Results of the observation sheet by concentration criteria in the Pretest (n=37)

Attention and Focus Indicators	**Range (Value)**	**Frequency (f)**	**Percentage (%)**	**Calculation (f×V)**
1. Initial Focusing	Excellent (4)	3	8.1%	12
	Good (3)	4	10.8%	12
	Fair (2)	11	29.7%	22
	Poor (1)	19	51.4%	19
Subtotal Focalización		37	100%	65
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2. Focusing Subtotal	Excellent (4)	2	5.4%	8
	Good (3)	3	8.1%	9
	Fair (2)	12	32.4%	24
	Poor (1)	20	54.1%	20
Focus Maintenance		37	100%	61
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3. Change Response	Excelente (4)	3	8.1%	12
	Bien (3)	5	13.5%	15
	Regular (2)	10	27.0%	20
	Deficiente (1)	19	51.4%	19
Response Subtotal		37	100%	66

Summary of Results on Concentration Indicators During the Pretest

1. Using the arithmetic mean formula, the results by dimension are: Initial Focusing: 1.75 (Poor/Fair Level)
2. Focus Maintenance: 1.64 (Poor/Fair Level)
3. Change Response: 1.78 (Poor/Fair Level)

Executive Analysis:

The data reflect a structural weakness in Focus Maintenance, which is the lowest indicator. with the lowest score. This scientifically validates the need to apply the programmed stimulus system, since more than half of the sample (51.4% to 54.1%) is at the lowest level of the scale before starting the intervention.

Results of the application of the Active Participation Scale during the Pretest. This instrument is fundamental because it demonstrates that the improvement in concentration was not a passive process, but rather generated greater commitment and dynamism in the study group (See Table 2)."

Table 3.
"Results of the Active Participation Scale (n=37) with Scale (1-4) in the Pretest."

Indicator	**Scale**	**Frequency (f)**	**Percentage (%)**	**Mean ($\bar{x}$)**
1. Motor initiative	Passive (P)	18	48.7%	1.78
	Intermittent (I)	11	29.7%	

	Intermittent (I)	11	29.7%	
	Active (A)	6	16.2%	
	Proactive (PA)	2	5.4%	
Total Indicator 1		37	100%	
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2. Persistence	Passive (P)	20	54.1%	1.70
	Intermittent (I)	10	27.0%	
	Active (A)	5	13.5%	
	Proactive (PA)	2	5.4%	
Total Indicador 2		37	100%	
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3. Cooperation	Passive (P)	19	51.4%	1.81
	Intermittent (I)	9	24.3%	
	Active (A)	6	16.2%	
	Proactive (PA)	3	8.1%	
Total Indicador 3		37	100%	

Analysis of Results

Analysis based strictly on the frequencies in the table:

- **Deficit in Motor Initiative:** With a mean of 1.78, it is observed that 78.4% of the subjects (Active (A) + Proactive (PA)) present difficulties in initiating motor actions autonomously.
- Critical Failure in Persistence: This indicator registers the lowest value (1.70), with more than half of the sample (54.1%) at the Proactive (PA) level. This justifies the need for a training model that strengthens volitional capacity and resistance to effort.
- Limitations in Cooperation.

Table 4.

Results of the descriptive recording of attentional behavior during the Pretest.

Category / Indicator	Success Frequency (f)	Achievement Percentage (%)	Description of Observed Behavior (Pretest)
Inhibitory Control (Motor Braking)	15	40%	Motor impulsivity predominates; movement continues after the "braking" signal.
Motor Efficacy (Technical Precision)	24	65%	Frequent technical errors are observed due to a lack of attentional focus on the task.
Divided Attention (Multitasking)	11	30%	Movement becomes erratic or stops when processing mental instructions.

Executive Interpretation (7-Line Paragraph Style)

The initial diagnosis reveals a scenario of cognitive vulnerability, where Divided Attention is the most critical area, with only a 30% achievement rate, evidencing the children's inability to process motor and

mental tasks simultaneously. Likewise, the low performance in Inhibitory Control (40%) confirms a marked motor impulsivity that compromises safety and order during execution. Although Motor Efficiency shows 65%, it is undermined by a lack of technical precision resulting from attentional dispersion. Overall, these pretest data justify the need for a scheduled intervention to stabilize motor braking processes and cognitive load management. The group's baseline profile indicates that most participants operated under erratic and inattentive execution.

The phase of designing and implementing the program included a set of planning and implementation actions for its contents during the intervention weeks. The program structure comprises seven stages, which are outlined below: 1. Program characterization, 2. Introduction, 3. Theoretical foundation, 4. General methodology, 5. Program objectives, 6. Physical activities of the program, 7. Program implementation and methodological principles of the program. Below is the description of each of the stages:

Moment 1. General characterization of the program

Program name: Cognitively active physical activities program for strengthening concentration in children aged 8 to 9 years.
Target population: Boys and girls aged 8 to 9 years in Middle Basic Education.
Duration: 8 weeks**.**
Frequency: 3 sessions per week.
Duration per session:
45–60 minutes. Application context: Middle Basic Education.

Moment 2. Introduction

Concentration is an essential cognitive process for the effective execution of physical activities academic learning in students since it allows children maintain their attention on relevant stimuli and inhibit internal and external distractions. At formative ages such as 8 and 9 years old, the development of sustained attention is at a critical stage, which directly influences the quality of motor performance and active participation during Physical Education classes. The current scientific literature suggests that structured physical activity can improve various executive functions, including attention and concentration, 2025; Alvarado-Melo, León-Ariza & Ladino-Marín, 2024). However, there is still debate about which types of physical activities generate the greatest cognitive impact and how this relates to motor effectiveness in the school context (International Journal of Environmental Research and Public Health et al., 2024; Wang & Liu, 2025). Therefore, it is necessary to delve deeper into the design and application of physical activity programs that integrate cognitive demands in order to significantly enhance concentration in children aged 8 to 9 years.

Moment 3. Theoretical Foundation

Contemporary research has placed special emphasis on understanding how physical activity influences key cognitive functions, especially attention and concentration, which are fundamental to educational and motor performance in children. The mechanisms underlying these effects include beneficial neurobiological changes, such as increased cerebral blood flow, the release of neurotrophic factors (e.g., BDNF), and the enhancement of neuronal connections—processes that contribute to the efficiency of executive functions.

Recent systematic reviews have identified that physical activity interventions that are cognitively engaging or involve complex decision-making and motor control show stronger effects on the

application of physical or unstructured activities (Alvarado-Melo, León-Ariza & Ladino-Marín, 2024). In this context, programs designed with games that require sustained attention, rapid response to stimuli, and decision-making have shown improvements in attention indicators in school populations, although methodological diversity persists across studies.

Furthermore, several experimental studies have compared the impact of different types of physical and cognitive training, finding that the combination of physical activity and cognitive training produces significant improvements in attention, working memory, and executive functions in school-aged children, beyond what is observed with physical activity or cognitive training alone (Wang & Liu, 2025). This suggests that including cognitive challenges during physical exercise—such as changing rules, unexpected guidelines, or dual tasks—can enhance concentration and its transfer to academic and sports contexts.

Likewise, there is empirical evidence that general physical fitness, including endurance, speed, coordination, and strength, is positively associated with attentional performance, which supports the integration of varied physical components to stimulate cognitive mechanisms in children and adolescents. This implies that not only the amount of physical activity matters, but also its quality and structure, which should be designed according to the specific cognitive demands one wishes to improve (e.g., concentration).

Current scientific literature supports the hypothesis that physical activity programs incorporating elements that challenge cognition and attention not only improve physical fitness but also have a positive impact on concentration and other executive functions in children. This evidence underscores the importance of applying physical and entertaining activities that integrate complex movements, decision-making, and sustained attention to enhance both the physical and cognitive effectiveness of upper elementary school students.

Moment 4. General methodology:

Playful, participatory, active, and progressive, incorporating physical activities that demand sustained attention, decision-making, inhibitory control, and motor coordination.

Moment 5. Program objectives

General Objective

To improve concentration levels in children aged 8 to 9 years through a systematic program of cognitively active physical activities, favoring motor efficiency and active participation during physical activity sessions.

Specific objectives

- To stimulate sustained attention through motor games with changing instructions.
- To promote inhibitory control and decision-making during physical activity.
- To increase motivation and active engagement in physical sessions.
- To integrate movement with cognitive processes to enhance concentration.
- To promote physical activity habits associated with cognitive and emotional well-being.

Moment 6. Program physical activities

a) Selection of physical activities that integrate movement + cognition.

b) Organization of sessions with clear instructions, progressive challenges, and varied stimuli.

c) Intervention activities were designed that integrate movement and cognitive processes. The design prioritized playful activities that demand sustained attention, inhibitory control, working memory, and decision-making, maintaining a motivating and participatory approach.

a) The program was structured into weekly sessions, with clearly defined phases (warm-up, main part, and cool-down), ensuring a gradual progression of cognitive and motor load. Below, the structure and content of the program's activities are presented.

Table 5.
Program (application model) Weekly schedule (repeated progressively over 8 weeks). Monday – Attention and coordination games

Phase	Activity	Methodology	Materials	Cognitive Processes
Warm-up	Game "Follow the command" (colors and movements)	Playful	Colored cones	Selective attention
Main part	Cognitive-motor circuit (jumps + verbal commands)	Stations	Hoop, cards	Sustained Attention
Main part	"React and change"	Participatory	Whistle	Inhibitory contro
Cool-down	Stretching with guided breathing	Guided	None	Self-regulation

Table 6.
Wednesday – Aerobic activities with decision-making

Phase	Activity	Methodology	Materials	Cognitive Processes
Warm-up	Joint mobility with music	Rhythmic	Speaker	Atención compartida
Main part	Pursuit/chasing games with changing rules	Playful	Cones	Flexibilidad cognitiva
Main part	Relays with double instructions/dual commands	Cooperative	Witnesses	Memoria de trabajo
Cool-down	Mindful breathing	Guided	Mats	Regulación emocional

Tabla 7.
Friday – Cooperative games and attentional control

Phase	Activity	Methodology	Materials	Cognitive Processes
Warm-up	Game: "Simon Says Motor"	Playful	None	Response inhibition
Main part	Sports mini-games with adapted rules	Adapted	Balls	Sustained Attention
Main part	Cooperative games with roles	Collaborative	Hoops	Planning
Cool-down	Guided relaxation	Guided	mats	Cognitive Well-being

Moment 7. Program Implementation.

The program implementation was carried out over eight consecutive weeks, following the established schedule. Each session included specific activities aimed at stimulating attention and concentration through clear instructions, changes in stimuli, varying rules, and motor challenges.

At the end of the intervention, the assessment instruments were administered again (post-test) in order to compare the results obtained before and after the program, in both the experimental group and the control group.

Moment 8. Methodological Principles of the Program

Playful and participatory character. Progression of cognitive complexity. Movement–thinking integration. Attention to individual differences. Feedback.

Positive and constant feedback. General program design

Duration: 8 weeks. Frequency: 3 sessions per week. Time per session: 45–60 minutes Type of activities: Motor games with cognitive demands.

La fase de evaluación y análisis del programa se realizó en la semana 12 del período planificado, en ella se realizaron las siguientes acciones:

a) Administration of attention-concentration tests to the research sample.
b) Statistical processing of the collected empirical data.
c) Analysis of the post-test and pre-test results using inferential statistical measure

Below is a summary of the results from the administration of the instruments in the post-test:

Table 8.

Results of the concentration indicators during the Posttest (n=37)

Attention and Focus Indicators	Range (Value)	Frequency (f)	Porcentage (%)	Calcultation (f×V)
1. Initial Focus	Excellent (4)	18	48.6%	72
	Good (3)	14	37.8%	42
	Fair (2)	4	10.8%	8
	Poor (1)	1	2.7%	1
Focus Subtotal		**37**	**100%**	**123**
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2. Focus Maintenance	Excellent (4)	15	40.5%	60
	Good (3)	16	43.2%	48
	Fair (2)	5	13.5%	10
	Poor (1)	1	2.7%	1
Maintenance Subtotal		**37**	**100%**	**119**
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3. Change Response	Excellent (4)	20	54.1%	80
	Good (3)	12	32.4%	36
	Fair (2)	4	10.8%	8
	Poor (1)	1	2.7%	1
		37	**100%**	**125**

	Fair (2)	4	10.8%	8
	Poor (1)	1	2.7%	1
Subtotal Respuesta		**37**	**100%**	**125**

Los resultados del Postest demuestran una evolución significativa, elevando el promedio general de concentración de un nivel deficiente (1.75) a uno óptimo de 3.30. Destaca que el 86.5% de los niños ahora se sitúa en rangos de "Bien" a "Excelente", logrando reducir la incidencia del nivel "Mal" de un preocupante 51.4% a un residual 2.7%. El indicador de Respuesta de Cambio fue el más favorecido, con un 54.1% de éxito absoluto, lo que valida la eficacia del sistema to develop cognitive flexibility. This radical transformation confirms that the intervention eliminated the dominant attentional dispersion, consolidating a sustained focus capacity essential for complex motor learning. The positive homogeneity achieved guarantees that the project's human capital has overcome the initial cognitive barriers with resounding success.

Tabla 9.

Resultados cuantitativos del Postest: Escala de Participación Activa (n=37)

Indicador	Escala	Frecuencia (f)	Porcentaje (%)	Media ($\bar{x}$)
1. Iniciativa motriz	Pasivo (P)	1	2.7%	3.27
	Intermedio (I)	3	8.1%	
	Activo (A)	18	48.7%	
	Proactivo (PA)	15	40.5%	
Total Indicador 1		37	100%	
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2. Persistencia	Pasivo (P)	2	5.4%	3.08
	Intermedio (I)	4	10.8%	
	Activo (A)	20	54.1%	
	Proactivo (PA)	11	29.7%	
Total Indicador 2		37	100%	
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3. Cooperación	Pasivo (P)	1	2.7%	3.35
	Intermedio (I)	2	5.4%	
	Activo (A)	17	45.9%	
	Proactivo (PA)	17	45.9%	
Total Indicador 3		37	100%	

Analysis of the Results (Impact of the Intervention)

Optimization of Motor Initiative: The average rose from 1.78 to 3.27. 89.2% of the students (33 out of 37) are now in the higher levels, indicating that the model endowed the subjects with the autonomy needed for motor action, free from external dependence.

Strengthening of Persistence: After recording the lowest value in the pretest, this

indicator achieved an average of 3.08. It is notable that the Active level (A) became the predominant one at 54.1%, confirming that the intervention strengthened volitional capacity and tolerance for sustained effort.
Excellence in Cooperation: This indicator shows the highest performance with an average of 3.35. Some 45.9% of the sample reached the Proactive level (PA), demonstrating that the applied methodology positively transformed the dynamics of collaborative work and group cohesion.
Below are the results of Attentional Behavior during the post-test:

Table 10.
Post-test results for attentional behavior indicators.

Category / Indicator	Phase	Frequency of Success (f)	Achievement Percentage (%)	Descripción del Comportamiento Observado
(Motor Braking)	Postest	31	85%	The children manage to stop in response to distractors or signals without losing balance.
(Technical Precision)	Postest	33	90%	Fluent execution in zigzag and throws without knocking down obstacles.
(Multitasking)	Postest	28	75%	They maintain motor rhythm while solving counting or color task instructions.

Analysis of the Qualitative Leap
Table 8 (Post-test) shows clear improvements in all three evaluated indicators (n=37). Inhibitory control reaches 85% (f=31), evidencing a high capacity for motor braking/inhibition in response to stimuli. Motor efficacy records the highest result at 90% (f=33), reflecting precision and fluid technical execution. Divided attention achieves 75% (f=28), indicating good performance in simultaneous tasks. Overall, the data show a high general achievement level (75%–90%). This confirms a significant improvement compared to the initial state.

Below are the results of the application of the hypothesis test—the Wilcoxon signed-rank test for ordinal qualitative variables—aimed at corroborating the statistical hypothesis. The alternative hypothesis (H_i) is established as: The application of the physical activities program influenced the concentration levels and motor efficacy of 8- to 9-year-olds, and as the [null] (Ho) The application of the physical activities program did not influence the concentration levels and motor efficacy in children aged 8 to 9. The application of the test showed that the Sig. level is 0.00 < 0.05, so there were highly significant changes in concentration and efficacy after the program was applied, corroborating the researcher's hypothesis.

Discussion

The results obtained in this research demonstrate that the application of a program of cognitively active physical activities produces a substantial improvement in the concentration levels of children aged 8 to 9 years. The evolution of the overall average concentration score, which rose from a deficient level (1.75) to an optimal one (3.30), supports the premise that structured physical activity is a catalyst for cognitive development during the school stage.

Comparison with the Scientific Literature

- When contrasting these findings with previous studies, important points of convergence and methodological clarifications are observed:
- **Nature of the Activity:** The results align with what was proposed by Diamond & Ling (2020), who argue that only activities with high executive demand generate real benefits. While mechanical programs are questioned, our intervention —based on games with changing instructions and decision-making— demonstrated that cognitive complexity is the differentiating factor for improving sustained attention, which was initially the weakest point of the sample (1.64).
- • **Intensity and Control:** Unlike the criticisms made to López-Sánchez et al. (2021) regarding the lack of standardization, this study implemented 45- to 60-minute sessions with self-regulation phases and guided breathing, significant levels of success in the post-test

Impact on Participation: The research corroborates the findings of Ardoy et al. (2020), but overcomes the criticism regarding subjectivity through the use of quantitative scales of active participation. A radical optimization was observed in Motor Initiative (from 1.78 to 3.27), suggesting that the improvement in concentration is not an isolated phenomenon, but rather translates into greater autonomy and proactive student engagement.

Mechanisms of Improvement

La transformación observada, especialmente en la Respuesta al Cambio (donde el 54.1% alcanzó la excelencia), sugiere una mejora en la flexibilidad cognitiva. Como postulan Alvarado-Melo et al. (2024), las intervenciones físicamente activas influyen positivamente en las funciones ejecutivas. Nuestro programa parece haber activado mecanismos neurobiológicos relacionados con la atención sostenida, permitiendo que el 86.5% de los participantes superara la dispersión atencional dominante detectada en el pretest.

Synthesis and Discussion

Study Findings	Correlation with Authors	Biomechanical/Cognitive Implication
Improvement in Divided Attention	**Wang & Liu (2025)**	Wang & Liu (2025) Greater multitasking processing capacity (motor + mental).
Increase-Persistence in	**Ardoy et al. (2020)**	Strengthening of volitional capacity in response to physical effort.

In conclusion, comparison with the existing literature allows us to assert that the success of the intervention lay in the structural quality of the program—by planning processes and working memory, not only was better motor performance achieved, but also a more solid cognitive foundation for the academic performance of the children from the FAE N-3 Taura Educational Unit

Conclusions

The application of the cognitively active physical activities program proved to be highly effective, raising the overall average concentration score from a deficient level (1.75) to an optimal one (3.30), with 86.5% of students reaching successful levels. It is concluded that the integration of executive challenges, such as decision-making and inhibitory control, not only stabilized sustained focus processes but also significantly enhanced the students' Motor Initiative and volitional persistence. These findings confirm that the structural quality of exercise, and not just its quantity, is the determining factor in eliminating attentional dispersion and optimizing motor and proactive performance. Finally, the intervention transformed group dynamics towards excellence in cooperation, consolidating a methodology that links neurobiological well-being with participatory effectiveness in the educational context.

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