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Practice of lateral dominance: an early evaluation strategy in children from the rural area of Puno

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ABSTRACT

The purpose of this study was to investigate the practice of lateral dominance as an early evaluation strategy in children from the rural area of Puno, Peru. Early assessment of lateral dominance is crucial for understanding a child's cognitive and motor development. This study focused on children attending a school for children with learning disabilities in the rural Initial Educational Institution Camacani within the Local Educational Management Unit of Puno, located in the southern region of the Province of Puno, under the jurisdiction of the Platería District. A total of 100 children (50 boys and 50 girls), aged 5 years, were selected for the study. The research was descriptive-quantitative in nature, aimed at evaluating the dominance of four dimensions—hands, feet, ears, and eyes—using the Harris test. The findings revealed that lateral dominance in both boys and girls was characterized by poorly affirmed laterality in 60% of the cases and crossed laterality in 40%. This suggests that at the age of 5 years, the children were still in the developmental stage of lateralization, with no clear dominance of the left or right hemisphere. Based on the results, it was concluded that lateral dominance in these children was not yet fully established. Furthermore, the study emphasized the importance of incorporating psychomotor activities during early childhood development to promote the continuous improvement of laterality, motor skills, and spatial orientation.

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1. INTRODUCTION

The development of lateral dominance is a crucial brain function that enables the body to develop motor skills and facilitates spatial and temporal orientation. According to Quispe [1], lateral dominance in children is not fully established at an early age, requiring support from educators to reinforce the development of both hemispheres. This support is vital to prevent issues such as difficulties with spatial orientation, indecision in writing, and impairments in motor function. Furthermore, Zarei and Mazloumi [2] suggest that challenges with lateral dominance hinder the learning of reading and writing, as well as the acquisition of receptive language skills, which are essential for expression and language orientation. Maassen and Terband [3] argue that lateral dominance directly influences a child's motor skills; without it, functions fail to develop normally, leading to clumsy actions, poorly coordinated drawings, and a negative impact on linguistic abilities. Similarly, Duarte-Hernández and Pérez-Mendoza [4] highlight those problems arise when children use either side of their body arbitrarily, which interferes with cerebral dominance and lateralization. Therefore, integrating activities that help children identify their lateral dominance, whether in the right or left

hemisphere, strengthens brain stimuli, positively influencing their activities and significantly impacting their learning acquisition.

This study introduces a novel approach by focusing on evaluating lateral dominance specifically in children from rural areas of Puno, Peru. It uniquely targets a demographic—5-year-old children from the Initial Educational Institution Camacani (IEI-C)—where studies on lateral dominance are sparse. The research employs the Harris test of lateral dominance, adapting it to a rural context, which has rarely been explored in prior literature. This allows for understanding how cultural and environmental factors influence lateral dominance development. The findings aim to contribute practical insights for educators to design interventions tailored to the specific needs of children in these settings, enhancing psychomotor and learning outcomes from an early age.

The development of lateral dominance is a crucial brain function that enables the body to develop motor skills and facilitates spatial and temporal orientation. According to Quispe [1], lateral dominance in children is not fully established, necessitating support from educators to reinforce the right and left hemispheres. This support helps prevent problems with spatial orientation, indecision in writing, and motor function impairments. Furthermore, Barabási *et al.* [5] suggest that difficulties with lateral dominance hinder the learning of reading and writing and the acquisition of receptive language skills essential for expression and language orientation. Maassen and Terband [3] argue that lateral dominance directly influences a child's motor skills; without it, functions do not develop normally, leading to clumsy actions, poorly coordinated drawings, and primarily affecting linguistic abilities. Similarly, Duarte-Hernández and Pérez-Mendoza [4] note that problems arise when children use either side of their body arbitrarily, thereby affecting cerebral dominance and lateralization. Therefore, integrating skills that help children identify their lateral dominance—whether right or left hemisphere—strengthens brain stimuli that influence their activities and significantly impacts their learning acquisition.

In this context, the present study aims to determine the practice of lateral dominance as an evaluation strategy for 5-year-old children. It seeks to assess the effectiveness of pedagogical actions that guide educational perspectives towards mastering lateral dominance [6]. This approach contributes not only to the child's spatial orientation but also impacts the acquisition of language and motor skills from an early age. Given that spatial orientation and lateral dominance are crucial brain functions, this study involves a sample of 100 students aged 5 from the IEI-C. The goal is to apply methodologies that strengthen lateral dominance and thereby promote the development of new skills in children.

Lateralization is vital in child development as it governs the brain's division of labor between the left and right hemispheres, influencing motor skills, language, and cognitive functions [7]. Clear lateral dominance supports the efficient execution of tasks such as reading, writing, and spatial orientation. The development of lateralization in early childhood is critical for preventing learning difficulties and motor coordination issues. Understanding lateralization's role helps educators design interventions that support children's neurological growth. Duarte-Hernández and Pérez-Mendoza [4] illustrate that children display varying degrees of lateral deviation depending on their psychomotor development. For instance, 2-year-olds exhibit different lateral deviations compared to 4 and 5-year-olds. Their study underscores the correlation between age and the development of psychomotor stratification programs in children, concluding that most children exhibit a prevailing lateralization among peers. Similarly, Martínez *et al.* [8] diagnosed, described, and evaluated the movement patterns of active athletes. Their findings highlighted crucial aspects, such as the competitive edge of left-handed athletes, the equipment used in competitions, and the athletes' characteristics based on their preferences, and their impact on sports performance.

Villavicencio and Ríos [9] focused on the influence of lateralization on reading and writing processes using the Harris test. They found that 15% of the children had poorly established lateralization, which led to difficulties in consolidating literacy skills and written code competencies. In line with this, Tacuri *et al.* [10] identified that issues in defining and properly using lateralization often stem from inadequate learning, preventing individuals from developing dominance skills effectively. Therefore, establishing strategies that aid in the development of lateralization through pedagogical activities is essential. Milenković *et al.* [11] defines lateralization as the predominance of one hand or eye over the other, determining the dominance of the left or right side. Left-handed individuals exhibit 'left lateralization,' while right-handed individuals exhibit 'right lateralization'. Duarte-Hernández and Pérez-Mendoza [4] describe lateralization as the dominance of certain functional activities of the body, driven by a dominant hemisphere in the brain. Thus, lateralization reflects the dominance of either the right or left hemisphere, allowing individuals to perform activities based on their orientation stimuli.

Cherukunnath and Singh [12] describe lateralization as a sensorimotor capacity that underpins language, executive function, spatial, and numerical skills, interweaving cognitive abilities. Conversely, Corrigan [13] emphasize that although the hemispheres control the opposite sides of the body, they should not be viewed as opposites but as complementary, with neither being more important than the other. Hence, lateralization is considered a preference where one side of the body is dominant in most people.

Medvedeva *et al.* [14] assert the left hemisphere's predominance for motor skills, attributed to asymmetries in the primary motor cortex. Li *et al.* [15] support this, noting the left hemisphere's dominance in terms of intersection, with the right hemisphere considered non-dominant. However, during the neonatal period, lateralization is crucial for brain control involving language skills and motor functions.

Gaab and Duggan [16] advocate that teaching practices should include resources that bolster the development of lateralization processes. This ensures that children engage their dominant side and body parts according to their left or right dominance. Teaching methodologies from an early age, around 4 or 5 years, should involve phonological tasks, reading, writing, and movement activities to help students acquire skills and consolidate motor development for optimal performance. In summary, there is a vital relationship between a child's age and the development of proper lateralization, necessitating continuous attention from educators in early school years.

2. METHOD

2.1. Study design

This study employs a quantitative research approach with a descriptive design to determine the practice of lateral dominance as an early evaluation strategy for children in the rural area of Puno. Lateral dominance refers to the preference for one side of the body—either the left or right hemisphere—over the other, influencing motor skills and cognitive development. The descriptive scope of this study aims to identify key characteristics related to effective lateralization practices, which involve activities and strategies that help children develop a dominant hand, foot, ear, or eye. These practices are essential for enhancing children's motor abilities, coordination, and learning outcomes.

2.2. Participants and location

The study population comprises children aged 5 to 6 years from the southern area of the Province of Puno, specifically within the District of Platería. The total population includes 458 inhabitants, with 125 children aged 5 to 6 years, as in presented Figure 1. The sample size of 100 children was determined using Krejcie and Morgan [17] sample size determination table, which provides guidance on selecting an adequate sample size for a finite population, ensuring representativeness and reducing sampling error. This method is widely accepted and ensures that the sample size is statistically sufficient for analysis. These children attend the IEI-C and the Initial Educational Institution La Rinconada Salcedo (IEI-R).

2.3. Instruments

The Harris test of lateral dominance was used as the primary data collection instrument. This test evaluates the preference for the use of hands, feet, eyes, and ears to determine hemisphere dominance. The test's validity has been established in prior research, confirming its ability to accurately measure lateral dominance as it relates to motor and cognitive development. Reliability was ensured through its repeated application in similar studies, with consistent results reported across diverse populations. To further verify reliability in this study, a pilot test was conducted with 10 children not included in the sample, yielding consistent outcomes.

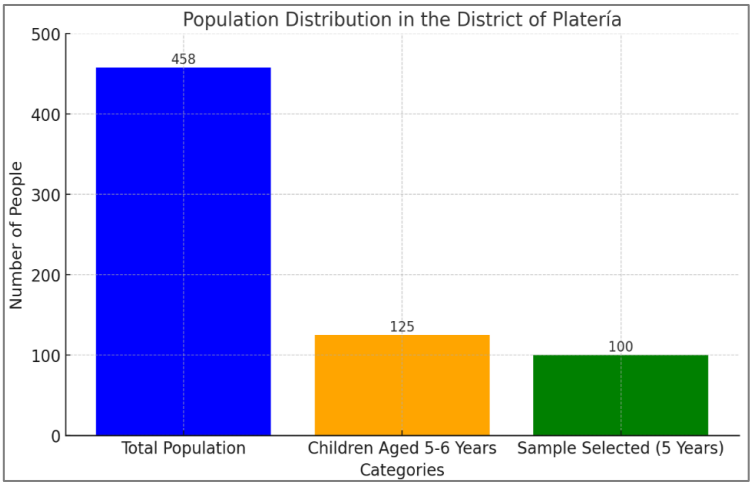

Figure 1. Bar chart of the study population and sample

2.4. Procedure

2.4.1. Data collection

Data collection was conducted using the Harris test, administered with prior coordination with the director of the IEI-C. The test evaluated the children's preferences for using their hands, feet, eyes, and ears, providing insights into their lateral dominance.

2.4.2. Data analysis

The data obtained from the Harris test were analyzed to assess the lateral dominance practices that promote the development of motor skills, language abilities, and overall activity performance in children. The Harris test of lateral dominance is a widely used tool to assess a child's preference for one side of their body over the other. It evaluates how children use their hands, feet, eyes, and ears in various tasks to determine their lateral dominance. By observing a series of activities, such as reaching for objects or responding to auditory cues, the test identifies which side of the body is more dominant. This information helps assess the development of motor skills and provides insights into a child's overall cognitive and neurological development. The analysis included data from both the IEI-C and the IEI-R.

2.5. Limitation

The study's limitations include its small sample size of 100 children from a single educational institution. The findings may not be generalizable to all children in rural areas or different educational settings. Further research with larger and more diverse samples is recommended to validate the findings.

3. RESULTS AND DISCUSSION

Lateral dominance involves using one hand, foot, eye, or ear with greater skill and efficiency than the other, indicating proper neurological organization. This dominance affects not only the hands but also the lower extremities and sensory organs, through which humans exhibit this characteristic and the specialization of each hemisphere of the brain. The obtained results were presented: i) a comparison was made between the data obtained from the test applied to boys and girls aged 5; ii) the data regarding which hand showed greater dominance in the population; iii) the foot that showed greater dominance; iv) the eye dominance in the selected population; v) the results on ear dominance; and vi) a comparison was made between the laterality of boys and girls.

The results in Figure 2 showed that the number of children who participated from the IEI-R is a total of 60, which constitutes 60% of the investigated population. On the other hand, from the IEI-C, a total of 40 participants were identified. Therefore, the total number of participants involved in the research was 100, which allowed for the evaluation of the psychomotor development of the child, that is, to determine if the child presents any degree of lateral deviation (partial or complete) and, in addition, to evaluated the cognitive development through the Harris test.

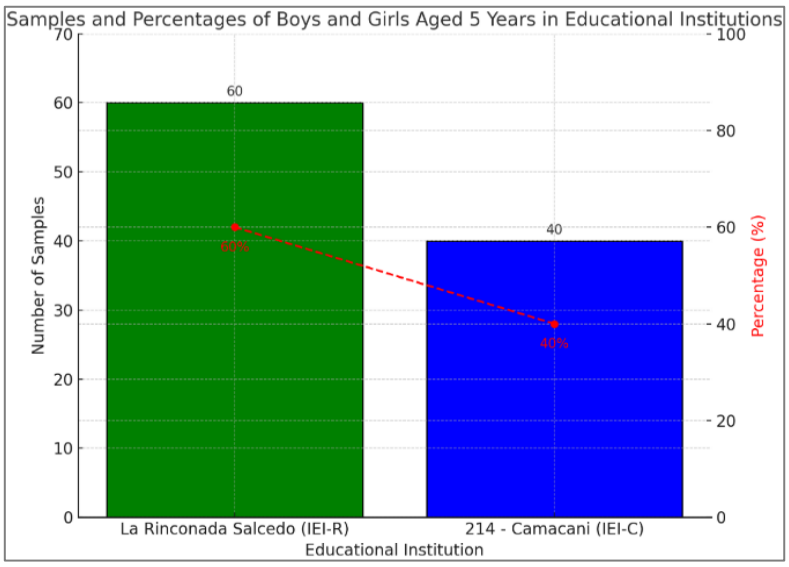

Figure 2. Bar chart of 5-year-old boys and girls from IEI-R and 214-IEI-C, rural Puno

3.1. Hand dominance

Table 1 presents the distribution of hand dominance across two educational institutions (IEI-R and IEI-C) with a total sample of 100 children, consisting of 60 children from IEI-R and 40 children from IEI-C. In IEI-R, the largest group, 36.67% (22 children), exhibited cross laterality, meaning their hand dominance was not clearly established. This was followed by 36.67% (22 children) who had poorly established laterality, suggesting that their hand dominance was still in the process of developing. A total of 26.67% (16 children) from IEI-R were right-handed, while no children were classified as left-handed, as shown in Table 1.

In IEI-C, 35% (14 children) exhibited cross laterality, and 37.5% (15 children) demonstrated poorly established laterality. 27.5% (11 children) were right-handed, while like IEI-R, no children in IEI-C were left-handed, as in Table 1. Overall, the results indicated that a significant proportion of children across both institutions had either cross laterality or poorly established laterality, highlighting that many children had not yet fully developed a clear hand preference. The absence of left-handedness in both groups suggested a predominance of right-handedness, though the overall dominance was still in the process of development for most of the children at this stage.

Table 1. The hand dominance in the educational institutions IEI-R and IEI-C

Category	IEI-R (Number of children)	IEI-R (% of total)	IEI-C (Number of children)	IEI-C (% of total)	Total (Number of children)	Total (% of total)
Right-handed	16	26.67	11	27.5	27	27
Cross laterality	22	36.67	14	35	36	36
Poorly established laterality	22	36.67	15	37.5	37	37
Left-handed	0	0	0	0	0	0
Total	60	60	40	40	100	100

Note: data obtained from the application of the Harris test, according to hand dominance in boys and girls aged 5 years in the rural area of Puno (2024).

3.2. Foot dominance

Table 2 presents the foot dominance distribution among 100 children, with 60% (60 children) from IEI-R and 40% (40 children) from IEI-C. In IEI-R, 30% of the children, or 18 children, were classified as complete right-footed. Additionally, 25% of the children, or 15 children, exhibited cross laterality, where they showed a mix of foot dominance. The largest group in IEI-R, making up 45% (27 children), had poorly established laterality, meaning their foot dominance was not clearly defined. In IEI-C, the distribution was slightly different, as in Table 2. A total of 22.5% (9 children) were complete right-footed, while another 22.5% (9 children) showed cross laterality. The majority of the children in IEI-C, however, had poorly established laterality, comprising 55% (22 children) of the group. Overall, the results demonstrated that, in both institutions, the majority of children exhibited poorly established laterality (both in IEI-R and IEI-C), while a smaller percentage displayed more definite foot preferences, either as right-footed or showing cross laterality. This distribution emphasizes the developmental nature of foot dominance in young children, where clear preferences are not yet fully established.

Table 2. The foot dominance in the educational institutions IEI-R and IEI-C

Foot dominance	IEI-R (Number of samples)	IEI-R (% of total)	IEI-C (Number of samples)	IEI-C (% of total)
Complete right-footed	18	30	9	22.5
Complete left-footed	0	0	0	0
Cross laterality	15	25	9	22.5
Poorly established laterality	27	45	22	55
Total	60	60	40	40

Note: data obtained from the application of the Harris test, according to foot dominance in boys and girls aged 5 years in the rural area of Puno (2024).

3.3. Eye dominance

Table 3 presents the distribution of eye dominance among a total sample of 100 children, with 60% (60 children) from IEI-R and 40% (40 children) from IEI-C. In IEI-R, the majority of children, 30% (18 children), were classified as complete right-eyed, while 5% (3 children) were complete left-eyed. A smaller proportion, 10% (6 children), exhibited cross laterality, where they showed a mix of eye dominance, and the remaining 55% (33 children) demonstrated poorly established laterality, meaning their eye dominance was not clearly defined. In IEI-C, the distribution was somewhat different. A total of 20% (8 children) were complete right-eyed, and there were no children who were complete left-eyed. In addition,

10% (4 children) exhibited cross laterality, while the majority, 70% (28 children), had poorly established laterality. These results indicate that in both groups, the largest proportion of children exhibited poorly established eye dominance, suggesting that eye dominance may not yet be fully developed in many children at this age, as seen in Table 3. The presence of cross laterality in both groups also points to variability in eye preference. Overall, the data underscored the developmental nature of eye dominance, with many children still in the process of establishing a clear eye preference.

Table 3. Eye dominance among boys and girls aged 5 years in different institutions of Peru

Eye dominance	IEI-R (Number of samples)	IEI-R (% of total)	IEI-C (Number of samples)	IEI-C (% of total)	Total (Number of samples)	Total (% of total)
Complete right-eyed	18	30	8	20	26	26
Complete left-eyed	3	5	0	0	3	3
Cross laterality	6	10	4	10	10	10
Poorly established laterality	33	55	28	70	61	61
Total	60	60	40	40	100	100

Note: data obtained from the application of the Harris test, according to eye dominance in boys and girls aged 5 years in the rural area of Puno (2024).

3.4. Ear dominance

Table 4 shows the distribution of ear dominance among a total sample of 100 children, with 60% (60 children) from IEI-R and 40% (40 children) from IEI-C. In IEI-R, the majority of children, 30% (18 children), exhibited complete right-eared dominance, while a smaller proportion, 5% (3 children), were complete left-eared. A total of 15% (9 children) showed cross laterality, where their ear dominance was not clearly defined as right or left. The largest group in IEI-R, making up 50% (30 children), demonstrated poorly established laterality, meaning their ear dominance was still developing or undefined, as in Table 4. In IEI-C, the distribution was similar, with 17.5% (7 children) being complete right-eared, and no children exhibiting complete left-eared dominance. Furthermore, 12.5% (5 children) showed cross laterality, and 70% (28 children) had poorly established laterality, indicating a high percentage of children in this group had yet to develop a clear ear preference. These findings highlighted that, across both groups, the dominant trend was a lack of well-established ear dominance, with a significant proportion of children showing either cross laterality or poorly established laterality. This suggested that ear dominance, like other literalities, develops gradually and is not fully formed in young children.

Table 4. Ear dominance among boys and girls aged 5 years in different institutions of Peru

Ear dominance	IEI-R (Number of samples)	IEI-R (% of total)	IEI-C (Number of samples)	IEI-C (% of total)	Total (Number of samples)	Total (% of total)
Complete right-eared	18	30	7	17.5	25	25
Complete left-eared	3	5	0	0	3	3
Cross laterality	9	15	5	12.5	14	14
Poorly established laterality	30	50	28	70	58	58
Total	60	60	40	40	100	100

Note: data obtained from the application of the Harris test, according to ear dominance in boys and girls in the rural area (2024).

3.5. Dominant laterality

Table 5 presents the distribution of dominant laterality among a total sample of 100 children, with 60% (60 children) from IEI-R and 40% (40 children) from IEI-C. In IEI-R, the majority of children, 22% (13 children), exhibited right-handedness, while no children were classified as left-handed. A significant portion, 25% (15 children), showed cross laterality, meaning their hand preference was not clearly established. The largest group in IEI-R, 53% (32 children), displayed poorly defined laterality, indicating that their hand dominance was still developing or unclear. In IEI-C, 17.5% (7 children) were right-handed, while no children were left-handed. There were 17.5% (7 children) exhibited cross laterality, and 65% (26 children) had poorly defined laterality, as in Table 5. These findings highlighted that the majority of children across both groups had either cross laterality or poorly defined laterality, suggesting that hand dominance was still in the process of developing. The absence of children with left-handedness in both groups further indicated a possible trend of right-handed dominance, though many children had not yet fully established clear hand preferences at this age.

Table 5. Dominant laterality in boys and girls aged 5 years in Peru in institution of different location

Dominant laterality	IEI-R (Number of samples)	IEI-R (% of total)	IEI-C (Number of samples)	IEI-C (% of total)	Total (Number of samples)	Total (% of total)
Right-handed	13	22	7	17.5	20	20
Left-handed	0	0	0	0	0	0
Cross laterality	15	25	7	17.5	22	22
Poorly defined laterality	32	53	26	65	58	58
Total	60	60	40	40	100	100

Note: data obtained from the application of the Harris test, according to laterality dominance in boys and girls from the rural area (2024)

3.6. Correlations among all parameters

The correlation matrix illustrates the relationships between hand, foot, eye, and ear dominance in children. The matrix provides correlation coefficients, ranging from -1 to 1, which reflect the strength and direction of the relationship between each pair of dominance types. A correlation close to 1 indicates a strong positive relationship, where increases in one variable are associated with increases in another. Conversely, a correlation near -1 signifies a strong negative relationship, indicating that as one variable increases, the other decreases. A correlation near 0 suggests little to no relationship between the two variables. In terms of hand dominance, the data reveals a weak negative correlation with both foot dominance (-0.28) and eye dominance (-0.32). This implies that as hand dominance becomes more pronounced, foot and eye dominance tend to display some variability or opposite trends, although these relationships are not particularly strong. Additionally, hand dominance exhibits a slight positive correlation with ear dominance (0.18), though this relationship is also weak, indicating only a minimal tendency for hand and ear dominance to increase together. Foot dominance shows a weak positive correlation with eye dominance (0.17), suggesting a mild association between the 2, though not a significant one. However, foot dominance has a moderate negative correlation with ear dominance (-0.38), indicating that as foot dominance becomes more defined, ear dominance tends to exhibit a contrasting pattern, with one increasing as the other decreases. Regarding eye dominance, the matrix indicates a weak negative correlation with ear dominance (-0.13), suggesting that there is a slight inverse relationship between these two types of dominance, although the effect is minimal. Lastly, ear dominance shows weak correlations with the other dominance types, with the strongest inverse relationship being with foot dominance, as presented in Figure 3.

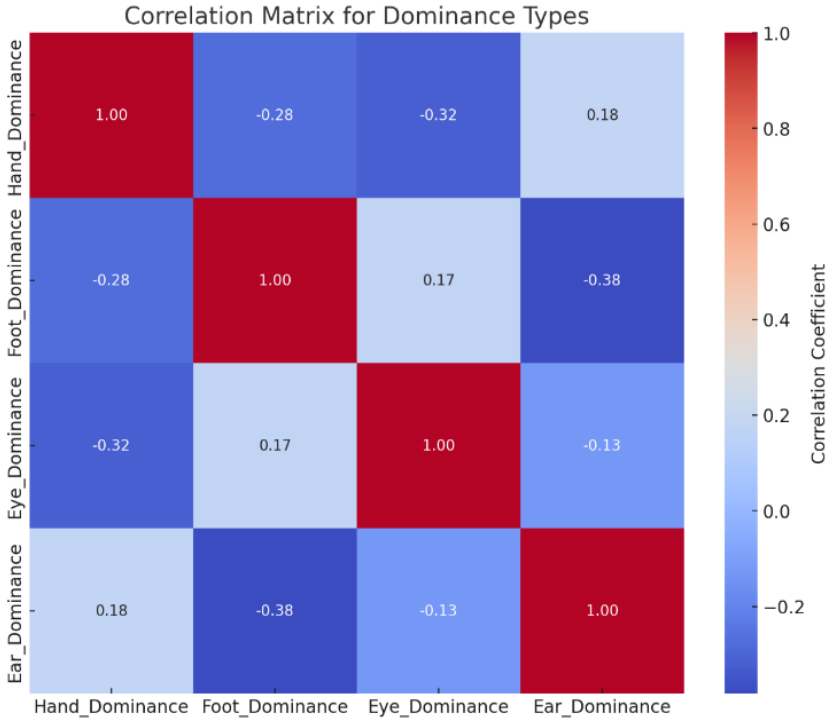

Figure 3. Correlation matrix of hand, foot, eye, and ear dominance in children

Overall, the correlation matrix suggests that the relationships between different types of dominance (hand, foot, eye, and ear) are generally weak. This implies that dominance in one area (e.g., hand dominance) does not strongly predict dominance in other areas (e.g., foot or eye dominance). The data suggests that each dominance type may develop relatively independently, and there is no clear, strong relationship among these dominance dimensions. Further analysis or additional data might help to explore these relationships in more detail or identify any specific patterns across the population.

3.7. Discussion

The following section discusses the laterality dominance found in 5-year-old boys and girls based on the Harris test dimensions. This analysis is framed within the context of existing literature, integrating pedagogical strategies and didactics to encourage the development of lateral dominance from an early age. Bondi *et al.* [18] analyzed laterality in primary school students, finding 60% right-handed dominance and significant levels of cross and poorly defined laterality. The lower rate of right-handed dominance and higher rates of cross laterality in our study are significant because they suggest that many 5-year-old children are still in the early stages of lateralization, meaning their brain hemispheres have not yet fully specialized [19]. Cross laterality, where different limbs or senses are dominant on opposite sides of the body, can indicate that the brain's left and right hemispheres are not yet fully coordinated [20]. This has implications for child development, as clear lateral dominance is crucial for motor coordination, cognitive functions, and language development. In educational practices, this highlights the importance of early intervention through targeted activities that promote lateralization, helping children develop more efficient motor skills, better spatial awareness, and stronger cognitive abilities [21]. Without such interventions, children may experience difficulties in tasks like reading, writing, and motor coordination.

Duarte-Hernández and Pérez-Mendoza [4] highlighted that lateral deviation varies with age and psychomotor development. They found right-handed dominance prevalent in older children, aligning with our findings of significant cross and poorly defined laterality in younger children. This indicates a need for targeted activities to support laterality development. Other studies [22], [23] also demonstrated the importance of establishing clear laterality for successful psychomotor and cognitive development. Our study echoes these findings, showing that poorly defined laterality is prevalent, necessitating early educational strategies to foster defined laterality and reduce potential developmental hindrances. Rinaldi *et al.* [24] emphasized the role of hemispheric dominance in brain function and its impact on motor skills and language development. This study found that 5-year-olds primarily exhibited cross laterality, underscoring the need for activities that promote hemispheric specialization and support cognitive and motor development. By promoting activities that encourage the development of clear lateral dominance, such as tasks involving hand-eye coordination or foot placement, educators [25] and caregivers can help children establish stronger hemisphere specialization [26]. This helps both sides of the brain communicate more effectively, leading to improved motor skills, better balance, and more efficient cognitive processing [27]. For example, encouraging specific hand and foot activities can help the brain “fine-tune” its coordination, which is essential for later learning tasks like writing, reading, and even social interactions [28]. Therefore, the study emphasizes the need for early pedagogical strategies that target lateralization, promoting the development of motor skills and supporting broader cognitive growth. Previous studies [29], [30] demonstrated the advantages of defined laterality in sports, further supporting the importance of early intervention. Establishing lateral dominance early can enhance children’s motor skills, balance, and spatial orientation, benefiting their overall development and performance in various activities.

Several previous studies [31], [32] stressed the negative impact of undefined laterality on learning and psychomotor skills. Our findings align with these studies, highlighting the need for educational strategies that address laterality from an early age to support children’s language, movement, and cognitive development [33]. Promoting lateral dominance from an early age is crucial for optimizing psychomotor and cognitive development. Educational institutions should implement strategies to help children develop clear lateral dominance, enhancing their ability to perform daily tasks efficiently, and supporting their overall growth and development. The Harris test proves to be a valuable tool in identifying and strengthening lateral dominance in young children.

4. CONCLUSION

This study emphasizes the importance of developing lateral skills as fundamental to children’s growth and daily functioning. The findings underline that lateral dominance plays a significant role in shaping motor skills, cognitive development, and spatial-temporal orientation. Without strategies to strengthen lateralization, children’s development may be hindered, affecting their ability to effectively use their right or left hemisphere. Lateral skills are crucial for children’s overall development, influencing their ability to perform everyday tasks with coordination and efficiency. The study highlights the need for early

identification and development of lateral dominance, as this is foundational for later cognitive and motor skills. The Harris test proved valuable in assessing lateral dominance and guiding educational strategies to support psychomotor development, literacy, and cognitive mastery. The results show that lateral dominance in rural children is characterized by significant cross laterality: 55% for hand dominance and 70% for foot dominance. Eye dominance, however, is predominantly right-handed (80%), and ear dominance shows less gender variation (45% right-handedness). Additionally, 60% of children exhibited poorly defined laterality, underscoring the need for targeted interventions. The lack of clear lateralization impedes psychomotor development, which can affect children's ability to perform tasks requiring coordination, such as writing and physical activities.

To support the development of lateral dominance, educational institutions should implement strategies that encourage the use of children's dominant side, whether left or right. Forcing children to use the non-dominant side can hinder their psychomotor growth and delay skill acquisition. Schools and educators should provide tailored activities that foster both hand and foot dominance, ensuring that children of all literalities receive the support they need to develop their motor and cognitive skills. Early pedagogical interventions, including activities that promote coordination and hemispheric specialization, will help children maximize their potential. In conclusion, understanding and nurturing lateral dominance is essential for children's academic success and overall development. By prioritizing lateral skills, educators can enhance children's cognitive functions, motor abilities, and readiness for learning, leading to better academic performance and improved daily functioning.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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Haydee Clady Ticona-Arapa		✓				✓		✓	✓	✓	✓	✓		

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

ETHICAL APPROVAL

The study was conducted in accordance with ethical guidelines for research involving human subjects. Informed consent was obtained from the parents or guardians of all participants, and the privacy and confidentiality of the participants were maintained throughout the study.

DATA AVAILABILITY

Derived data supporting the findings of this study are available from the corresponding author [NOZ-P] on request.

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