Correlational analysis of coordination ability indicators related to arm and leg movements

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Abstract
This study investigates the relationships between coordination ability indicators for arm and leg movements using correlational analysis. The performance of 34 participants was evaluated for their upper and lower extremities. Indicators of kinesthetic, statokinetic, coordination, balance, rhythm control, rapid response, orientation, and complex reaction abilities were analyzed. The results revealed a very strong correlation between rapid response, orientation, and complex reaction in arm movements. In leg movements, rhythm, kinesthetic, and statokinetic indicators were found to be significant. Balance emerged as a relatively independent component. The findings of this study substantiate the need to develop closely related indicators collectively and independent components through separate exercises. This approach can significantly increase the effectiveness of practical training.
Keywords: coordination abilities; correlational analysis; arm movements; leg movements; kinesthetic ability; motor control.

Introduction

Coordination abilities are an important sensorimotor foundation of human motor activity, enabling movements to be performed with precision, speed, rhythm, balance, and adaptability to situational demands. Recent research interprets proprioceptive sense, balance, spatial control of movement, reaction speed, and motor control as interconnected components of coordination training (Yılmaz et al., 2024; Rezaee et al., 2026). Particularly in children and adolescents, proprioceptive and sensorimotor exercises are considered a crucial factor in developing coordination, motor skills, and postural stability.

Coordination abilities related to hand movements are characterized by the performance of fine and precise actions, hand-eye coordination, differentiation of movement amplitude, coordination of both hands, and the execution of complex choice-reaction tasks. Upper extremity proprioception in children has been found to be associated with fine motor skills, general motor competence, coordination, and movement precision (Tezel et al., 2024; Hsueh et al., 2025). Furthermore, research on bimanual coordination indicates that the harmonious control of two-handed movements depends on the interplay between age, intermanual adaptation, and unimanual-bimanual components (Decraene et al., 2023; Nobusako et al., 2025).

Coordination abilities related to leg movements rely on the processes of dynamic balance, spatial orientation, rhythm-temporal control, and responding to external signals. Lower limb proprioception is essential for gait, postural control, and maintaining balance, which is achieved through the integration of the vestibular, visual, and somatosensory systems (Marsico et al., 2024; Gao et al., 2024). For this reason, proprioceptive and plyometric exercises can serve to improve static and dynamic balance in children and adolescents (Guerriero et al., 2025).

Due to the multi-component structure of coordination abilities, they must be assessed not only by individual test results but also by the internal correlations between indicators. Correlation analysis enables the identification of functional proximity between individual indicators, common psychomotor blocks, and relatively independent components. When examining numerous paired correlations simultaneously, using the FDR correction to reduce the probability of statistical error helps to ensure a more reliable interpretation of the results (Rastaghi et al., 2024).

The purpose of this study is to identify the correlations between coordination ability indicators related to arm and leg movements through correlational analysis. The findings serve to elucidate the internal structure of coordination abilities and to scientifically substantiate the necessity of developing closely related indicators jointly, while developing relatively independent components through separately targeted exercises.

Methods

This study was organized based on a correlational-analytical design. The main objective of the research was to determine the degree of correlation between coordination ability indica-

tors related to arm and leg movements, assess their functional proximity, and distinguish the relatively independent components.

The study analyzed the coordination ability indicators of 34 participants. Only complete results suitable for processing were included in the final statistical analysis. Incomplete results, those recorded with technical errors, or those that were logically inconsistent were excluded from the analysis. All indicators were assessed separately for arm and leg movements.

Coordination abilities were assessed based on eight key indicators: 1) kinesthetic ability; 2) coordination and combination ability; 3) statokinetic ability; 4) balance maintenance ability; 5) ability to control movement tempo and rhythm; 6) rapid response ability to external stimuli; 7) spatial orientation ability; and 8) complex or choice reaction. These indicators were recorded separately for the upper extremities (arm movements) and the lower extremities (leg movements).

During the testing process, the content of the tasks was explained to each participant in advance, and practice trials were conducted where necessary. The evaluation process considered the participants' movement execution accuracy, level of balance, spatial orientation, control over movement tempo and rhythm, and their response characteristics to external signals. The results from the arm and leg movements were entered into a separate electronic database, and each indicator was coded as V1–V8.

The statistical analysis was performed in several stages. First, the completeness and accuracy of the data for each indicator were verified. In the next stage, separate correlation matrices were constructed for arm movements and leg movements. The Pearson correlation coefficient (r) was used to determine the degree of association between the indicators. Statistical significance was evaluated at $p<0.05$ and $p<0.01$ levels.

To reduce the likelihood of randomly significant results due to the large number of pairwise correlations examined, the False Discovery Rate (FDR) correction was applied. For each pair, the p_FDR value was calculated following the FDR correction, along with the standard p-value. Additionally, a 95% confidence interval for the correlation coefficients was determined to assess the statistical stability of the relationships.

The strength of the correlation was interpreted based on the following criteria: $r<0.30$ — weak relationship; $r=0.30–0.49$ — moderate relationship; $r=0.50–0.69$ — notable relationship; $r\geq0.70$ — strong relationship. Negative correlations were interpreted separately to indicate the direction of the association. To visually represent the results, graphical depictions of the correlational relationships for arm and leg movements were created as visual matrices in the form of a heat map.

The personal data of the participants was kept confidential throughout the study. The results were analyzed only in a generalized, statistical format. The research was conducted in accordance with the general methodological and ethical requirements for scientific research in the field of physical education and sports.

Results and discussion

Within this section, the interrelationships between indicators of coordination abilities related to arm and leg movements were examined using correlation analysis. The main objective of the analysis was to determine the degree of functional proximity between individual indicators, identify statistically significant relationships, and isolate relatively independent components. On this basis, a scientific rationale was provided for the internal structure of coordination abilities, their level of mutual integration, and the necessity of determining which indicators should be developed jointly and which should be targeted individually during the training process.

A correlation analysis was conducted to determine the interrelationships among coordination ability indicators for hand movements. The results from the correlation matrix in Table 1 and the graphical representation in Figure 1 showed that varying degrees of positive correlations exist among the 8 indicators studied; some of these were very strong, while others were weak or moderate. Overall, the correlations between the indicators ranged from $r=0.201$ to $r=0.993$, which indicates that, on one hand, coordination abilities for hand movements are part of an integrated system, and on the other hand, they possess an internally differentiated structure.

According to the analysis results, the strongest correlations were observed between indicators 6, 7, and 8. Specifically, the correlation between indicators 6 and 7 was $r=0.993$, between indicators 6 and 8 was $r=0.953$, and between indicators 7 and 8 was $r=0.950$. These

Table 1. Correlation matrix between indicators of coordinative abilities in hand movements (n=34)

	1	2	3	4	5	6	7	8
1	1.000	0.489	0.722	0.201	0.470	0.255	0.285	0.349
2	0.489	1.000	0.665	0.490	0.435	0.400	0.427	0.533
3	0.722	0.665	1.000	0.484	0.607	0.501	0.530	0.627
4	0.201	0.490	0.484	1.000	0.544	0.355	0.364	0.435
5	0.470	0.435	0.607	0.544	1.000	0.681	0.662	0.774
6	0.255	0.400	0.501	0.355	0.681	1.000	0.993	0.953
7	0.285	0.427	0.530	0.364	0.662	0.993	1.000	0.950
8	0.349	0.533	0.627	0.435	0.774	0.953	0.950	1.000

Note: *1-kinesthetic ability; 2-coordination and combination ability; 3-statokinetic ability; 4-ability to maintain balance; 5-ability to control the tempo and rhythm of movement; 6-ability to react quickly to external stimuli; 7-orientation ability; 8-complex reaction or choice reaction*

correlations were not only highly statistically significant but also fully retained their significance even after the FDR correction (p=0.000; p_FDR=0.000). Their 95% confidence intervals are also very narrow and located in a high range: for example, CI95=0.985–0.996 for the 6

Table 2. Pairwise correlation coefficients, p-values, and 95% confidence intervals between hand movement indicators (n=34)

V1	V2	r	p	p_FDR	CI95_lower bound	CI95_upper bound	Strength of association	p<0.05	p<0.01	p<0.05 after FDR correction
1	2	0.489	0.003	0.006	0.181	0.710	Moderate	Yes	Yes	Yes
1	3	0.722	0.000	0.000	0.507	0.852	Strong	Yes	Yes	Yes
1	4	0.201	0.254	0.254	-0.147	0.505	Weak	No	No	No
1	5	0.470	0.005	0.008	0.157	0.698	Moderate	Yes	Yes	Yes
1	6	0.255	0.146	0.151	-0.091	0.546	Weak	No	No	No
1	7	0.285	0.103	0.111	-0.059	0.568	Weak	No	No	No
1	8	0.349	0.043	0.048	0.012	0.615	Moderate	Yes	No	Yes
2	3	0.665	0.000	0.000	0.422	0.819	Significant	Yes	Yes	Yes
2	4	0.490	0.003	0.006	0.182	0.711	Moderate	Yes	Yes	Yes
2	5	0.435	0.010	0.014	0.113	0.674	Moderate	Yes	No	Yes
2	6	0.400	0.019	0.024	0.072	0.651	Moderate	Yes	No	Yes
2	7	0.427	0.012	0.016	0.104	0.669	Moderate	Yes	No	Yes
2	8	0.533	0.001	0.003	0.238	0.738	Significant	Yes	Yes	Yes
3	4	0.484	0.004	0.006	0.175	0.707	Moderate	Yes	Yes	Yes
3	5	0.607	0.000	0.000	0.339	0.784	Significant	Yes	Yes	Yes
3	6	0.501	0.003	0.005	0.196	0.718	Significant	Yes	Yes	Yes
3	7	0.530	0.001	0.003	0.233	0.736	Significant	Yes	Yes	Yes
3	8	0.627	0.000	0.000	0.366	0.796	Significant	Yes	Yes	Yes
4	5	0.544	0.001	0.002	0.252	0.745	Significant	Yes	Yes	Yes
4	6	0.355	0.039	0.046	0.020	0.619	Moderate	Yes	No	Yes
4	7	0.364	0.034	0.042	0.029	0.625	Moderate	Yes	No	Yes
4	8	0.435	0.010	0.014	0.114	0.674	Moderate	Yes	No	Yes
5	6	0.681	0.000	0.000	0.446	0.828	Significant	Yes	Yes	Yes
5	7	0.662	0.000	0.000	0.417	0.817	Significant	Yes	Yes	Yes
5	8	0.774	0.000	0.000	0.590	0.881	Strong	Yes	Yes	Yes
6	7	0.993	0.000	0.000	0.985	0.996	Strong	Yes	Yes	Yes
6	8	0.953	0.000	0.000	0.906	0.976	Strong	Yes	Yes	Yes
7	8	0.950	0.000	0.000	0.901	0.975	Strong	Yes	Yes	Yes

Note: *V1 and V2 denote the pair of indicators being analyzed; r is the Pearson correlation coefficient; p is the level of statistical significance; p_FDR is the p-value after FDR correction for multiple comparisons; CI95 lower bound and CI95 upper bound represent the bounds of the 95% confidence interval. In the "Strength of Association" column, the degree of correlation is assessed as weak, moderate, significant, and strong. "Yes" and "No" indicate the presence or absence of statistical significance, respectively.*

–7 pair, CI95=0.906–0.976 for the 6–8 pair, and CI95=0.901–0.975 for the 7–8 pair. This indicates that the ability to respond quickly to external stimuli, the ability to aim, and complex reaction or choice reaction in hand movements are manifested through extremely similar psychomotor mechanisms. From a practical standpoint, these three indicators can be regarded as a strongly complementary functional block.

High-level correlations were also observed in pairs involving indicator 5. Specifically, the correlation between indicators 5 and 8 was r=0.774, which corresponds to a strong level of association; for this pair, p=0.000, p_FDR=0.000, and CI95=[0.590, 0.881]. Similarly, r=0.681 was recorded between indicators 5 and 6, and r=0.662 between indicators 5 and 7; in both cases, the association was significant and confirmed to be statistically reliable (p=0.000; p_FDR=0.000). These results indicate that the ability to control the tempo and rhythm of movement is intrinsically linked with rapid sensory response, targeting, and choice reaction. Thus, rhythm-temporal control does not manifest in isolation within hand coordination, but rather in conjunction with a high level of response speed and spatial-motor adaptation.

Correlation analysis also revealed strong and substantively justified correlations between indicators 1, 2, and 3. Most notably, the correlation between indicators 1 and 3 was r=0.722, which was assessed as a strong correlation; this result was confirmed by the indicators p=0.000, p_FDR=0.000, and CI95=0.507–0.852. A correlation of r=0.665 was recorded between indicators 2 and 3, and r=0.489 was recorded between indicators 1 and 2. The 2–3 pair expressed a significant level of correlation, while the 1–2 pair expressed a moderate level, with both being statistically reliable (for 1–2: p=0.003; p_FDR=0.006; for 2–3: p=0.000; p_FDR=0.000). These results suggest the existence of a common control mechanism among kinesthetic ability, coordination and combination ability, and statokinetic ability. In other words, precisely controlled force movements, complex combinational movements, and post-rotation control quality share a similar neuromo-

Fig 1. A graphical representation of the correlational relationships between indicators of hand movement coordination abilities (from left to right)
A graphical representation of the correlational relationships between indicators of coordinative abilities in leg movements

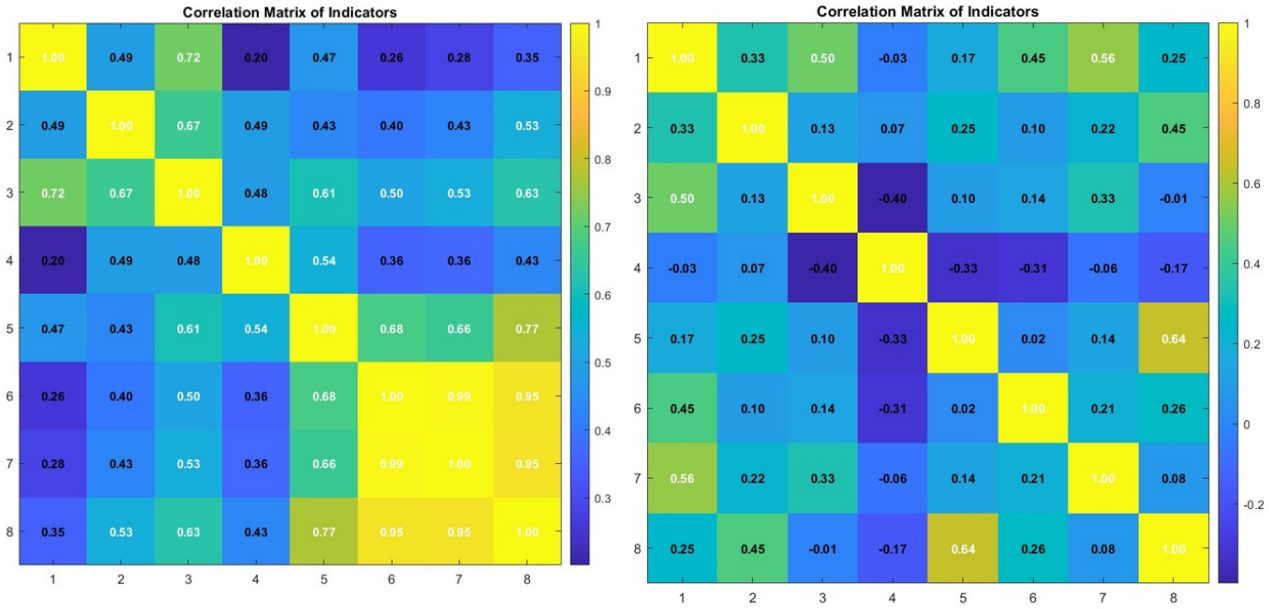


Table 3. Correlation matrix of coordination ability indicators for leg movements

Indicator	V1	V2	V3	V4	V5	V6	V7	V8
1	1	0.603	0.719	0.311	0.477	0.680	0.757	0.539
2	0.603	1	0.447	0.400	0.544	0.422	0.521	0.686
3	0.719	0.447	1	-0.068	0.426	0.455	0.599	0.330
4	0.311	0.400	-0.06	1	0.008	0.031	0.282	0.182
5	0.477	0.544	0.426	0.008	1	0.355	0.454	0.805
6	0.680	0.422	0.455	0.031	0.355	1	0.508	0.552
7	0.757	0.52	0.599	0.282	0.454	0.508	1	0.409
8	0.539	0.686	0.330	0.182	0.805	0.552	0.409	1

tor basis.

The 4th indicator, representing the ability to maintain balance, demonstrated a predominantly moderate correlation with the other indicators. Specifically, the correlation was r=0.544 between indicators 4 and 5, r=0.490 between indicators 4 and 2, r=0.484 between indicators 4 and 3, and r=0.435 between indicators 4 and 8. Additionally, correlations of r=0.355 between indicators 4 and 6 and r=0.364 between indicators 4 and 7 were recorded. Nearly all of these pairs were statistically significant at the $p<0.05$ level, a status that was maintained even after the FDR correction. For instance, for the 4–5 pair, p=0.001 and p_FDR=0.002; for 4–6, p=0.039 and p_FDR=0.046; and for 4–7, p=0.034 and p_FDR=0.042. Only the correlation between the 1st and 4th indicators was found to be weak and not statistically significant, with r=0.201, p=0.254, and p_FDR=0.254. This suggests that while the balance component is related to other components of hand coordination, it possesses a more independent characteristic in relation to certain indicators. p_FDR=0.042. Only the correlation between indicators 1 and 4 was weak and was not statistically significant in the form of r=0.201, p=0.254, p_FDR=0.254.

A point requiring special attention is that when the pairwise correlations presented in Table 1 were analyzed for statistical reliability, the majority of indicators remained significant at $p<0.05$, even after FDR correction. For instance, for pair 1–8, with r=0.349, p=0.043, and p_FDR=0.048, this correlation was found to be statistically significant, albeit borderline. However, some weak correlations are notable for their lack of significance: 1–4 (r=0.201; p=0.254), 1–6 (r=0.255; p=0.146), and 1–7 (r=0.285; p=0.103). This situation indicates that while there is general integration among the indicators, not all pairs are equally close, meaning that functional differentiation is maintained within the system.

When examining the distribution by correlation strength, it was found that some pairs fell into the "Strong" category, some into the "Substantial" category, and others into the "Moderate" and "Weak" categories. The "Strong" group primarily included pairs 1–3 (r=0.722), 5–8 (r=0.774), 6–7 (r=0.993), 6–8 (r=0.953), and 7–8 (r=0.950). Correlations of a "Substantial" degree included pairs 2–3 (r=0.665), 2–8 (r=0.533), 3–5 (r=0.607), 3–6 (r=0.501), 3–7 (r=0.530), 3–8 (r=0.627), 4–5 (r=0.544), 5–6 (r=0.681), and 5–7 (r=0.662). This suggests that within the hand coordination system, the reaction-speed and rhythm-aiming components, as well as the kinesthetic-statokinetic control components, are formed as relatively cohesive blocks.

The graphical representation of the correlational relationships shown in Figure 1 also visually confirms these numerical results. In the heat map, the highest correlations are reflected in lighter colors, which clearly shows the close relationship between blocks 6–7–8 and 5–6–7–8. At the same time, the 1–2–3 triad also appears as a stable, interconnected complex. In contrast, the color intensity for indicator 4 is relatively lower compared to other indicators, which graphically confirms that it occupies a more distinct functional position.

In general, the results of the inter-indicator correlation analysis on hand movements demonstrated that coordination abilities constitute a multi-component system with an internal structure. Among the indicators studied, very strong correlations were recorded in some cases (r=0.950–0.993), significant correlations in others (r=0.501–0.774), and moderate to weak correlations in the remaining instances. Specifically, it was determined that rapid response, aiming, and complex reaction indicators form one closely-knit block, while kinesthetic, coordination, and statokinetic abilities form another, relatively stable block. These findings indicate the

Table 4. Pairwise correlation coefficients, p-values, and 95% confidence intervals between hand movement indicators

V1	V2	r	p	p_FDR	CI95_lower bound	CI95_upper bound	Correlation Strength	p<0.05	p<0.01	p<0.05 after FDR correction
1	2	0.333	0.054	0.182	-0.005	0.604	Moderate	No	No	No
1	3	0.504	0.002	0.022	0.200	0.720	Strong	Yes	Yes	Yes
1	4	-0.030	0.865	0.932	-0.365	0.311	Weak	No	No	No
1	5	0.166	0.347	0.576	-0.182	0.478	Weak	No	No	No
1	6	0.445	0.008	0.047	0.126	0.681	Moderate	Yes	Yes	Yes
1	7	0.564	0.001	0.007	0.279	0.758	Strong	Yes	Yes	Yes
1	8	0.246	0.160	0.345	-0.100	0.540	Weak	No	No	No
2	3	0.129	0.467	0.653	-0.219	0.448	Weak	No	No	No
2	4	0.072	0.687	0.801	-0.273	0.400	Weak	No	No	No
2	5	0.252	0.150	0.345	-0.094	0.544	Weak	No	No	No
2	6	0.098	0.581	0.739	-0.248	0.422	Weak	No	No	No
2	7	0.222	0.207	0.414	-0.125	0.521	Weak	No	No	No
2	8	0.454	0.007	0.047	0.137	0.687	Moderate	Yes	Yes	Yes
3	4	-0.397	0.020	0.093	-0.648	-0.069	Moderate	Yes	No	No
3	5	0.103	0.562	0.739	-0.244	0.426	Weak	No	No	No
3	6	0.139	0.434	0.649	-0.209	0.456	Weak	No	No	No
3	7	0.328	0.059	0.182	-0.012	0.599	Moderate	No	No	No
3	8	-0.009	0.960	0.960	-0.346	0.330	Weak	No	No	No
4	5	-0.331	0.056	0.182	-0.602	0.008	Moderate	No	No	No
4	6	-0.310	0.074	0.208	-0.587	0.032	Moderate	No	No	No
4	7	-0.061	0.730	0.818	-0.391	0.283	Weak	No	No	No
4	8	-0.165	0.350	0.576	-0.477	0.183	Weak	No	No	No
5	6	0.020	0.913	0.947	-0.321	0.355	Weak	No	No	No
5	7	0.137	0.440	0.649	-0.211	0.454	Weak	No	No	No
5	8	0.642	0.000	0.001	0.389	0.806	Significant	Yes	Yes	Yes
6	7	0.205	0.244	0.455	-0.143	0.508	Weak	No	No	No
6	8	0.264	0.131	0.334	-0.081	0.553	Weak	No	No	No
7	8	0.083	0.642	0.781	-0.263	0.409	Weak	No	No	No

need to scientifically differentiate the content of training aimed at developing hand coordination abilities in subsequent stages. This means developing closely related indicators together, while developing relatively independent indicators through separate, targeted exercises.

A correlation analysis was conducted to determine the interrelationships between indicators of leg coordination abilities. The results were evaluated based on the correlation matrix in Table 3, the statistical significance of paired correlations in Table 4, and the graphical representation in Figure 2. The analysis results revealed that the correlations between coordination abilities related to leg movements were not uniform, but rather manifested at weak, moderate, and significant levels. This indicates that while the leg coordination system is an integrated structure, it also contains certain relatively independent functional components.

Foremost, the analysis identified the most pronounced and statistically significant correlation between indicator 5 (the ability to control movement tempo and rhythm) and indicator 8 (complex reaction or choice reaction). For this pair, r=0.642, p=0.000, and p_FDR=0.001, with the 95% confidence interval being 0.389–0.806. This correlation was assessed as "significant." This result indicates that rhythm-temporal control and complex choice reaction in leg movements are formed on the basis of closely related psychomotor mechanisms. From a practical standpoint, maintaining rhythm, controlling sequential movements, and executing a choice re-

action in response to changing external conditions often rely on the same control resources.

As a second important area, a significant correlation at r=0.564 was noted between indicator 1 (kinesthetic ability) and indicator 7 (orientation ability). For this pair, p=0.001, p_FDR=0.007, and the 95% confidence interval was 0.279–0.758. This result indicates that kinesthetic precision and spatial orientation in leg movements are substantively related. In other words, as the ability to finely control the amplitude of movement increases, the ability to choose the correct direction in space and re-establish the necessary positioning also improves.

Furthermore, a significant correlation was identified between indicators 1 and 3 (r=0.504; p=0.002; p_FDR=0.022; CI95=0.200–0.720). This result suggests a functional proximity between kinesthetic and statokinetic abilities. Therefore, the ability to accurately reproduce distance or amplitude in leg movements manifests, to a certain degree, alongside vestibular-statodynamic regulation. Likewise, the correlation between indicators 1 and 6 was statistically significant, recorded as r=0.445, p=0.008, p_FDR=0.047, and CI95=0.126–0.681. This indicates that the ability to respond quickly to an external signal is associated with kinesthetic accuracy.

For the 2nd indicator, which represents coordination and combination abilities, the results were relatively selective. The correlation of this indicator with most other indicators was not statistically significant. For example, for pairs 2–3, r=0.129 (p=0.467); for 2–4, r=0.072 (p=0.687); for 2–5, r=0.252 (p=0.150); for 2–6, r=0.098 (p=0.581); and for 2–7, r=0.222 (p=0.207) were recorded, none of which remained significant after the FDR correction. Only a moderate but significant correlation was observed between the 2nd and 8th indicators: r=0.454, p=0.007, p_FDR=0.047, CI95=0.137–0.687. This suggests that the ability to perform combinational leg movements is more closely associated with a complex choice reaction, while its correlation with other indicators is less consistent.

The 4th indicator, representing the ability to maintain balance, warrants special attention. This is because it exhibited a negative correlation with some indicators and a very weak positive correlation with others. Specifically, between indicators 3 and 4, the correlation was r=-0.397, p=0.020, CI95=-0.648 to -0.069. Although this correlation was nominally significant at the $p<0.05$ level, it was found to be insignificant after FDR correction (p_FDR=0.093). Similarly, for the 4–5 pair, r=-0.331, p=0.056; for the 4–6 pair, r=-0.310, p=0.074; for the 4–7 pair, r=-0.061, p=0.730; and for the 4–8 pair, r=-0.165, p=0.350 were recorded. These data indicate that the ability to maintain balance is not fully integrated with other components of leg movement coordination but rather manifests as a relatively distinct neuromotor component. In particular, the fact that the 4th indicator did not show a statistically significant correlation with most other indicators after FDR correction confirms that this component has a relatively independent profile. For pairs 4–8, r=-0.165, p=0.350. These data indicate that the ability to maintain balance is not fully integrated into other components of leg coordination, but rather manifests as a relatively separate neuromotor component.

Weak and statistically insignificant correlations also indicate the differentiated nature of the system. For example, in pair 1–4, r=-0.030 (p=0.865); in pair 1–5, r=0.166 (p=0.347); in pair 1–8, r=0.246 (p=0.160); in pair 3–5, r=0.103 (p=0.562); in pair 3–6, r=0.139 (p=0.434); and in pair 3–8, a near-zero correlation was recorded (r=-0.009; p=0.960). Similarly, a correlation of r=0.020 (p=0.913) was recorded in pair 5–6; r=0.137 (p=0.440) in pair 5–7; r=0.205 (p=0.244) in pair 6–7; r=0.264 (p=0.131) in pair 6–8; and r=0.083 (p=0.642) in pair 7–8. These results show that not all components within the leg coordination system are equally correlated and that some operate with considerable functional independence.

The correlation matrix in Table 3 and the graphical representation in Figure 2 also visually confirm these conclusions. Relatively high values are observed in the matrix, particularly for pairs 1–3, 1–6, 1–7, 2–8, and 5–8, and these same pairs are also noted in Table 4 as having statistically significant correlations. Conversely, in pairs such as 3–8, 5–6, and 7–8, the correlation is low or practically nonexistent, indicating that these indicators belong to different functional blocks. In the graphical representation, the fact that some cells are depicted in lighter shades while others are in more subdued colors clearly illustrates the internal differentiation among the indicators.

Overall, the results of the inter-indicator correlation analysis for leg movements demonstrated that coordinative abilities constitute a

complex and differentiated system. The most stable and statistically significant relationships were observed between the pairs of rhythm control and complex reaction (5–8; r=0.642), kinesthetic ability and orientation (1–7; r=0.564), kinesthetic ability and statokinetic ability (1–3; r=0.504), as well as kinesthetic ability and rapid response to external stimuli (1–6; r=0.445). At the same time, the ability to maintain balance proved to be relatively independent of most other indicators. These findings indicate the necessity of organizing training sessions aimed at developing leg coordination abilities on a differentiated basis. Specifically, it would be advisable to develop kinesthetic-statokinetic control and spatial orientation as one block, rhythm and complex choice reaction as another block, and the balance component as a separate, targeted area of focus.

Conclusion

The correlation analysis conducted showed that coordination abilities related to arm and leg movements constitute an interconnected yet internally differentiated system. For arm movements, the strongest correlations were observed among indicators of rapid response to external stimuli, aiming, and complex reaction. This suggests that these indicators manifest as a single psychomotor block. For leg movements, the most significant correlations were identified between rhythm control and complex reaction, kinesthetic ability and aiming, as well as between kinesthetic ability and statokinetic control. Meanwhile, the ability to maintain balance stood out as a relatively independent component.

Overall, the results indicate the necessity of a differentiated approach to developing coordination abilities. It is advisable to develop closely related indicators together, while developing relatively independent components through separate, targeted exercises.

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