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Differences in Several Coordination and Precision Tests in 11-year-old Children from Kosovo

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Abstract: *Coordination abilities are among the most significant components of a child's motor development, with the greatest rate of growth between 7-11 years of age. This study aims to compare the difference between boys and girls on several different coordination and precision tasks among 177 children aged 11 in Kosovo (83 boys and 94 girls) using a cross-sectional design through the administration of standardized coordinated movement (i.e. rectangular run, side steps, dribbling slalom) and precision tasks (i.e. targeting accuracy, kicking & throwing). Independent-samples t-test indicates that there are significant differences between boys and girls concerning basic agility and applied ball-control tasks. Boys were found to complete the rectangular run (t = -3.05, p = 0.003) and side steps (t = -3.01, p = 0.003) more quickly than girls, demonstrating higher levels of applied coordination for both the hand (t = -5.38, p = 0.001) and foot dribbling slalom (t = -8.25, p = 0.001). In addition, boys exhibited greater performance on all short-stick targeting tasks (t = 3.17, p = 0.002), horizontal throwing with a run-up (t = 2.52, p = 0.013) and kicking at the goal with a run-up (t = 6.24, p = 0.001) than girls. However, there were no significant differences between the sexes on general coordination tasks that do not require the use of a ball. Results suggest that differences between boys and girls at age 11 are task-specific and that differences in movement experience seem to account for these differences rather than general neuromotor maturity.*
Keywords: *Coordination, Precision, Childhood Motor Development, Sex Differences, Physical Activity*

Introduction

Coordination is important for both developing motor efficiency in a child's daily life and sport. Coordination also has significant implications for physical development. Coordination is the interaction between the neuromuscular system and motor control as influenced by the following: (1) balance; (2) rhythm; (3) spatial orientation; (4) accuracy of movement; and (5) adaptability to changes in the environment. Studies show that coordination improves rapidly between the ages seven through eleven, when the neuromuscular system is developing rapidly and children's motor competence is expanding. Marchenko et al. (2024) found significant age-related improvements in the following dimensions of coordination: (1) spatial differentiation; (2) transitioning between physical movement (e.g., running to jumping); (3) balance; and (4) hand-eye coordination in boys aged seven through eleven with the most significant amount of improvement occurring between ages seven through ten and stabilizing around age eleven. Therefore, age eleven is an important time for children as certain aspects of coordination reach functional maturity, while others remain highly variable and will continue to develop. Research suggests coordination development is influenced by both age and sex. Opstoel et al. (2015) examined boys and girls aged nine through eleven who played various sports and found that the development of coordination does not occur the same between boys and girls in all areas of coordination. While boys and girls do improve at the same rate according to age, boys tend to perform better on tasks that require speed and control of multiple segments of their bodies. Conversely, girls tend to significantly outperform boys on tasks involving flexibility, rhythm, and precision which require a high degree of accuracy. The patterns of differences in coordination performance are likely due to factors such as (1) differing amounts of movement experience; (2) varying ways in which children play; and (3) the availability of a structured training environment. These factors, rather than biological maturation, play a major role in the motor development of all children at this stage of their lives. In general, studies from around the world have shown that coordination ability at age eleven differs minimally and only in conjunction with the specific task performed. Studies have shown that children with the same amount of physical activity (either at home or in a structured setting) generally have similar coordination abilities regardless of body composition and/or previous movement experience. Limited research is available in many

countries, including Kosovo, regarding the coordination development of children aged eleven. There has not yet been any published studies that have focused on the measurement of coordination performance and precision in eleven-year-old children from Kosovo. Therefore, the objective of the current research study is to explore coordination performance and precision ability differences between eleven-year-old boys and girls from Kosovo. This study will add to the body of knowledge concerning a population that is not well represented in international coordination literature.

Literature Review

The most dramatic increase in coordination occurs during the period of middle childhood. According to Marchenko, et al. (2024) Children will experience significant age-related improvements in many different aspects of coordination from 7-10 years of age, and the majority of aspects of coordination will reach a level of relative stability by age 11. At age 11, many children will have a comparable level of performance on common coordination tasks and continued development of skills like dynamic balance. Therefore, age 11 is an important point of distinction for identifying subtle variations in coordination performance. It is critical to expose children to structured movement opportunities to maximise positive outcomes related to coordination development. Opstoel et al. (2015) looked at children ages 9-11 years across 25 different sports and found that the difference in coordination between any two sports was minor, with gymnastics and racquet sports providing small advantages; specialization by age 11 is a consequence of training volume rather than genetic predisposition and participation in organized sport increases one's capacity to develop coordination. Similar to this conclusion, Biino et al. (2023) reported that children who participate in organized sports demonstrate higher levels of gross motor coordination (GMC) than children not involved in sports. A similar pattern of results was observed by Canli et al. (2023) who reported that children aged 6-9 years of age experience rapid improvements in motor coordination, and physical activity participation is an independent predictor of greater motor coordination across gender and age. The combined results from the above studies demonstrate that structured motor experience is important for optimal coordination development. In addition, there are many studies that demonstrate a relationship between body composition and motor competence.Studies conducted in Colombia, Morocco and Japan showed that higher fat mass (amount of fat tissue), BMI (body mass index), and waist circumference were associated with less physical fitness and lower motor efficiency in fast and agile movements requiring balance and endurance Allen et al., 2022; Alcalid et al., 2022; Ibrahim et al., 2021; Yanagi et al., 2024). In contrast to this finding, a greater amount of muscle mass is positively correlated with greater neuromuscular performance e.g., strength, power, and speed. Ivashchenko et al. (2023) confirmed such relationships in a sample of 7- to 10-year-old children, finding a positive correlation between muscle tissue and coordination, whereas fat percentage was negatively correlated with balance and agility. Similarly, Nikšić et al. (2025) reported on morphological characteristics and motor skills of a representative sample of elementary school children in grades two through five. Their findings indicated that boys had a significantly higher BMI and significantly greater skinfold thickness when measured on the subscapular region of their body. Additionally, motor tests demonstrated strong correlations between body composition (i.e., muscle versus fat) and motor skills performed at an early school age. These results provide further evidence of the direct association between body composition and physical education programs offered in schools as well as indicate that coordination differences are measurable prior to the age of 11 years, suggesting that differences in body composition may continue to have an effect during the primary education years. Mixed findings regarding sex-based differences in coordination are evident in studies performed by Yassin et al.According to research conducted by Adriyani et al., boys perform better in ball handling and precision-related tasks that require hand-eye coordination than girls. Likewise, Ivashchenko et al. also found that boys perform better than girls on strength-based tasks, while girls show superior flexibility compared to boys. Nikšić et al. demonstrated that boys typically outperform girls in tests measuring flexibility, trunk strength, and functional strength. On the other hand, girls typically outperform boys in static hand strength and explosive leg power tests. It should be noted that sex differences in performance at this age are highly dependent upon the given task, and therefore different types of tests should be utilized to measure coordination performance for 10- to 12-year-olds. Boys generally excel in power-type or ball-precision tasks, while girls demonstrate greater advantage with flexibility and static strength. The school physical education program is still one of the major contexts for children's motor development during childhood. Prior studies have proven that structured physical education greatly influences children's motor competence development. Klaričić, Petrički, and Marenčko studied the physical activity levels of children in third and fourth grade in Croatia and revealed that within these two

grades of primary education there are no differences in total physical activity levels; however, different indicators of partial physical activity demonstrate a difference between boys and girls depending upon specific contexts of physical activity, such as during recess or free time. This research suggests that while the volume of physical education (PE) received during the course of a week will not greatly impact total activity levels of children, differences do exist in how boys and girls engage in specific motor behaviours and the level of involvement in physical activity. Along with this evidence, researchers also developed predictive models using discriminant analysis to find which tests would accurately predict age-related coordination changes. Ivashchenko, Lee, and Price determined that the most accurate predictors for age-related coordination changes of boys from 11 to 13 years of age are long jump, rhythmic hand tapping, and precision throwing. In girls, the most accurate predictors for girls from 11 to 12 years are pull-ups, movement speed-perception, and static equilibrium, while rhythmic movements are also predictive for age-related coordination changes among girls from 12 years of age to 13 years of age (Ivashchenko et al., 2018). These studies show that, through these studies, targeted test batteries have the ability to detect differences in motor development using specific coordination and precision assessments in very narrow age ranges.

Methods and materials

The main aim of this research is to determine differences in types of coordination in 11-year-old children and to examine differences between participants with respect to age and sex.

Hypotheses

H: There are statistically significant differences between 11-year-old boys and girls in coordination and precision performance.

Sample of population

The sample of participants was obtained through random selection from the population of boys and girls aged 11 years. The total sample included 177 participants, age 11 years: 83 boys and 94 girls.

All individuals that participated provided informed consent to participate in this study, met the age requirement for participation and currently were enrolled in school at the time of the study. There were no medical diseases/disorders by the participants of this study.

Instruments and Procedures

This research represents a cross-sectional study designed to identify differences in coordination and precision between boys and girls. The experimental method was used, applying a testing technique for data collection. Each measurement was taken and recorded in accordance with the Assessment Manuals. As supporting methods, a partially applied survey method, historical method, and statistical analysis were used.

Table 1. *Set of variables for Coordination and Precision*

No.	Variables for Assessing Coordination	No.	Variables for Assessing Precision
1	CRRT – Rectangular Run (Envelope Test)	1	PTSS – Targeting with Short Stick
2	CRSS – Side Steps Test	2	PTHPT – Paddle Throw at Horizontal Target
3	CRF8 – Figure-Eight Run with Bending	3	PTVPT – Paddle Throw at Vertical Target
4	COBOP – Backward Obstacle Course	4	PKVT – Kicking at Vertical Target
5	CCST – Stick Coordination Test	5	PKG – Kicking the Ball into Goal
6	CAGA – Ground Agility Test	6	PTVBR – Vertical Ball Throw with Run-Up
7	CCHDS – Hand Dribbling Slalom	7	PTHBR – Horizontal Ball Throw with Run-Up
8	CCFDS – Foot Dribbling Slalom	8	PKGR – Kicking the Ball into Goal with Run-Up

Statistical Procedures

Independent-samples T-test was used to examine for sex differences in coordination and precision of 11-year-old adolescents. Descriptive statistics were computed to determine mean values and standard deviations for all variables derived from tests as well as their normal distribution. The assessment of normal distribution determined the

appropriate tests of correlation between variables. Correlation was investigated by means of Pearson's coefficient of correlation. Statistical significance was determined as $p<0.01$.

Results

Table 2. *Descriptive Statistics for Boys*

	N	Range	Min.	Max.	Mean	Std. Deviation	Variance	Skew.	Kurt.
CRRT	83	15.15	22.91	38.06	31.71	2.74	7.52	-0.13	0.94
CRRS	83	10.13	9.77	19.90	13.34	1.64	2.69	1.49	3.68
CRF8	83	8.51	17.14	25.65	21.72	2.15	4.64	-0.21	-0.81
COBOP	83	40.81	9.43	50.24	19.33	8.36	69.94	2.61	7.27
CCST	83	33.16	6.34	39.50	11.68	5.22	27.20	3.44	14.11
CAGA	83	23.94	7.85	31.79	20.04	4.29	18.40	0.53	1.04
CCHDS	83	13.53	9.13	22.66	12.94	2.37	5.62	1.21	2.67
CCFDS	83	15.67	10.02	25.69	15.72	3.51	12.32	0.96	0.59
PTSS	83	7.00	98.00	105.00	103.42	1.48	2.20	-1.29	2.05
PTHPT	83	54.00	19.00	73.00	48.35	12.94	167.42	-0.04	-0.69
PTVPT	83	32.00	4.00	36.00	19.20	6.43	41.36	0.29	0.30
PKVT	83	38.00	6.00	44.00	21.44	6.85	46.96	0.59	0.93
PKGK	83	33.00	3.00	36.00	7.78	4.21	17.69	3.89	24.08
PTVBR	83	9.00	0.00	9.00	3.39	2.16	4.68	0.56	0.05
PTHBR	83	71.00	0.00	71.00	6.98	12.30	151.34	4.16	17.64
PTGR	83	12.00	1.00	13.00	6.48	2.23	4.99	0.29	1.34

Compared to complex coordination such as the backward obstacle course, where mean time under test conditions varied substantially among individuals, with a mean time of 19.33s (SD=8.36), reflecting widespread differences in dynamic balance and coordination ability. In summary, boys had consistently accurate performances and relatively little variability in their ability to perform basic coordination activities during the test period (rectangular run) with a mean time of 31.71 s (SD=2.74) thus, the rectangular run demonstrated stable patterns of development for boys in structured coordination tasks through age eleven. By comparison, complex coordination activities had greater variability in individual performance than did basic coordination activities. Static aiming accuracy was consistently high for boys, with the aid of a short stick, as measured by a mean score of 103.42 (SD = 1.48) for targets. This data indicates that boys achieved a mature developmental level with static aiming accuracy by age 11. In contrast, considerable variability existed in the boys' ability to hit a target when aiming while running or making a throwing sequence. A paddle throw directed towards a horizontal target produced a mean score of 48.35 (SD = 12.94). Thus, while boys have matured with regard to static aiming accuracy, their ability to achieve accuracy while executing dynamic activity is still developing.

Table 3. *Descriptive Statistics for Girls*

	N	Range	Min.	Max.	Mean	Std. Deviation	Variance	Skew.	Kurt.
CRRT	94	16.87	26.23	43.10	32.89	2.44	5.97	0.66	3.12
CRRS	94	9.35	10.62	19.97	14.04	1.46	2.12	0.97	3.68
CRF8	94	20.80	18.36	39.16	22.48	2.79	7.76	3.63	18.97
COBOP	94	39.67	10.23	49.90	19.53	6.26	39.14	3.38	14.49
CCST	94	28.44	1.76	30.20	10.50	4.04	16.31	2.89	12.22
CAGA	94	21.52	9.91	31.43	22.00	3.77	14.19	-0.28	1.14
CCHDS	94	18.31	8.70	27.01	15.02	2.74	7.53	1.52	5.79
CCFDS	94	16.74	12.90	29.64	20.01	3.40	11.56	0.63	0.73
PTSS	94	11.00	94.00	105.00	102.71	2.15	4.64	-1.47	2.64

PTHPT	94	55.00	12.00	67.00	37.09	11.03	121.73	0.47	-0.06
PTVPT	94	36.00	0.00	36.00	12.94	5.70	32.52	0.75	2.16
PKVT	94	32.00	2.00	34.00	16.17	5.72	32.76	0.51	0.86
PKGK	94	9.00	1.00	10.00	5.94	1.79	3.21	0.00	0.24
PTVBR	94	8.00	0.00	8.00	2.22	1.52	2.30	1.17	2.78
PTHBR	94	41.00	0.00	41.00	4.46	5.14	26.45	5.02	32.19
PTGR	94	8.00	1.00	9.00	5.48	1.83	3.37	-0.05	0.25

Girls' performance in basic coordination activities was consistent. The average time spent on the rectangular run was 32.89 s (SD = 2.44), which shows that the way girls were able to perform basic running movements at age 11 did not vary much between them. Girls also exhibited a lot of variation in their abilities to perform more complex coordination activities. The average time taken to complete the figure-eight run was 22.48 s (SD = 2.79), and the times ranged widely (18.36–39.16 s), indicating that some girls were better able than others to change positions and control their bodies when moving in the figure-eight pattern. Girls consistently demonstrated that their ability to do basic coordination activities had reached a stable level, whereas their ability to perform more complex coordination activities still varies a lot between them. In terms of static precision, the girls showed a high degree of consistency in their performance. The average score achieved when aiming at a target using a short stick was 102.71 (SD = 2.15), which shows that girls' basic ability to aim accurately developed very well by age 11, with little to no difference between the scores of the girls. Dynamic precision tasks showed a greater spread of scores across the girls. The average score achieved while throwing a paddle at a horizontal target was 37.09 (SD = 11.03), which indicates that the girls exhibited a large amount of variability between them in terms of their timing, arm coordination, and accuracy when throwing the paddle while in motion. Overall, girls' static precision skills are relatively well developed, while their dynamic precision's, which requires the coordination of several muscle actions in a precise sequence of time and order, still shows considerable individual variation.

Correlation analysis Boys

Table 4. *Correlation matrix for Boys*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CRRT	1															
CRRS	.459**	1														
CRF8	.015	.074	1													
COBOP	-.013	.093	.068	1												
CCST	.196	.353**	-.014	-.033	1											
CAGA	.341**	.049	.190	.110	-.233*	1										
CCHDS	.441**	.331**	.157	-.077	.009	.341**	1									
CCFDS	.496**	.303**	-.074	-.127	-.135	.323**	.502**	1								
PTSS	-.146	-.045	-.136	-.142	-.123	-.025	-.284**	.289**	1							
PTHPT	-.215	-.248*	.065	-.027	-.018	-.382**	-.428**	.074	.206	1						
PTVPT	-.518**	-.191	.011	-.038	-.237*	-.250*	-.254*	-.026	.285**	.421**	1					
PKVT	-.067	-.161	.022	-.274*	.156	-.137	-.269*	.061	.198	.245*	-.019	1				
PKGK	-.238*	-.245*	.009	-.095	-.049	-.141	-.093	.206	.278*	.144	.278*	.063	1			
PTVBR	-.327**	-.073	.183	-.019	-.045	-.262*	-.159	.222*	-.034	.186	.062	.007	.172	1		
PTHBR	.074	.282**	.072	-.022	.016	.044	-.015	-.074	.025	-.080	.010	-.085	-.043	-.080	1	
PTGR	-.286**	-.127	.034	.000	-.097	-.224*	-.021	.071	.110	.146	.306**	.089	.058	.129	.111	1

The correlation analysis indicates that basic coordination tasks are positively related to one another, whereas precision tasks show generally weak or negative correlations with coordination measures. Many coordination tasks were highly correlated (e.g., Rectangular Run had a strong correlation with Side Steps, $r = .46$, $p < .01$), indicating that general movement speed and lateral agility have a common coordination basis. Hand dribbling slalom had a high

correlation with foot dribbling slalom (r = .50, p < .01), indicating that ball control with hand and foot have a shared basis of coordination. These relationships suggest that children who are skilled at applied coordination in one way will typically be good at other types of applied coordination, especially agility and directional change. Coordination and precision, on the other hand, were generally negatively correlated, as greater performance (lower time) in agility tasks was usually associated with lower precision scores. The likely source of this negative relationship is the different scoring systems; for example, Side Steps and Paddle Throw had a negative correlation (r = -.25, p < .05), while Rectangular Run and Vertical Paddle Throw displayed a strong negative correlation (r = -.52, p < .01). Since coordination tasks measure time (with lower time being better) and precision tasks measure scores (with higher scores being better), the negative correlation reflects an inverse correlation rather than a lack of skill.

A number of precision tasks were positively correlated: Short Stick Targeting was positively correlated with Vertical Paddle Throwing (r = .29, p < .01), which indicates that as an individual's static aim improves, so too does his or her success in guided precision tasks. Thus, both target aiming and paddle throwing indicate consistency in precision across hand-based tasks.

Correlation analysis Girls

Table 5. *Correlation matrix for Girls*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CRRT	1															
CRRS	.369**	1														
CRF8	.028	.021	1													
COBOP	.013	.204*	.598**	1												
CCST	.238*	.155	.020	.013	1											
CAGA	.181	.400**	.027	.105	-.188	1										
CCHDS	.367**	.158	-.020	.015	.194	.255*	1									
CCFDS	.146	.069	-.020	.060	-.062	.185	.314**	1								
PTSS	-.126	-.030	.095	.033	-.123	-.304**	-.414**	.200	1							
PTHPT	-.194	-.006	.058	.041	-.004	-.270**	-.300**	.083	.263*	1						
PTVPT	-.105	-.132	.110	-.034	.055	-.117	-.241*	-.045	.062	.449**	1					
PKVT	-.116	-.013	.014	-.008	-.042	.018	-.262*	-.009	.094	.213*	.102	1				
PKGK	-.092	-.126	-.034	.035	-.074	-.214*	-.092	-.209*	.028	.226*	.198	.148	1			
PTVBR	.204*	-.055	-.015	-.142	-.138	-.063	-.030	-.059	-.097	.041	.231*	.090	.022	1		
PTHBR	-.126	-.086	-.021	-.032	.174	-.086	.120	.139	-.194	-.096	.073	.041	.109	.061	1	
PTGR	-.231*	-.039	.207*	.043	-.051	-.188	-.095	-.003	-.078	.178	.215*	.049	-.052	.110	-.034	1

A number of coordination tasks indicated that they measure similar types of motor abilities due to their correlation with one another. The rectangular run and sideways steps were both positively correlated (r=.37, p<.01), indicating that for girls, lateral agility and basic spatial coordination are the same type of movement structure. Sideways steps and ground agility were also positively correlated (r=.40, p<.01), suggesting that girls who move quickly through directional changes are more likely to complete agility-related tasks successfully. A very strong relationship was seen between figure-eight running and the backward obstacle course (r=.60, p<.01), suggesting that girls with good higher-level spatial restructuring also have good dynamic balance. These relationships seem to indicate that girls who perform well in one form of complex coordination (such as figure-eight running) will also perform well in similar tasks, particularly those that involve balance, direction change, and spatial control. Conversely, coordination tasks were mostly negatively correlated to the different areas of precision due to their respective inverse scoring method (time versus points). As such, ground agility had a negative correlation with short-stick targeting (r=–.30, p<.01), indicating that the quicker an individual can complete ground agility (lower score), the higher the precision score she will earn. Similarly, the hand-dribbling slalom had a negatively related relationship to several precision tasks such as horizontal paddle throws (r=–.30, p<.01), indicating that, although some children possess better potential throwing accuracy than others because they are more coordinated, the relationship is reflected as a negative

correlation due to the different scoring directions used. Negative correlations between coordination and precision do not indicate the opposite skill but rather illustrate the different forms of checking speed (time) toward a lower score and checking accuracy (points) toward a higher score. Several precision tasks were positively correlated with one another. Vertical and horizontal paddle throws had a moderate positive correlation with one another ($r=.45$, $p<.01$); thus, throwing precision to different targets reflects an underlying shared accuracy skill. Kicking accuracy into a goal had a positively correlated relationship with horizontal paddle throws ($r=.23$, $p<.05$), indicating girls with higher hand-based accuracy are generally more capable in foot-based accuracy; however, this relationship was minor. This finding would suggest that precision motor skill development transfers from one form of movement (hands) to another (feet) when changing modes of activity.

Independent Samples t-Test Comparing Girls and Boys (Age 11)

Table 6. *T-test*

Variable	Girls (M)	Boys (M)	t	p
CRRT – Rectangular Run	32.89	31.71	–3.05	.003
CRRS – Side Steps	14.04	13.34	–3.01	.003
CRF8 – Figure Eight	22.48	21.72	0.04	.965
COBOP – Backward Obstacle	19.53	19.33	–0.37	.714
CCST – Stick Coordination	10.50	11.68	1.58	.117
CAGA – Ground Agility	22.00	20.04	–3.23	.001
CCHDS – Hand Dribbling Slalom	15.02	12.94	–5.38	.001
CCFDS – Foot Dribbling Slalom	20.01	15.72	–8.25	.001
PTSS – Short Stick Targeting	102.71	103.42	3.17	.002
PTHPT – Paddle Throw Horizontal	37.09	48.35	–1.40	.163
PTVPT – Paddle Throw Vertical	12.94	19.20	–1.09	.278
PKVT – Kick at Vertical Target	16.17	21.44	–1.39	.166
PKG – Kick at Goal (static)	5.94	7.78	–0.61	.542
PTVBR – Vertical Throw (run-up)	2.22	3.39	1.89	.060
PTHBR – Horizontal Throw (run-up)	4.46	6.98	2.52	.013
PKGR – Kick at Goal (run-up)	5.48	6.48	6.24	.001

Statistical analyses of the t-Tests performed on these data indicate that there are statistically significant differences between boys and girls in many of the measures of coordination and precision skills at age 11. The differences between boys and girls are most evident within the time-based coordination test measurements. For example, in both the rectangular run ($M = 31.71$ s for boys vs. $M = 32.89$ s for girls; $t = -3.05$, $p = .003$) and lateral side-steps ($M = 13.34$ s for boys vs. $M = 14.04$ s for girls; $t = -3.01$, $p = .003$), boys completed these tests faster than girls, indicating that boys had superior basic agility and speed and the ability to change direction. The results indicate that boys demonstrate more efficient patterns of movement in space than girls, which is likely attributable to the additional time spent participating in activities that require changes of direction and rapid acceleration. The largest differences in performance between boys and girls occurred within the area of coordination related to sports, particularly in dribbling. Boys outperformed girls when compared on the hand dribbling slalom ($M = 12.94$ s for boys vs. $M = 15.02$ s for girls; $t = -5.38$, $p = .001$) and foot dribbling slalom ($M = 15.72$ s for boys vs. $M = 20.01$ s for girls; $t = -8.25$, $p = .001$), indicating that boys exhibit greater applied states of coordination with respect to manipulating a ball than do girls. It is likely that this pattern of performance reflects differences in sports participation, whereby boys of this age are more likely to be playing ball-oriented sports such as football and basketball, which require complex combinations of coordination, timing, and perception-action coupling. For precision skills, boys performed slightly better than girls on short-stick targeting ($M = 103.42$ for boys vs. $M = 102.71$ for girls; $t = 3.17$, $p = .002$), which demonstrates that boys were slightly more accurate in aiming at targets that were stationary. The boys also produced better performance than the girls in dynamic accuracy tasks, such as horizontal throwing with a runway ($p = .013$) and kicking a soccer ball toward a goal with a runway ($M = 6.48$ for boys vs. $M = 5.48$ for girls; $t = 6.24$, $p = .001$),

indicating that boys are better able to perform precision tasks that require a combination of speed and precision of movement than are boys and girls combined due to the effects of motor confidence and practice developed through formal or informal play activities. Conversely, boys and girls displayed similar results on general coordination tasks without manipulating a ball (e.g., figure eight runs and backward obstacle runs), suggesting that boys and girls appear to have comparable levels of basic neuromuscular coordination at this age, with differences emerging only in activities influenced by sport participation.

Discussion

The purpose of the study was to examine if differences exist between male and female 11-year-olds with regard to coordination and precision performance for motor skills, as this is a developmental period where several components of coordination have become solidified while others continue to progress toward functional stabilization. As hypothesized and in agreement with previous research, the findings indicate that there are no uniform differences between the sexes for all motor skills, only a limited number of tasks reflect environmental experience, movement culture and sport participation. No differences were identified in general coordination tasks not requiring the use of a ball, such as the figure eight running and the backward obstacle course. The absence of difference suggests that all boys and girls at age 11 have established a similar level of fundamental neuromuscular coordination as indicated by prior research (Marchenko et al., 2024) establishing all components of coordination reached status quo by age 11. Conversely, positive sex differences were noted on those tasks involving the ability to perform rapidly changing direction as well as those involving applied ball controlling. Male participants demonstrated a greater percentage of increased speed of movement in the agility tasks measured, as well as higher scores for hand and foot dribbling performance on the slalom course than females, likely reflecting the degree of ball-related sporting activity that the male participants engage in on a frequent basis (football and basketball) at this stage of their development in Kosovo. These results are in agreement with those reported in Yassin et al. (2024) and Adriyani et al. (2020).When assessing precision in the current study, results indicated a parallel pattern. While the precision accuracy measures indicated a high level of consistency, the boys achieved a greater amount of improved accuracy on different forms of dynamic accuracy tasks that required both the component of movement rate as well as sequencing (the run-up); thus, the frequency of practised success in precision accuracy combined with the degree of success experienced leads researchers to associate them to a higher degree of coordination. It is important to note that both coordination and precision exhibit generally inverse correlation due to different method of measurement (timed vs. scored) and therefore the correlation exhibited by individual measures of coordination is a stronger predictor of performance on correlational precision tasks; children with higher scores in one category typically experience a significant advantage with respect to tasks that require use of similar categories. Results of the current research study suggest that differences at age 11 years are a result of both biological maturation and, to a greater extent, accumulated experiences within the area of motor movement. The research findings support those of Opstoel et al. (2015) and Biino et al. (2023), who report that exposure to training has a much greater impact on performance differences in middle childhood than does the timing of specialization. Therefore the need for increased emphasis on receiving structured and regular(safe) physical education as well as accessible sporting experiences for both sexes is needed to further develop coordination.

Conclusion

The current findings enable us to see that coordination and precision performances at 11 years have been shown through our analysis to be specific to tasks performed rather than a consistent difference between genders. For example, boys showed superior performance on agility-based exercises as well as ball control measures which likely reflect experiences that boys have had during sporting activities or developing directional change movements than girls, while no sex differences were found on coordination tasks that did not involve balls indicating that both genders were at an equivalent level of neuromuscular maturity for this type of exercise. Differences in precision mainly emerged on dynamic accuracy tests in which boys exhibited a greater level of combined movement speed and target accuracy than did girls. Therefore, there is great evidence of two major influences upon the development of coordination performance (motion experience and sport culture) when we consider coordination outcomes at school age; therefore, schools need to be aware of these factors if they are to promote diversity in motor opportunities for young girls and boys through physical education programs.

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