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A COMPARISON STUDY DURING YEARS IN ALBANIAN CHILDREN WITH REGARDS TO MOTOR COORDINATION ABILITIES

Juel Jarani; Andi Spahi
Sports University of Tirana

Abstract

The age periods before puberty are "considering this ages as a sensitive period for coordination abilities" as a results from a study by Hirtz and Starosta, (2002). The aim of this monitoring study is to find out the actual level of coordination abilities with regard to balance and to compare the level from a period of 10 years (2013 and 2023).
In total during year 2013 were measured N=139 boys and N=150 girls while in 2023 were measured (in Tirana capital city of Albania) N=253 boys and N=257 girls for balance using one from four test battery KTK (balance beam test- balancing backwards) in elementary school children (grade 1 to grade 4).
Final result from this study using independed sample t Test by gender between year 2013 with 2023 show statistical significance results (boys p= 0.000 and girls p=0.004) for boys and girls measured in 2013 year (boys better with 5.9 steps while girls with 4.1 steps). Result from this study using independed sample t Test by grade between year 2013 with 2023 show statistical significance results for third and fourth grade (grade 3 p= 0.000 and grade 4 p=0.004) in favour of measured in 2013 year (grade 3 better with 13.7 steps while girls with 6.8 steps).
In conclusion data comparison from year 2013 with 2023 in children assessing balance show a decline in the performance for a period of 10 years (boys and girls) in third and fourth grade while no statistical differences in first and second grade.
Keywords: children, KTK, balance, steps

Introduction

Obesity is caused by an imbalance between energy input and energy expenditure. This epidemic is rapidly and constantly growing and affects all socioeconomic levels and ethnicities (Ogden et al., 2006). Recent reports from different studies have highlighted the severity of obesity in children by suggesting: "today's generation of children will be the first for over a century for whom life expectancy falls" (Hills et al., 2007). Day by day physical activities in the quintile of the least active children with a total around 30 minutes of moderate to vigorous physical activity, means that the new recommendations constitute more activity in total compared with earlier studies (Andersen et al., 2011). More than 60 minutes of physical activity especially aerobic activities can provide more health benefits. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least 3 times per week in order to

improve cardiorespiratory and muscular fitness, bone health, and cardiovascular and metabolic health biomarkers (WHO, 2010). Welk et al. (2000) reviewed the measuring PA problems among children and concluded that the evidence was not clear which measure were most accurate. The age periods before puberty are "considering this ages as a sensitive period for coordination abilities" as a results from a study by Hirtz and Starosta, (2002). Hirtz, P. (2003) on his study also defined this age group (before puberty) as a golden age for training with regard to coordination and speed. Also after this period the actual level of coordination will affect the success in motor learning. The aim of this monitoring study is to find out the actual level of coordination abilities with regard to balance and to compare the level from a period of 10 years.

Methods

In total during year 2013 were measured N=139 boys and N=150 girls while in 2023 were measured N=253 boys and N=257 girls for balance (in Tirana capital city of Albania) using one from four test battery KTK (balance beam test- balancing backwards) in elementary school children (grade 1 to grade 4).

Gross motor coordination evaluation- To assess gross motor coordination we used Body Coordination Test for Children (KTK) (Kiphard and Schilling, 1974, 2007) using a final score (MQ- motor quotient). It consists of four subtests where each value of a subtest in converted in a motor quotient score. All four values are summed and converted into a final score.

In this study were used balancing backwards test (BB) aiming the steadiness of balance while walking backwards on the bar (dynamic balance). The child walks backwards three times along each of three balance beams (3m length; 6, 4.5 and 3 cm width, respectively; 5 cm height). A maximum of 24 steps (eight per trial) were counted for each balance beam, which comprises a maximum of 72 steps (24 steps, 3 beams) for this test. For this test equipment are required: three balance beams (3m length; 6, 4.5 and 3 cm width, respectively; 5 cm height). Test- Retest reliability coefficient (Jarani 2013); first (r= 0.81) and fourth grade (r= 0.83)

Results

Table 1 shows statistics about participation in the assessment by year and gender.

Table 1 Group Statistics for Balance Beam (raw data) 2013 vs 2023

Gender	Year_Assessment	N	Mean	Std. Deviation	Std. Error Mean
boy	2013	139	38.367	13.3374	1.1313
	2023	253	32.411	14.4449	.9081
girl	2013	150	37.860	12.6899	1.0361
	2023	257	33.739	14.3382	.8944

Data analysis from table 2 statistical analysis show the results for comparison by gender for year 2013 and 2023 measurement for balance beam. Children results for 2013 measurement show for boys 38.4 steps while girls 37.8 steps while for 2023 measurement boys 32.4 steps while girls 33.7 steps.

Table 2 Independent Samples Test for Balance Beam (raw data) 2013 vs 2023

Gender	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
boy	0.895	0.345	4.011	390	**0.000**	5.9558	1.4848	3.0367	8.8750
girl	3.666	0.056	2.916	405	**0.004**	4.1207	1.4133	1.3424	6.8990

Table 3 Group Statistics for Balance Beam (raw data) by grade for year 2013 and 2023

Class	Year Assessment	N	Mean	Std. Deviation	Std. Error Mean
First Grade	2013	93	30.140	9.9996	1.0369
	2023	128	28.672	12.1085	1.0703
Second Grade	2013	52	34.404	12.0493	1.6709
	2023	137	36.109	11.8729	1.0144
Third Grade	2013	54	45.185	12.0001	1.6330
	2023	117	31.453	14.6113	1.3508
Fourth Grade	2013	90	44.222	11.4350	1.2054
	2023	70	37.371	17.7226	2.1183

Data analysis from table 4 statistical analysis show the results for comparison by grade for year 2013 and 2023 measurement for balance beam. Children results for 2013 measurement show for grade 1 = 1.5 steps, grade 2= -1.7 steps, grade 3=13.7 steps and grade 4= 6.8 steps.

Table 4 Independent Samples Test[a] for Balance Beam (raw data) by grade

Class	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
First Grade	4.954	0.027	.956	219	0.340	1.4679	1.5357	-1.5587	4.4945
Second Grade	0.078	0.780	-.878	187	0.381	-1.7056	1.9417	-5.5362	2.1249
Third Grade	9.635	0.002	6.029	169	0.000	13.7322	2.2778	9.2356	18.2288
Fourth Grade	20.088	0.000	2.961	158	0.004	6.8508	2.3139	2.2806	11.4210

Table 5 show results for balance beam by grade level and gender for year 2013 and 2023 mean values.

Table 5 Group Statistics for Balance Beam (raw data) by grade and gender for year 2013 and 2023

Class	Gender	Year Assessment	N	Mean	Std. Deviation	Std. Error Mean
First Grade	boy	2013	42	29.238	10.6010	1.6358
		2023	70	27.629	10.9692	1.3111
	girl	2013	51	30.882	9.5177	1.3327
		2023	58	29.931	13.3441	1.7522
Second Grade	boy	2013	27	35.333	12.4406	2.3942
		2023	66	34.848	12.4903	1.5374
	girl	2013	25	33.400	11.7828	2.3566
		2023	71	37.282	11.2303	1.3328
Third Grade	boy	2013	28	45.607	10.2500	1.9371
		2023	51	30.627	13.5999	1.9044
	girl	2013	26	44.731	13.8349	2.7132
		2023	66	32.091	15.4200	1.8981
Fourth Grade	boy	2013	42	44.619	12.3188	1.9008
		2023	37	38.378	18.8316	3.0959
	girl	2013	48	43.875	10.7221	1.5476
		2023	33	36.242	16.6077	2.8910

Data analysis from table 6 statistical analysis show the results for comparison by grade and gender for year 2013 and 2023 measurement for balance beam

Table 6 Independent Samples Test[a] for Balance Beam (raw data) by grade and gender

Class		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
First Grade	boy	.766	0.383	.761	110	0.448	1.6095	2.1145	-2.5809	5.7999
	girl	5.329	0.023	.423	107	0.673	0.9513	2.2484	-3.5058	5.4085
Second Grade	boy	.015	0.903	.170	91	0.865	0.4848	2.8501	-5.1766	6.1463
	girl	.047	0.829	-1.467	94	0.146	-3.8817	2.6451	-9.1336	1.3703
Third Grade	boy	5.912	0.017	5.084	77	**0.000**	14.9797	2.9466	9.1123	20.8471
	girl	3.097	0.082	3.640	90	**0.000**	12.6399	3.4724	5.7414	19.5383
Fourth Grade	boy	8.428	0.005	1.763	77	0.082	6.2407	3.5407	-.8098	13.2911
	girl	10.768	0.002	2.515	79	**0.014**	7.6326	3.0349	1.5918	13.6734

Discussion

Final result from this study using independed sample t Test by gender between year 2013 with 2023 show statistical significance results (boys p= 0.000 and girls p=0.004) for boys and girls measured in 2013 year (boys better with 5.9 steps while girls with 4.1 steps). Result from this study using independed sample t Test by grade between year 2013 with 2023 show statistical significance results for third and fourth grade (grade 3 p= 0.000 and grade 4 p=0.004) in favour of measured in 2013 year (grade 3 better with 13.7 steps while girls with 6.8 steps).

The results from a study of Martins et al. (2010) showed that girls gross motor coordination increases until 9 years of age and then declined but lower levels compare to boys (Martins et al., 2022). Contrary to girls, boys tend to present a rather stable mean behavior ($p \leq 0.05$) in motor coordination performance. Lopes et al. (2012) and Graf et al. (2004) found that boys outperformed girls at every age group regarding gross motor coordination level ($p \leq 0.05$). During puberty in children a few differences in growth characteristics exist but in terms of physical activity level, motor skills and motor coordination differences between boys and girls are observed (Thomas, 2001).

Vandorpe et al. (2011) findings show that each age group scored significantly better than their 1-year younger counterparts on all four sub tests, with all P-values =0.001. Vandorpe et al. (2011) found that on the balancing backward sub test, mean values revealed girls performing better than boys in all age groups but only in seven old age group this difference was significant ($p \leq 0.01$).

In conclusion in this study data comparison from year 2013 with 2023 in children assessing balance show a decline in the performance for a period of 10 years (boys and girls) in third and fourth grade while no statistical differences in first and second grade.

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