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Relationship between leisure physical activity time and basic motor skill performance in younger school aged children

LUKÁŠ ODRÁŠKA[1], HENRICH KRC[2] , DAJANA DOLNÍKOVÁ[1]

[1]*Department of School Education, Faculty of Education, Trnava University, Trnava, Slovakia*
[2]*Institute of Physical Education and Sports, Faculty of Medicine, Comenius University, Bratislava, Slovakia*

ABSTRACT

The aim of this study was to examine the relationship between leisure physical activity time and basic motor skill performance in younger school age children. Relationship between leisure physical activity time and basic motor skill performance was assessed using the Spearman correlation coefficient. We assessed the observed relationship for basic motor skill tests (standing broad jump, 10-meter agility shuttle run, sit and reach flexibility test, 30-second sit-up test) and leisure physical activity time. The monitored group consisted of 91 children, 45 boys and 46 girls (age 8.37 ± 1.63). In the monitored tests, we observed a statistically significant relationship between leisure physical activity time and basic motor skill performance. The correlation for monitored tests was: 1. Standing board jump: R = .664. 2. 10-meter agility shuttle run: R = -.695. 3. Sit and reach flexibility test: R = .737. 4. 30-second sit-up test: R = .636. The results of our research point to an existing relationship between leisure physical activity time and basic motor skill performance. It should be noted that this is a low number of probands to formulate general conclusions. However, further scientific verification is required for these claims.
Keywords: Leisure time; Children; Motor skills.

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Corresponding author. *Institute of Physical Education and Sports, Faculty of Medicine, Comenius University, Bratislava, Slovakia.*
E-mail: henrich.krc@fmed.uniba.sk
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INTRODUCTION

Leisure physical activity (LPA) is according to Kotz, et. Al (2017) a physical activity not motivated by a rewarding goal, such as that associated with food-seeking or wheel-running behaviour. LPA is often thought of as only "*fidgeting*," but that is a mischaracterization, since fidgety behaviour can be linked to stereotypes in neurodegenerative disease and other movement disorders. Instead, LPA should be thought of as all physical activity behaviour that emanates from an unconscious drive for movement.

Regular participation in physical activity is important for overall health. It provides children with immediate social, mental and physical health benefits (Boreham and Riddoch, 2010), such as reducing symptoms of depression, improving academic and cognitive performance, promoting healthy bone structure, skeletal health supporting muscle growth and the development of the body's vital organs, particularly the heart and lungs, improving health related fitness, muscular strength and, preventing children from becoming overweight (Hoare, et. Al. 2013; Fedewa and Ahn, 2011; Boreham and McKay, 2011; Saris, et al. 2003; Gunter, et al. 2012).

Canadian 24-Hour Movement Guidelines for Children and Youth (ages 5-17 years) recommends an accumulation of at least 60 minutes per day of moderate to vigorous physical activity involving a variety of aerobic activities. Vigorous physical activities, and muscle and bone strengthening activities should each be incorporated at least 3 days per week. Several hours of a variety of structured and unstructured light physical activities and no more than 2 hours per day of recreational screen time (Canadian Society for Exercise Physiology, 2021). Similar recommendations we can find in UK Chief Medical Officers' Physical Activity Guidelines. Children and young people (5-18 years) should engage in moderate-to-vigorous intensity physical activity for an average of at least 60 minutes per day throughout the week. This can include all forms of activity such as physical education, active travel, after-school activities, and play and sports. Children and young people should engage in a variety of types and intensities of physical activity throughout the week to develop movement skills, muscular fitness, and bone strength. Children and young people should aim to minimise the amount of time spent being sedentary, and when physically possible should break up long periods of not moving with at least light physical activity (Department of Health and Social Care, 2019). Physical activity guidelines for Slovak children and youth (6-18 year.) recommends 90 min of moderate intensity or 60 min of moderate to vigorous intensity. Physical activities could be split and cumulated. Active movement should be partly performed in schools as a subject of physical and sports education, organized in clubs and as spontaneous physical activity during free time (Bielik, et al. 2017).

According to Vitáriušová, et al. (2009) Slovak children spent almost all of their afternoon time until the evening doing sedentary activities (watching television, playing on a computer, learning). Recent studies (Zapletalová, et al., 2011; Sulovský & Bielik, 2017; Medeková, 2009) show that the physical performance of today's school population is deteriorating. Many students in sports classes are currently at a level of certain fitness similar to those who were not included in organized sports in the past, only spending their free time in spontaneous physical activities.

Leisure is one of the important occupational areas in which children participate. Studies have shown that children spend 30% of their day in leisure activities (Jarus, et al.,2010). These activities are defined as non-obligatory, intrinsically motivating and performed during discretionary time (Roley, et al., 2008). Participation in leisure activities may vary according to the type of activities and the level of physical activeness the activity requires ,i.e., vigorous, moderate or sedentary (Lifshitz et al., 2011; Ziviani, Scott & Wadley, 2004). Vigorous-level activities (that entail high levels of activeness) may include ball games or swimming, which require gross

motor skills such as balance and coordination (Kioumourtzoglou, Derri, Tzetzis & Theodorakis,1998). Moderate-level activities, such as artwork or playing musical instruments, require mostly fine motor skills. Sedentary activities, such as playing on the computer or watching television, require little physical exercise and are normally performed while sitting. These activities may vary with respect to the type of motor skills they entail, mostly fine-motor skills (Biddle, Marshall, Gorely & Cameron, 2009).

Temple, et al. (2014) concluded that locomotor skill scores were associated with participation in physical activities and active physical recreation, but not organized sport. There were no significant correlations between participation in more active pastimes and object control skills or stork stand times for the group as a whole. However, examination of the relationships between motor skills and participation for boys and girls separately, revealed stark differences. There were no significant relationships for girls at all, but for boys, participation in physical activities was associated with both locomotor and object control skill proficiency, participation in active physical recreation was associated with locomotor skill proficiency, and participation in organized sports was associated with static balance and object control skills. Regression analyses further revealed that participation in physical activities and organized sport predicted boys' object control proficiency, Organized Sport predicted boys' static balance, and participation in physical activities predicted the locomotor proficiency of boys. For the reverse pathway, locomotor skill scores predicted participation in physical activities. These findings support theories that suggests physical activity drives the development of motor skill proficiency among young children (Stodden et al., 2008).

METHODS

The sample consisted of 91 children, 45 boys and 46 girls (age 8.37 ± 1.63).

Measures

We put into the relationship the time that children spend with leisure physical activity per day and the achieved performance in selected motor tests. The method of obtaining data on the time that children spend with leisure physical activity, was a questionnaire. Due to the fact that the research was carried out on minors, parents (as legal guardians) of individual children were asked to fill in the questionnaire. The question was how much time does your child spend on leisure physical activities per day. The possibilities were 0-1 hour/day; 1-2 hour/day; 2-3 hour/day; 4≤ hour/day. We determined the physical performance of children using the following motor tests:

1. Standing broad jump [cm]

Reliability - ICC = 0.913 (Román, et al. 2015)

2. 10-meter agility shuttle run [sec]

Reliability - ICC = 0.947 (Patki et al. 2015)

3. Sit and reach flexibility test [cm]

Reliability – ICC = 0.964 (Patki et al. 2015)

4. 30-second sit-up test [n]

Reliability – ICC = 0.93 (Augustsson, 2009)

Written informed consent was obtained from each child's primary guardian prior to collection of data.

Analysis

To assess the relationship between performance in the motor tests and the leisure physical activity time, we used the mathematical-statistical program IBM SPSS 23 and the nonparametric Spearman correlation coefficient for the ranking data.

RESULTS

Time of leisure physical activity per day is summarized in Figure 1. Number of children engaged in leisure physical activity for less than an hour per day was 24, between 1 to 2 hours 26, between 3 to 4 hours 34 and more than 4 hours 7 children.

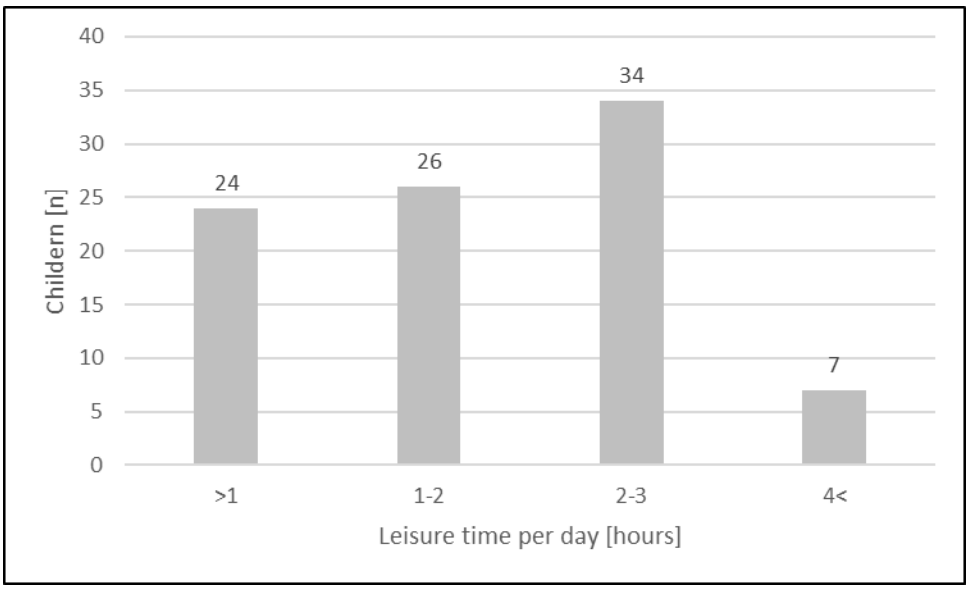

Figure 1. Number of children and time they spent with leisure physical activity per day.

Due to the lack of data, we divided the average results from the individual tests into groups of less than 2 hours and more than 2 hours of leisure physical activity per day. The results are shown presented in Tables 1 to 4.

Table 1. Obtain results in standing broad jump.

Age	Number	PA > 2h	PA < 2h	PA > 2h	Difference Avg		PA < 2h
	[n]	[n]	[n]	Avg [cm]			Avg [cm]
7 years	26	13	13	140	27.24 cm	28.24%	112.76
8 years	24	11	13	141.54	22.7 cm	23.70%	118.84
9 years	22	9	13	151.44	18.37 cm	19.37%	133.07
10 years	19	8	11	150.75	17.03 cm	18.03%	133.72
Sum	91	41	50	145.9325	21.335 cm	22.34%	124.5975

Table 2. Obtain results 10-meter agility shuttle run.

Age	Number	PA > 2h	PA < 2h	PA > 2h	Difference Avg		PA < 2h
	[n]	[n]	[n]	Avg [sec]			Avg [sec]
7 years	26	13	13	12.84	2.51 s	1.51%	15.35
8 years	24	11	13	12.97	2.34 s	1.34%	15.31
9 years	22	9	13	12.87	1.28 s	0.28%	14.15
10 years	19	8	11	12.58	1.88 s	0.88%	14.46
Sum	91	41	50	12.815	2.0025 s	1.00%	14.8175

Table 3. Obtain results in sit and reach flexibility test.

Age	Number	PA > 2h	PA < 2h	PA > 2h	Difference Avg		PA < 2h
	[n]	[n]	[n]	Avg [cm]			Avg [cm]
7 years	26	13	13	7.15	3.69 cm	4.69%	3.46
8 years	24	11	13	8	4.85 cm	5.85%	3.15
9 years	22	9	13	8.89	4.2 cm	5.20%	4.69
10 years	19	8	11	9.38	5.02 cm	6.02%	4.36
Sum	91	41	50	8.355	4.44 cm	5.44%	3.915

Table 4. Obtain results in 30-second sit-up test.

Age	Number	PA > 2h	PA < 2h	PA > 2h	Difference Avg		PA < 2h
	[n]	[n]	[n]	Avg [n]			Avg [n]
7 years	26	13	13	20.154	6 rep.	7%	14.154
8 years	24	11	13	20.636	5.48 rep.	6.48%	15.153
9 years	22	9	13	22.889	5.5 rep.	6.50%	17.385
10 years	19	8	11	25.125	8.21 rep.	5.24%	16.909
Sum	91	41	50	22.2	6.3 rep.	6.30%	15.9

The following findings can be read from Tables 1 – 4:

In the monitored tests we recorded higher values in the group of children who spent more than 2 hours per day on leisure physical activity compared to the group who spent less than 2 hours per day on leisure physical activity. The average percentage difference was:

1. Standing broad jump – 22.335 %.
2. 10-meter agility shuttle run – 1.0025 %.
3. Sit and reach flexibility test – 5.44 %.
4. 30-second sit-up test – 6.3 %.

In the monitored tests, we recorded a statistically significant relationship between leisure physical activity time and basic motor skill performance (Table 5).

Table 5. Relationship between leisure physical activity time and basic motor skill performance.

		Leisure physical activity [hours]	Test 1. Standing broad jump [cm]	Test 2. 10-meter agility shuttle run [sec]	Test 3. Sit and reach flexibility test [cm]	Test 4. 30-second sit-up test [n]
Leisure physical activity [hours]	Pearson Correlation	1	.664**	-.695**	.737**	.636**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	91	91	91	91	91

*Note. ** Correlation is significant at the .01 level (2-tailed).*

DISCUSSION

The results showed that we confirmed a statistically significant relationship between leisure physical activity time and basic motor skill performance. Stodden et. al. (2008) points to indirect relationships in which fundamental movement skills indirectly, via perceptions of physical competence affect participation in active recreation and physical activity. Southall, Okely, and Steele (2004) assessed the relationship between

perceived motor skill competence and actual motor competence in fifth- and sixth grade (mean age = 10.8 years) overweight and no overweight children. They reported that overweight children had significantly lower actual and perceived motor skill competence than no overweight children. Physical activity was not measured in this study; however, based on previous literature, we would expect the overweight children to be less active than their no overweight counterparts. There is evidence of a positive relationship between motor proficiency, particularly between object control proficiency and accelerometer measured physical activity (Wrotniak, et al., 2006; Barnett, et al., 2009; Crane, et al., 2015) however, there is less evidence of relationships between types of physical activities and motor proficiency. Two related studies, one study with children in kindergarten (Temple, et al., 2016) and one with grade 2 students (Mirjafari, 2015), using the same tools (TGMD-2 and CAPE) and students from the same schools, suggest that the relationship between motor skill proficiency and participation in physical activities may be different for boys and girls as they age. In kindergarten, Temple, et al.,(2016) found that boys object control proficiency was modestly but significantly, positively associated with participation in organized sports and locomotor skills were modestly positively associated with participation in active physical recreation. These relationships were very similar for the boys in grade 2, with the addition of a significant positive relationship between the boys' object control skills and participation in active physical recreation (Mirjafari, 2015). For girls, however, there were no significant relationships between object control skills or locomotor skills and any sport or recreation categories in kindergarten (Temple, et al., 2016). In grade 2 there was a weak significant positive relationship between girls' object control skills and participation in active physical recreation, but locomotor skill proficiency was not related to any physical activities, and neither object control skills nor locomotor skills were associated with the frequency of girls' participation in organized sports (Mirjafari, 2015).

Our findings support the results of Wrotniak et al. (2006) according to which there is positively associated between motor proficiency and physical activity and inversely associated with sedentary activity in children. Authors in their study also concluded that there may be a threshold of motor proficiency above which children may be the most physically active.

CONCLUSIONS

Relationship between leisure physical activity time and basic motor skill performance in younger school age children was assessed using the Spearman correlation coefficient. We assessed the observed relationship for basic motor skill tests (standing broad jump, 10-meter agility shuttle run, sit and reach flexibility test, 30-second sit-up test) and leisure physical activity time. The monitored group consisted of 91 children, 45 boys and 46 girls (age 8.37 ± 1.63).

In the monitored tests, we observed a statistically significant relationship between leisure physical activity time and basic motor skill performance. The correlation for monitored tests was: 1. Standing board jump: R = .664. 2. 10-meter agility shuttle run: R = -.695. 3. Sit and reach flexibility test: R = .737. 4. 30-second sit-up test: R = .636.

The results of our research point to an existing relationship between leisure physical activity time and basic motor skill performance. It should be noted that this is a low number of probands to formulate general conclusions. However, further scientific verification is required for these claims.

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