Fundamental movement skills and physical activity recommendations for preschool children

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Abstract

Problem statement: Although the evidence indicates that fundamental movement skills (FMS) are the building blocks to master complex and specific movements, are a component of physical development as well as a key prerequisite to develop adequate physical activity levels (PAL), this relationship remains underexplored in preschoolers. **Purpose:** To analyze the association between FMS and PAL identifying differences by age as well as determining which skills have the greatest influence on preschool children complying with the World Health Organization (WHO) PA Guidelines. The sample included 95 preschoolers (59 boys) aged 4 to 6 years (5.5 ± 0.6 years) participating in a national program implemented by the Chilean Sports Ministry. FMS were measured using the TGMD (2nd edition); we considered the raw assessment scores and converted them into percentiles, while PAL, was assessed objectively using a triaxial accelerometer ActiGraph GT3X and Actilife-6 software. Moderate and vigorous physical activity was dichotomized into active (≥ 60 min/d) or inactive (≤ 60 min/d). Logistic regressions were used to determine associations among variables by age, adjusting by sex, nutritional status and time spent in sedentary behavior. Analysis of FMS scores and minutes spent at each PAL determined which skills had the greatest impact on children being active, at $p \leq 0.05$, using Stata 15 software. **Results** No associations among subscales for locomotor skills and PAL were found ($p=0.662$), object control ($p=0.264$), or total score ($p=0.704$); however, FMS was associated with age. Preschoolers aged 5 and older who engaged in ≥ 60 minutes of moderate to vigorous physical activity (MVPA) showed higher FMS, particularly in object control. **Conclusion** This study found no significant association between FMS and PAL in preschoolers, however a positive association was observed between FMS with age. Our study also supports the importance that FMS have for preschoolers in achieving WHO's guidelines for PA. Specifically, object control development at 5 years old may be key in obtaining a greater PAL.

Key words: Motor Activity, Preschool Child, Motor Skills, Object Control, Locomotor Skills.

Introduction

Fundamental movement skills (FMS) are a component of physical development and a key factor in promoting healthy and active lifestyles throughout life (Goodway et al., 2019). Which provide a unique opportunity to increase physical activity (PA) time and decrease sedentary time, positively impacting cognitive development and health indicators such as adiposity, skeletal and cardiometabolic health (World Health Organization 2019).

The FMS are the basic components necessary to master complex and specific movements, allowing participation in sport, dance, and other motor activities, classified into three subcategories: locomotion skills (eg, galloping and running), object control skills also known as manipulation (eg, catching and throwing) and finally stability ability (eg, one-foot balance and inverted postures) (Goodway et al., 2019). Its development occurs during early childhood, specifically between 3 to 5 years, and the participation of activities of moderate to vigorous intensity contributes to its development (Figuerola & An, 2017), therefore it seems to be that the FMS are potentiated by adequate levels of PA, as well as, the FMS allows a greater physical activity level (PAL), manifesting a reciprocal (Hulteen et al., 2018) and dynamic (Stodden et al., 2008) relationship.

In recent decades, FMS have received significant attention as an important correlate for PA (Dobell et al., 2020), being considered as keys to achieve and maintain adequate PAL throughout life (World Health Organization 2019). However, only a few studies have examined the relationship between FMS and PA in preschool age with varying results. Where preschoolers with greater development of FMS, spend significantly more time in moderate to vigorous PA (MVPA), while those with less FMS seem to be less physically active at

an early age, evidence that competence in FMS is positively associated with being more active in childhood and adolescence (Nilsen et al., 2019; Jaakkola et al., 2018).

When analyzing the association of two of the three subcategories of FMS with PAL in preschoolers and its effect in adolescence, it was found that the control of objects between 3 and 6 years could play an essential role over the skills of locomotion (Xin et al., 2020). However, when analyzing the relationship between the FMS subcategories with PAL, it was found that in preschool age the findings are inconsistent (Schmutz et al., 2020), even conflicting (Kain et al., 2018), especially with respect to the degree and direction of the association (Matarma et al., 2018; Xin et al., 2020). Therefore, the objective of this study was to analyze the association between FMS and PAL, identifying differences according to age and, as well as what is the most developed skill in those who meet the PA recommendations.

Materials & Methods

Study and participant design

This cross-sectional study – registered in Clinicaltrials.gov, number NCT.04269135 – was conducted from August to December, 2018, and included preschoolers from *Valparaíso* and *Viña del Mar*, Chile who were part of the national program *Jugar y Aprender* [Play and Learn]. This program is implemented by the Chilean Ministry of Sport initiative, “*Crece en Movimiento*” [Grow in Movement] – and has been in place since 2014. It consists of structured physical education classes carried out by Physical Education teachers (PE) twice a week for seven months of the school year (Kain et al., 2018).

Of the 70 schools registered in “Play and Learn”, six were invited to participate in the study. Incidental sampling resulted in 95 preschoolers (59 boys and 36 girls), 4 to 6 years of age (5.56 ± 0.61 years). Preschoolers and their parents and/or legal guardians expressed their willingness to participate through informed consent.

This study was approved by the Ethics and Human Research Committee of the Institute of Nutrition and Food Technology (INTA) of the University of Chile (registry 9-2019), prepared in accordance with the Helsinki Declaration (1961) and the current Chilean legal regulations (DL 20.120).

Procedure

Fundamental movement skills

The Test of Gross Motor Development-2 (TGMD-2) (Ulrich, 2000) has been shown to evaluate FMS with adequate validity and reliability for US populations, with values of $r=0.88$ for test-retest, and 0.98 for inter-rater reliability. It has further been validated in several countries, such as Brazil (Valentini, 2012) and Chile (Cano-Cappellacci et al., 2015).

Developed for children aged 3 to 10 years, the rating scales are established for 12 FMS across two subscales in 6-month ranges: 6 locomotor skills (running, galloping, hopping on one foot, leaping over an object, horizontal jumping, and sliding) and 6 object control skills (striking a stationary ball, stationary dribbling, catching, hitting, overhand throwing, and underhand rolling) (Ulrich, 2000).

Each skill has three to five standardized criteria, scored with a “1” if performed correctly and “0” otherwise. The test provides a standard score for each subscale, and the score for each subscale is summed to obtain a total score (locomotor skills + object control scores). Although the TGMD-2 has seven levels of performance, this study considered the raw assessment scores and converted them to percentiles, i.e., calculated as greater than or equal to the 50th percentile ($\geq p50$) for skills at or above the median of the sample; and, conversely, below the 50th percentile ($< p50$) for poor skills.

The children completed the TGMD-2 in groups of eight in a space for sports practice. Each evaluation lasted about 40 minutes. A PE teacher showed the correct technique, without indicating which skill criteria were being assessed. Participants were assessed individually by a trained researcher and accompanied by the school teacher. There was no feedback on test performance, only motivational encouragement. Each child performed the test twice.

Physical Activity

The physical activity level (PAL) of the children was assessed objectively using a triaxial accelerometer (ActiGraph model GT3X, Florida), previously validated to measure PA in preschool children (Bornstein et al., 2011). The accelerometer was used for seven consecutive days, and was removed for sleeping (at night) and activities in contact with water. The accelerometers were set at a frequency of 100 Hz and epoch duration of 15 seconds. The accelerometer was placed in the right hip area over the iliac crest with an adjustable elastic strap (Calahorra et al., 2015). The trained researchers placed the devices in the company of the school teacher. A parent and/or legal guardian was provided with verbal and written information on the correct use, care and position of the monitor. In addition, during the seven consecutive days, they were reminded by messaging of the correct installation of the accelerometer.

Once the device was removed, the data was analyzed using Actilife-6 software (ActiGraph, USA). Records that contained at least 3 weekdays and one weekend day with at least 8 hours (Migueles et al., 2017) were included in the study. PAL was estimated using the cut-off points proposed by Butte et al. (2014). Light

intensity PA was defined as 240 to 2119 counts per minute; moderate, as 2120 counts per minute; moderate to vigorous, as 2120 counts per minute to 4449 counts per minute; and vigorous, as ≥ 4450 counts per minute. Sedentary behavior time - defined as minutes that children remained awake in sitting, lying, or reclining positions - was estimated using the cutoff point of ≤ 239 counts per minute (Tremblay et al., 2017). To explore which skill had the greatest impact on preschooler being active, MVPA was dichotomized (active ≥ 60 min/d or inactive ≤ 60 min/d) in line with the WHO recommendation (2019 and 2020).

Anthropometry

Trained research staff measured height of participants (centimeters) using a portable altimeter (Seca brand, model 213); and weight (kilograms), using a digital scale (Seca, model 813). Height was measured twice, and in case of discrepancy of more than 0.05 cm for height and 0.05 kg for weight, was measured a second time. These measurements were performed according to the Technical Standard for the monitoring of children aged 0-9 years in Primary Health Care (Ministry of Health, 2014). BMI Z score was calculated to classify the nutritional status according to the WHO reference (2007).

Statistical analysis

Stata 15 statistical software (Stata Corporation, College Station, USA) analyzed data at *a priori* significance level set at $p \leq 0.05$. Prior to analysis, the data were explored to determine normality with the Shapiro-Wilk test. Homogeneity of variance was confirmed with Levene's test. Continuous variables were described as mean and standard deviation. The sample was characterized by sex and age using Student's t-tests and ANOVA, for normally distributed data; and Mann-Whitney U and Kruskal-Wallis, for non-normally distributed data.

The degree of association between FMS and PAL was analyzed with a logistic regression in which FMS was the dependent variable; age, PA and time in sedentary behavior the independent ones, adjusting by nutritional status and sex. The Hosmer-Lemeshow test determined goodness of fit.

Results

Table 1 shows the descriptive characteristics of the study participants. No differences were observed by sex in the anthropometric parameters; however, differences by age were observed.

Analysis of FMS and PA are shown in Table 2, where no association is evident between locomotor skills ($p=0.662$), object control ($p=0.264$) and total FMS score ($p=0.704$) with PAL, adjusted for sex, age, nutritional status and time of sedentary behavior. The generated model shows that age (6 years) explained results obtained for object control skills ($p=0.001$), as well as for total FMS score ($p=0.004$). However, only age (5 years) explains object control skills ($p=0.017$).

Table 1. Description of the general characteristics of the sample.

	SEX			p	AGE			p
	All (n=95)	Boys (n=59)	Girls (n=36)		4 y (n=16)	5 y (n=48)	6 y (n=31)	
Age (years) ²	5.50 (5.10-6.10)	5.50 (5.00-6.10)	5.50 (5.20-6.27)	0.551	4.70 (4.70-4.80)	5.30 (5.20-5.60)	6.30 (6.10-6.50)	0.000*
Weight (kg) ²	21.05 (18.90-23.45)	21.10 (18.80-23.70)	20.82 (19.11-23.33)	0.842	18.85 (17.74-19.39)	21.07 (17.92-23.56)	23.10 (20.75-26.25)	< 0.001*
Height (cm) ¹	112.12 $\pm$ 5.98	111.74 $\pm$ 5.80	112.76 $\pm$ 6.29	0.422	104.65 $\pm$ 3.71	111.31 $\pm$ 4.44	117.25 $\pm$ 4.05	< 0.001*
Nutritional Status	45 (47.4%)	26 (44.1%)	19 (52.8%)		5 (31.3%)	24 (50%)	16 (51.5%)	
Normal Weight ³	30 (31.6%)	17 (28.8%)	13 (36.1%)		8 (50.0%)	14 (29.2%)	8 (25.8%)	
Overweight ³	20 (21.1%)	16 (27.1%)	4 (11.1%)		3 (18.8%)	10 (20.8%)	7 (22.6%)	
Obese ³								

Note. ¹ Average $\pm$ standard deviation, Student's T-test and ANOVA; ² Median, (25 and 75 percentiles), U-tests, Mann-Whitney and Kruskal-Wallis; ³ N. Participants

Table 2. Association of fundamental movement skills with PA, sex, age, nutritional status and sedentary behavior

Predicting variable	Locomotor skills			Object Control			FMS total		
	Adj. OR	95% CI	P> z	Adj. OR	95% CI	P> z	Adj. OR	95% CI	P> z
Model:									
PA	1.220	0.499-2.986	0.662	1.704	0.668-4.345	0.264	0.828	0.314-2.185	0.704
Sex	0.749	0.309-1.819	0.524	0.842	0.327-2.165	0.721	0.663	0.254-1.730	0.402
Age									
5	1.215	0.368-4.009	0.749	5.978	1.382-25.853	0.017*	2.229	0.676-7.769	0.183
6	2.470	0.628-9.721	0.196	14.66	2.838-75.818	0.001*	9.989	2.114-47.187	0.004*
NS	0.526	0.222-1.243	0.144	0.480	0.189-1.220	0.123	0.480	0.189-1.220	0.123
Sedentary	0.716	0.305-1.680	0.443	0.616	0.246-1.543	0.301	0.821	0.328-2.055	0.675
Hosmer-Lemeshow		0.325			0.924			0.540	

Note. Logistic regression; Hosmer-Lemeshow: goodness of fit for logistic regression models; OR: Odds Ratio; 95 % CI: 95 % Confidence Interval; FMS: fundamental movement skills; PA: physical activity; NS: nutritional status; * $p \leq 0.05$

Table 3 shows PAL according to FMS categorization by age, considering FMS categories $\geq p50$ and $< p50$ for the TGMD-2 test and minutes of PA at each level. Preschoolers aged 5 and 6 years in $\geq p50$ category for locomotor skills, object control and total FMS spent more time in light, moderate, vigorous and moderate to vigorous PA compared to preschoolers in the $< p50$ category. At 4 years, this pattern was not observed. Boys and girls in the $\geq p50$ category of the object control subscale showed more time in MVPA. Preschoolers aged 4 years, regardless of their FMS score and in light of the PA recommendations for this age group, exceeded 180 minutes of PA of light to vigorous PA intensity; however, when analyzing only the sum of MVPA, they did not reach 60 minutes per day. The 5-year age group at $\geq p50$ reached the recommendations. However, at 6 years of age, all preschoolers reached the WHO recommendation for MVPA, regardless of their FMS score.

Table 4 shows the time (in minutes) of PA by sex and age. Minutes of PA in which preschoolers participated in light PA were 220.94 ± 62.71 per day, including 50.75 (41.25-67.50) of moderate PA; 8.75 (6.0-15.00) of vigorous PA; and 62.25 (59.75-80.75) of MVPA. No differences were observed by sex (Table 4). Boys aged 6 years engaged in more moderate PA, vigorous PA, and MVPA than girls the 4 year-olds spent more time in sedentary behavior and light PA. No differences were observed by age (Table 4).

Table 3. PA level according to FMS categorization by age.

FMS	Sedentary		Light		Moderate		Vigorous		MVPA	
PAL	M $\pm$ SD	p	M $\pm$ SD	p	M $\pm$ SD	p	M $\pm$ SD	p	M $\pm$ SD	p
4 years (16)										
Locomotor skills	358.78	0.558	239.53	0.215	49.62 $\pm$	0.595	6.75	0.694	56.37	0.567
<p50	± 111.5		± 65.73		14.01		± 3.07		± 14.05	
$\geq p50$	324.5		200.15		46.03		6.18		52.21	
	± 117.14		± 55.22		± 12.39		± 2.50		± 14.32	
Object control	337.40	0.764	219.53	0.969	47.44	0.813	6.11	0.296	53.55	0.672
<p50	± 110.11		± 65.61		± 14.05		± 2.83		± 14.92	
$\geq p50$	360		221.16		49.5 $\pm$ 7.70		8 $\pm$ 1.75		57.5	
	± 143.25		± 55.38						± 9.41	
FMS total	339.33	0.929	229.47	0.500	50.69	0.330	6.83	0.562	57.52	0.306
<p50	± 119.50		± 68.49		± 13.49		± 2.88		± 13.59	
$\geq p50$	344.60		207.46		44.14		6 $\pm$ 2.64		50.14	
	± 110.61		± 55.31		± 12.07				± 14.11	
5 years (48)										
Locomotor skills	355.52	0.322	222.59	0.303	50.89	0.670	9.03	0.159	59.92	0.474
<p50	± 143.26		± 77.10		± 23.61		± 6.48		± 27.64	
$\geq p50$	321.13		202.98		53.96		12.6		66.56	
	± 91.28		± 52.08		± 25.86		± 10.20		± 35.29	
Object control	337.82	0.990	225.93	0.189	49.19	0.398	8.78	0.125	57.97	0.282
<p50	± 121.62		± 66.76		± 19.31		± 5.72		± 23.20	
$\geq p50$	337.42		200.91		55.27		12.67		67.95	
	± 119.18		± 63.05		± 28.39		± 10.40		± 37.28	

FMS total										
<p50	336.96	0.975	223.1	0.341	48.35	0.329	8.77	0.157	57.12	0.252
≥ p50	± 127.89		± 78.79		± 22.11		± 6.09		± 26.08	
	338.07		204.72		55.44		12.40		67.84	
	± 114.65		± 53.95		± 26.20		± 10.03		± 34.94	
6 years (31)										
Locomotor skills	321.37	0.775	227.52	0.640	67.42	0.845	14.42	0.726	81.85	0.804
<p50	± 126.67		± 55.59		± 27.93		± 9.57		± 36.87	
≥ p50	333.01		238.22		65.47		13.11		78.59	
	± 93.67		± 60.56		± 24.76		± 9.63		± 32.58	
Object control	382.09	0.093	246 ± 47.51	0.536	61.96	0.600	13.59	0.985	75.56	0.695
<p50	± 133.87		230.86		± 17.44		± 9.82		± 26.48	
≥ p50	310.88		± 62.07		67.54		13.52		81.06	
	± 86.67				± 27.79		± 9.57		± 35.96	
FMS total										
<p50	354.75	0.556	250.35	0.523	67.1	0.925	12.95	0.882	80.05	0.977
≥ p50	± 163.55		± 52.02		± 12.65		± 7.17		± 19.73	
	324.35		231.77		65.91		13.65		79.56	
	± 91.64		± 59.89		± 27.32		± 9.96		± 35.77	

Nota. *T* test; mean ± standard deviation; FMS: fundamental movement skills; PA: physical activity; MVPA: moderate to vigorous physical activity; < p50: below the 50th percentile; ≥ p50: above the 50th percentile; p ≤ 0.05

Table 4. Time (minutes) of Physical Activity by sex and age.

Physical Activity Level	Sex			<i>p</i>	Age			<i>p</i>
	All (n=95)	Boys (n=59)	Girls (n=36)		4 y (n=16)	5 y (n=48)	6 y (n=31)	
Sedentary ² (min/day)	322 (245 – 399)	311 (241.50 – 398)	341.38 (248.81 – 432.25)	0.392	296.50 (251.50 – 444.25)	319.87 (246.18 – 395.25)	329.75 (229.75 – 402.00)	0.964
Light ¹ (min/day)	220.94 ± 62.71	218.07 ± 63.72	225.65 ± 61.62	0.570	221.62 ± 62.07	212.38 ± 65.31	234.77 ± 58.29	0.303
Moderate ² (min/day)	50.75 (41.25 – 67.50)	52.00 (42.00 – 67.50)	50.75 (41.25 – 68.87)	0.673	49.62 (39.68 – 55.06)	48.25 (37.68 – 62.75)	66.00 (47.75 – 81.25)	0.008
Vigorous ² (min/day)	8.75 (6.00 – 15.00)	9.75 (6.75 – 15.75)	7.50 (4.81 – 12.87)	0.117	7.12 (3.62 – 8.50)	9.50 (4.56 – 15.00)	9.75 (7.00 – 18.50)	0.021
MVPA ² (min/day)	62.25 (59.75 – 80.75)	64.25 (49.75 – 82.25)	58.87 (48.18 – 77.75)	0.394	57.12 (45.56 – 64.18)	59.87 (44.06 – 77.18)	74.50 (56.50 – 100.25)	0.009

Note: ¹ Mean ± standard deviation, Student's *t*-test and ANOVA; ² Median, (25th and 75th percentile), Mann-Whitney U-test and Kruskal-Wallis; MVPA: moderate to vigorous physical activity; p ≤ 0.05.

Discussion

The aim of this study was to analyze the association between FMS and PAL in preschoolers, categorized by age and skill development in those who comply with the WHO PA Guidelines

No association was observed between these variables; however, an association of FMS with age was found. These results are consistent with previous studies observing that the relationship between FMS with PA is weak in early childhood (3-5 years) (Schmutz et al., 2020) and moderate in middle to late childhood (6-12 years) (Engel et al., 2018; Hulteen et al., 2018; Stodden et al., 2008); i.e., this relationship strengthens as children age (Goodway et al., 2019; Stodden et al., 2008). In addition, no association between FMS with PA in children aged 5 and 6 has been found (Matarma et al., 2018). Nevertheless, most studies differ with our results observing associations between FMS with vigorous PA and MVPA (Nilsen et al., 2019; Xin et al., 2020), although the findings cannot establish causality of such associations. Nilsen et al. (2019) considered all categories of PA intensity for data analysis, which may explain the differences with our study, along with other factors, such as

preschoolers' predisposition or early experiences (Barnett et al., 2019), as these has been shown to be fundamental building blocks for the development of motor skills later (Goodway et al., 2019).

In the first years of life, the influence of FMS on PAL is inconsistent (Alves et al., 2021). Our findings suggest that, after 5 years of age, higher FMS performance may be related to more (minutes) of MVPA. This confirms that, between 3 and 5 years, FMS is usually at the initial stages of development, and that, by around 7 to 9 years, these should be in more mature stages of development; i.e., the older a child, the better the performance in the different skills (Goodway et al., 2019).

In relation to object control subscale percentiles, 5- and 6-year-old preschoolers perform greater intensity locomotor activities, and therefore achieve more MVPA. Despite not reaching the significance threshold in the object control test, children over the 50 th percentile comply with the WHO recommendations (2019 and 2020). The difference in MVPA time categorizes active versus inactive, and so it is a clinically relevant confirmation (WHO, 2020). An adequate level of FMS is necessary to move and control the body to allow participation in physically active play (Goodway et al., 2019; Stodden et al., 2008). Our results are in line with evidence suggesting that age may be an important factor in elucidating the nature of the relationship between FMS and PA (Schmutz et al., 2020).

Our findings demonstrated that children with high levels of object control spend more time in MVPA, which is similar to previous studies that relied on TGMD-2 and accelerometers. These showed that that object control skills - but not locomotor skills - was significantly associated with PA (Capio & Eguia, 2021). There is strong evidence in the literature to support a low to moderate positive association between object control and MVPA (Xin et al., 2020). Our data suggest that adequate object control skills may be an important element in increasing higher-intensity PA, because the development of object control during childhood is an important predictor of PA during adolescence (Sallen et al., 2020). Therefore, it is essential to intervene at preschool age with structured programs preferentially focused on object control skills to prevent decreases in MVPA and organized PA during adolescence.

It is important to note that our participants were beneficiaries of the "Play and Learn" component of a program, which considers 180 minutes of structured PA per week led by a professional. This may explain the object control skill performance as previous studies have shown improvements in object control after PE interventions in children (Lee et al., 2020), especially when children are directly instructed by professionals (e.g., PE teachers) (Engel et al., 2018).

Our results show that, although boys were more active than girls and that PA increases with age, children spend a significant time in sedentary behaviors or light PA, which is similar to previous evidence (Nilsen et al., 2019). In Chile, previous studies using accelerometer have shown the same trend, that is greater MVPA in preschool boys, however, those studies were limited due to the device being used only during the time at school. (Kain et al., 2018).

Prioritizing FMS instruction may lead preschoolers to engage more willingly in different levels of PA during childhood (Lee et al., 2020; Engel et al., 2018). However, the only opportunity children have to engage in activities that require FMS is free play; which although may encourage movement, it does not promote learning of these skills (Goodway et al., 2019; Marcel, 2019). Therefore, health strategies for improving FMS should preferentially develop competencies involved in object control as a priority component of early childhood education programs for this age group. Additionally, early childhood education programs after 5 years of age should ideally focus moderate to vigorous intensity activities and/or games. Thereby, professionals in this field should consider activities that stimulate object control skills when the goal is to achieve the WHO PA recommendations (2019 and 2020).

The strengths of our study include the use of objective assessments for both PA and FMS using a validated instrument (TGMD-2). However, the accelerometer - although used widely for measuring PAL - does not evaluate motor activities such as swimming, riding bicycles, or activities with a ball in a stationary position. Future studies should survey parents to collect data on these activities. Finally, due to the nature of the study, causality could not be established.

Conclusion

In conclusion, although this study found no significant association between FMS and PAL in preschoolers, a positive association between FMS and age was observed. We recommend carrying out additional longitudinal studies to confirm the impact of age and sex on this relationship.

Our study supports the importance of FMS in PA behaviors in preschoolers. Furthermore, we show the importance of object control skills to achieve a higher PAL as early as 5 years of age therefore, we recommend that these skills be promoted through structured PE classes conducted by a Physical Education teacher in preschool, and considering activities that involve manipulating or controlling objects such as throwing, kicking, catching, hitting, rolling and kicking / dribbling with various materials, progressing from the simple to the complex and with activities that involve objects with different sizes, colors and integrating both girls and boys.

Conflicts of interest - the authors don't have any conflicts of interest to declare.

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