- **Playable art:** To make the cities attractive for children, playable artwork is a must for the local authorities.
- **Hands-on:** In Graz a new and expensive building was built, and therefore got one third less of space, and for the opening exhibition there was no money left. But now, it is the best going and most successful museum in the republic. The secret is: daily theatre for children. Our plan was: from children to children.

11. Conclusion

If you got a mandate like I had – independent and free of orders – you can do a lot for a better access to play – even change the traffic rules. But when there is nor more institution of children-policy, initiatives get asleep, and it will last a long time to repeat older successes.

There is to create an event-culture by the adults in our streets and places– more sustainable than before, not only pedagogically specialised for children, but also traditional or new. There are some worldwide events like Bloomsday or unknown games like Petanque that is not a privilegue of old men defending the republique anymore, but can be played by children as well. Street- and summer-parties, flea-markets, open-air concerts, theatre and so on should be supported by the local authorities and not restricted.

PRESCHOOL ENVIRONMENTAL EFFECTS ON CHILDREN'S GROSS MOTOR DEVELOPMENT

Author Details:

Name Surname: **Linda Saraiva[a,b], Luís P. Rodrigues[c,d], Rita Cordovil[a], João Barreiros[a]**

Affiliation: [a] **CIPER, Faculdade de Motricidade Humana, Universidade de Lisboa, Portugal.**

[b] **Escola Superior de Educação do Instituto Politécnico de Viana do Castelo, Portugal.**

[c] **Escola Superior de Desporto e Lazer do Instituto Politécnico de Viana do Castelo, Portugal.**

[d] **Centro de Investigação em Saúde, Desporto e Desenvolvimento Humano (CIDESD), Portugal.**

E-mail: **lindasaraiva@ese.ipvc.pt**

Abstract:

The purpose of this study was to examine preschool environmental effects on children's gross motor development. We tested the hypothesis that preschools with more active opportunities/environment are more likely to have children with higher gross motor performance. A total of 380 children (3 to 5 year-olds), from 26 classrooms and 11 preschools were involved. The Peabody Developmental Motor Scales-2 (Folio & Fewell, 2000) were administered to assess gross motor performance. The EPAO (Environment and Policy Assessment and Observation) was used to measure physical activity environment of each classroom. ANOVAs were used to compare children's gross motor performance between preschools with high (75% quartile) and low (25% quartile) environment scores. The mean EPAO physical activity environmental total score was 9.3(±1.6). Average gross motor performance scores were 94.4(±7.6) for Gross Motor Quotient, 7.3(±1.6) for object manipulation, 9.0(±1.5) for locomotion, and 11.0(±1.8) for stationary skills. Preschool children who attended higher physical activity environments showed better results on the locomotion subtest. No significant differences were found for object manipulation or stationary subscales, or for the gross motor quotient score. Our results suggest that: *i)* preschool environmental effects on children's gross motor development are significant for the locomotion skills; *ii)* schools with high environment scores did not show a significant effect on the stationary or object manipulation skills of the attending children; *iii)* given the generally EPAO low values of the assessed preschools, implementation of conditions, practices and policies that can improve overall gross motor skills should be prioritized.

Keywords: *Preschool environment, Gross motor development, Preschool children*

Introduction:

It is widely recognized in literature that preschool age is a critical time for the development of the motor competence (Gabbard, 2011; Gallahue & Ozmum, 2006; Malina, 2004, NASPE, 2002). According to Gabbard (2009), this is a period in which experience is vital to laying the "foundation" of brain circuits dedicated to motor control, and "to optimize the development of each child, a rich nurturing environment is required" (p. 3). It is evident that the absence of adequate stimulation and/or the presence of certain environmental risk factors (e.g., low maternal education, low income household, low home stimulation) may limit children's motor repertoire as well as their overall development (Barros, Fragoso, Oliveira, Filho & Castro, 2003; Andraca, Pino, Parra, Rivera & Marcelo, 1998; To et al., 2004).

Furthermore, it is know that the acquisition of a broad motor repertoire is an important prerequisite for advanced motor skills and may be related to active and healthy lifestyles (Barnett et al., 2009; Lubans, Morgan, Cliff, Barnett, & Okely, 2001; Williams et al., 2008; Wrotniak et al., 2006). On this issue, recent systematic reviews support assumption that motor competence is linked with physical activity and fitness outcomes (Lubans et al., 2010; Rivilis et al., 2011). Children with low motor competence are generally less physically active, and have an increased risk for obesity and cardio-respiratory disease. Despite this knowledge, over the last decade several epidemiological studies have reported that preschool children generally exhibit low levels of physical activity and high levels of sedentary behavior (Hinkley, Crawford, Salmon, Okely, & Hesketh, 2008; Oliver, Schofield & Kolt, 2007; Pate, Pfeiffer, Trost, Ziegler & Dowda, 2004; Timmons, Naylor, Pfeiffer, 2007; Tucker, 2008). Likewise, a worldwide prevalence of childhood overweight and obesity increased from 4.2% in 1990 to 6.7% in 2010, and this trend is expected to reach 9.1% in 2020 (Onis, Blössner, & Borghi, 2010). These negative consequences on the child's health are reflective of the social, economical and cultural changes that occurred in the last decades. Among several limiting factors, decreased family size (less siblings to play with), the dangers and volume of traffic, the lack of accessible play spaces close to home, children's solitary play alongside the television or computers, and increase of organized after-school activities, have all contributed to a reduction of children's active play time (Prezza, Alparone, Renzi & Pietrobono, 2010; Tonucci & Rissotto, 2001; Valentine, 2004). These features of contemporary society certainly brought implications for the children's motor development that need to be unravelled. On this topic, the researchers have explored particularly the influence of the family environment (social and environmental factors) on child's motor development. Information relative to the influence of preschool environment on children's gross motor is rather limited. Therefore, the current study examined the influence of preschool environment on children's gross motor development. We hypothesized that preschools with more active opportunities/environment are more likely to have children with higher gross motor performance.

Methods

Sample

A total of 380 children (178 males and 202 females), aged between three to five years (mean age 53.2 ±9.6), from 26 classrooms pertraining to 11 public preschools were involved. The parents or legal guardians of the preschool children were informed about testing procedures, and corresponding written consent was obtained. Overall, the sample exhibited a balanced ratio of the participants according to sex (46,2% boys and 53,2% girls) and age (3 yrs: 32,4%; 4 yrs: 35,3%; 5 yrs: 32,4%). The children's parents had different education levels: middle school (35%), high school (33%), and college (32%).

Measurements

***Gross Motor Competence*:** The Peabody Developmental Motor Scales-Second Edition (PDMS-2) (Folio & Fewell 2000) was used to assess the children's gross motor performance. The PDMS-2 was previously translated into the Portuguese language, and its construct validity and reliability was confirmed for Portuguese preschoolers (Saraiva, Rodrigues, & Barreiros, 2011). All PDMS-2 subtests showed good internal consistency (Cronbach's alpha = .76 to .95) and good test-retest reliability (intraclass correlation coefficient = .85 to .95). Each child was individually tested by one PDMS-2 trained researcher in a quiet area of the school. The Stationary (ability to sustain control of the body within its center of gravity, 30 items), Locomotion (ability to move from one place to another, 89 items), and Object manipulation (ability to manipulate balls by children with 12 months of age or older, 24 items) subtests were administered according to manual guidelines (Folio & Fewell, 2000). Raw scores (the sum of the individual items within each subtest) were calculated for each subtests and converted in standard scores using the American norm references (since the Portuguese norm references were not available at the time we started our study). Then, the standard scores of each subtest were summed and converted into Gross Motor Quotient (GMQ) using the norm-referenced tables. The PDMS-2 has established the mean value of 10 points (± 3) for each subtest and the mean value of 100 points (± 15) for gross motor quotient.

Preschool Physical activity environment: The EPAO instrument (Environment and Policy Assessment and Observation) (Ward et al., 2008) was used to measure the physical activity environment of each classroom. The EPAO comprises a direct observation of the children and child care staff and a review of the child care documents in order to evaluate the preschool's physical activity policies, practices, and environments. In the observation and document review, 8 specific environmental characteristics are assessed: active opportunities (3 items); fixed and portable play environment (7 items); sedentary opportunities (3 items); sedentary environment (3 items); staff behavior (3 items); physical activity training and education (4 items); and physical activity policies (5 items). The EPAO has been considered a reliable and valid instrument with a strong agreement between observers (intra-correlation coefficient: 0.47–1.00) (Ward et al., 2008).

Data Analysis

Descriptive statistics (mean and standard deviation) were calculated for all variables. The one-way ANOVA was used to compare the gross motor performance between preschool with high (upper quartil) and low (lower quartile) environment scores.An alpha level of 0.05 was used to judge statistical significance.

Results

Table 1 presents the means and standard deviations for all variables.

Table 1. Mean (M) and standard deviations (SD) for all variables

Children's Motor Performance	**M (*SD*)**
Stationary	11. 0 (1.8)
Locomotion	9.0 (1.6)
Object manipulation	7.3 (1.6)
Gross motor Quotient (total score)	94.4 (7.6)
Preschool Physical activity environment	**M (*SD*)**
Active Play	14.9 (1.3)
Sedentary Behaviors*	5.2 (2.8)
Sedentary Environment*	7.6 (3.3)
Portable Play Environment	14.4 (4.0)
Fixed Play Environment	13.6 (3.7)
Staff behaviors Physical activity	15.2 (5.1)
Physical activity training and education	2.9 (2.5)
Physical activity policy	0.0 (0.0)
EPAO (total score)	9.3 (1.6)
Low EPAO	6.8 (0.8)
High EPAO	10.7(0.6)

*reverse coded (higher means fewer sedentary opportunities or less sedentary environment

Average gross motor performance scores were 94.4±7.6 for Gross Motor Quotient, 7.3±1.6 for object manipulation, 9.0±1.6 for locomotion, and 11.0±1.8 for stationary. Portuguese preschoolers had low performance on object manipulation skills. This subtest included motor skills such as kicking, throwing, catching, among others.

EPAO results indicate that portuguese preschools had low values in physical activity environment score. The mean EPAO physical activity environmental total score was 9.3±1.6 and each mean subscales of EPAO ranged from 0 (physical activity policy) to 15.2 (staff behaviors-physical activity). In fact, no preschool had written policies associated with physical activity.

Table 2 presents the mean scores and standard deviations (*M*±*SD*) for each PDMS-2 subtest and Gross Motor Quotient, by EPAO groups.

Table 2. Mean scores and standard deviations (*M*±*SD*) for each PDMS-2 subtest and Gross Motor Quotient, by EPAO groups.

Motor subtests	Low EPAO (n=90)	High EPAO (n=120)	*p*
Stationary	10.89 (1.8)	11.32 (1.8)	.085
Locomotion	8.96 (1.6)	9.49 (1.4)	**.010**
Object Manipulation	7.51 (1.7)	7.27 (1.4)	.253
GMQ	94.32 (7.7)	95.88 (7.6)	*.128*

The results of one-way Anova showed that preschool children who attended higher physical activity environments showed better results only on the locomotion subtest ($p < 0.01$). No significant differences were found for object manipulation or stationary subscales, or for the gross motor quotient score.

Conclusion

There are no doubts that preeschools should provide a rich nurturing environment for the development of children's motor competence. Nowadays, children spend most of their time in the preschool context, therefore, it is extremely important to promote a culture of active play.

In the present study, we found environmental effects on children's gross motor development of the locomotion skills. Locomotion skills involve moving the body from one point to another (e.g., running, galloping, skiping, hoping, jumping) and these type of movements seems to be particularly dependent of the play environment and opportunities given by the different schools. On the other hand, schools with high environment scores did not show a significant effect on the stationary or object manipulation skills of the attending children. These results are probably related to the fact that preschools in our sample did not present a great variability in the EPAO scores. On the other hand, although schools seem to have portable play equipment (subscale score -14.4), it is often not accessible to children, especially during recess, in the outdoor environment. This may be another reason for the low score that children exhibited in manipulative skills.

Given the generally EPAO low values of the assessed preschools, implementation of conditions, practices and policies that can improve overall gross motor skills should be prioritized.

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