

Differences between two types of community and preschool environment on children's motor skills and abilities

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ABSTRACT

PURPOSE: Influence of the environment is an important factor in child development. The purpose of this study was to determine the differences in motor skills and abilities of preschool children attending kindergartens in two different community size environments: medium vs. large city. **METHODS:** Participants in this research were 444 preschool children from the capital, large urban city, and one medium size city. For the assessment of motor abilities and skills six tests were used from the Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT2). Besides that, two tests were adapted from the ALPHA Health-Related Fitness test-battery (standing long jump and 40m sprint test). **RESULTS:** Main results of this research show significant differences in some motor abilities and skills of children from different places of residence. Children from the capital city achieved better results in the test of alternative ball dribbling with hands ($F=10.52$; $p<0.05$) and in the test of running 4x10m ($F=13.73$; $p<0.05$). Further, girls from the medium size city were better in standing long jump ($F=7.92$; $p<0.05$). Previous research has shown some specificity in motor abilities of kindergarten children living in different areas, but the results were not consistent. **CONCLUSIONS:** In general, there is some evidence of small city areas benefits for motor competence. It is important to detect possible differences related to community characteristics and influence on specifically very early in the child development when implementing effective interventions for physical activity and health improvements.

Key words: city, motor development, physical activity

Introduction

Influence of the environment is an important factor in child development. The environment full of different opportunities for children will have a positive impact on their cognitive and motor development at the earliest age (Venetsanou & Kambas, 2010). Previous research examined impact of various environmental factors on physical activity and motor competence of children, such as family's socioeconomic status, mother's educational level, father's physical activity habits, existence or absence of siblings, school physical activity related policies and time spent outdoors, preschool centers with adequate equipment and appropriate care, prosperity index of the municipality, type of housing or, for example, street traffic (Ferreira et al., 2007; Venetsanou & Kambas, 2010; Cools et al. 2011; Barnett et al. 2016).

Differences in motor performance of children in relation to physical environment or size of community was also interest of several studies (Ferreira et al., 2007; Greier, Brunner & Riechelmann, 2013). In parent's reports, availability of play spaces and frequency and time spent playing outside were very important correlates of child's physical activity (Sallis, 1993;

Ferreira et al., 2007). A few studies examining this association in children have demonstrated that time spent outdoors was associated with the observed physical activity and that preschool centers with larger indoor play areas tended to have higher step counts than centers with smaller indoor play areas (Troost et al., 2010). Research of Sallis and associates (2001) indicated a possibility that school area size, equipment availability and adult supervision could affect child's physical activity. Within the broader neighborhood, environmental factors such as living in an apartment block with a courtyard, living near a park and the age of the neighborhood were positively associated with children's independent mobility (Prezza et al., 2001).

In studies examining the relation of community or population size of the place of the residence following categories were determined: rural areas (less than 5 000 inhabitants), small city (between 5 000 and 20 000 inhabitants), medium city (between 20 000 and 100 000 inhabitants) and urban/large city (more than 100 000 inhabitants) (Greier, Brunner & Riechelmann, 2013). There were no consistent results on different communities' influence on children's movement competence. Possible negative influence of large cities include, unlike in rural areas, reduction of areas suited for movement and physical activity caused by population density and traffic. Children in rural areas have a twice as high chance of being active outdoors at least four times per week (Greier, Brunner & Riechelmann, 2013).

The purpose of this study was to determine the differences in motor skills and abilities of preschool children attending kindergartens in two different community size environments: medium vs. large city.

Methods

Participants in this research were 444 preschool children average age of 4.13 ± 1.60 . The children were divided in two subgroups by the place of residence, Zagreb (n=223) and Virovitica (n=221). Capital city Zagreb has around 800 000 inhabitants and will be considered as large urban city, and Virovitica has around 50 000 inhabitants and will be considered as a medium city. The parents have signed written informed consent for children's participation in research. The research was conducted in accordance with Declaration of Helsinki and was approved by Institutional Ethical Board.

Prior to motor testing, verbal information and demonstration was given to a child and he/she had one non-recorded trial. For the assessment of motor abilities and skills, from the Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT2), six tests were used. Test of Motor Proficiency has previously shown very good reliability (0.86 do 0.89)(Cools et al., 2009). Tests were standing on one leg with eyes open, standing on one leg with eyes closed, one-leg stationary hop, dropping and catching a ball – both hands, dribbling a ball - alternating hands and sit – ups. Test is suited for children from 4 up to 21 years of age and measures motor precision, motor integration, ambidexterity, manual coordination, balance, bilateral coordination, speed, agility and strength. Furthermore, two tests were adapted from the ALPHA health-related fitness test battery: standing long jump and 40m sprint test described in detail previously (De Miguel-Etayo et al. 2014).

Data was processed by Statistica software package, version 13.2. (Statsoft, Inc., Tulsa, OK, USA). Central and dispersive parameters were calculated for all variables. Analysis of variance (one-way ANOVA) and Bonferroni post-hoc tests were used for determining differences in motor skills and abilities between children of different places of residence. Level of statistical significance was set to $p < 0.05$.

Results

Main results of this research show significant differences in some motor abilities and skills of children from different place of residence. Children from the capital city achieved better results in the test of alternative ball dribbling with hands (2.43 vs. 1.5; $F=10.52$; $p<0.05$) and in the test of running 4x10m (18.12 vs 19.49; $F=13.73$; $p<0.05$). Further, girls from the

medium city are better in standing long jump ($F=7.92$; $p<0.05$) and balance ($F=4.18$; $p<0.05$)(Table 1). There were no other significant differences in motor skills and abilities of children in various age groups that can be attributed to different place of residence.

| | Medium size city | | | | Large urban city | | | |
|-----------------------|------------------|-------|-------|-------|------------------|-------|--------|-------|
| | girls | | boys | | girls | | boys | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Horizontal jump | 73.71* | 23.41 | 76.88 | 25.48 | 63.73 | 28.79 | 73.48 | 32.57 |
| Balance - eyes open | 7.92* | 2.98 | 6.87 | 3.28 | 7.03 | 3.47 | 6.94 | 3.49 |
| Balance - eyes closed | 3.87 | 2.53 | 3.50 | 2.68 | 4.18 | 2.89 | 3.92 | 2.81 |
| Dynamic balance | 20.24 | 15.02 | 17.50 | 13.93 | 18.97 | 15.36 | 19.24 | 16.22 |
| Ball drop and catch | 2.64 | 1.98 | 2.70 | 1.97 | 2.57 | 2.10 | 2.87 | 2.13 |
| Ball dribble | 1.51 | 1.77 | 1.49 | 1.82 | 2.10 | 3.09 | 2.65** | 4.14 |
| Abdominal strength | 6.54 | 4.25 | 5.93 | 4.68 | 5.57 | 4.97 | 6.06 | 5.31 |
| Shuttle run 4x10m | 19.72 | 3.02 | 19.20 | 3.59 | 17.73** | 4.07 | 18.44 | 3.95 |

Table 1. Results of motor skill and abilities testing in girls and boys in medium and large city

* significantly better compared to girls in a large urban city ($p<0.05$)

** significantly better compared to girls/boys in a medium sized city ($p<0.05$)

Discussion

Main results of this research show specific motor competence profile of children living in different community size areas. Children from large urban cities were better in manipulative skills and short running with changes of directions, while in medium city areas children had some advantages in explosive power performance. Previous research has shown some specificity in motor abilities of kindergarten children living in different areas but the results were not consistent (Joens-Matre et al. 2008; Tinazci & Emiroglu, 2009; Greier, Brunner & Riechelmann, 2013; Chillón et al. 2011). In general, there is some evidence of rural and small city areas benefits to motor competence. Children from small cities generally reported higher level of physical activity (Joens-Matre et al. 2008). Rural Spanish children and adolescents had overall a healthier profile than their urban peers in terms of cardiorespiratory fitness, upper- and lower-limb muscular fitness and adiposity, while they performed worse in speed-agility and flexibility (Chillón et al, 2011). In Germany, children from rural areas achieved higher scores in explosive power and balance compared to the kindergarten children from large cities (Greier, Brunner & Riechelmann, 2013), while in Cyprus higher flexibility, muscle endurance and strength was reported for rural children (Tinazci & Emiroglu, 2009). In our study we can see some benefits of medium city place of residence for girls in explosive power test standing long jump. Over the years, the standing long-jump has become the most frequently adopted test by a variety of sports professionals to measure and evaluate athletic performance and success. We can presume that level of standing long jump performance reflects general motor competence of children worldwide, and it might be indicative in urban cities to focus on explosive power performance. It is important to detect possible differences related to community characteristics and influence specifically very early in the child development.

Environmental background play important role in physical activity of children and

consequently motor skills and ability of children as well. Parents of children in rural environments reported more space available in the garden and in the neighbourhoods, and safer neighbourhoods than parents of children in urban schools, whereas children in urban schools had more exercise equipment available at home and were transported more frequently to places where they could be physically active (Loucaides, Chedzoy & Bennett, 2004). More equipment available at home or in the child care environment was possible reason for results in our study where children in urban city had higher levels of manipulative skills. Further, more children in medium city lives in houses with larger outside spaces for free play, but the availability of organized sport programs is better in large cities.

Also, attitude toward physical activity and exercise could have influenced on observed differences. Attitude of preschool parents from Virovitičko – podravska county and Zagreb county differ (Iveković, 2017). Parents in our medium city area are more prone to let children play outdoors and in different weather conditions (Iveković, 2017). Therefore, the place of residence should be taken into account when implementing effective interventions for physical activity and health improvements.

To increase children's motor skills and physical activity in general it is important to create childfriendly communities and provide skills to safely negotiate the environmental surroundings for children (Timperio et al., 2006). The challenge for researchers and practitioners wishing to promote motor skills, physical activity and prevent obesity in preschool children is to identify what types of environments best promote regular physical activity in child care, school and home settings.

Conclusion

This study suggests some specific relation of environment to motor skills and abilities of children. It seems that urban environment of capital city offers better surrounding for development of manipulative skills and short distance running.

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