

# Frequency of preschool children's outdoor physical activity and relations to body mass index and motor performance

Daniel Klein<sup>1,2</sup>, Stefan Türk<sup>1</sup>, Christine Graf<sup>3</sup>

<sup>1</sup> = Institute of Outdoor Sports and Environmental Science, German Sport University Cologne  
<sup>2</sup> = Institute of School Sport and School Development, German Sport University Cologne  
<sup>3</sup> = Institute of Movement and Neurosciences, German Sport University Cologne

## Background:

Children today spend less time actively playing in natural surroundings and more time passively consuming audio-visual media (San Jose & Nelson, 2017). Sedentary behavior potentially results in overweight and poor motor performance. Whereas the positive effects of physical activity in general are well documented, physical activity in an outdoor natural environment may lead to additional positive effects. Outdoor physically active children have a lower risk for developing chronic illnesses and physical activity in natural environments was found to be associated with a lower risk of poor mental health (Thompson Coon et al., 2011). The number of hours spent outdoors in childhood is the most important factor associated with people's long-term environmental attitudes and behaviors (Wells & Lekies, 2006). Frequent experiences in nature during childhood predict higher levels of physical activity in natural environments in adulthood (Calogiuri, 2016). The present study aims at the question, how frequent preschool children are physically active outdoors and if there are relations of the frequency being active outdoors to body mass index (BMI) and motor performance.

## Methods:

Presented data originate from different health promotion projects conducted in preschools in Cologne, Germany (Klein et al., 2015). Relevant cross-sectional data is available for n=799 children (44.7% girls, 55.3% boys). Anthropometric data were collected in a standardized procedure and BMI was calculated in kg/m<sup>2</sup>. A motor screening with five test items covering relevant motor abilities has been conducted (Klein et al., 2012). Parents completed a questionnaire aiming at the weekly frequency their children were physically active outdoors beyond the time spent in preschool. Possible answers were "daily", "on 4-6 days" or "on 1-3 days".



## Results:

Mean age of participating children was 4.7±0.9 years. 48.6% were active outdoors on a daily basis, 38.2% on 4-6 days and 13.3% on 1-3 days per week (Figure 1). No gender-specific differences (p=0.132) and no differences in age (p=0.904) occurred related to outdoor activity. BMI did not differ between children being active outdoors every day or less (Figure 2), neither in total (p=0.095) nor regarded separately for girls (p=0.815) or boys (p=0.076). Motor performance did not differ due to the frequency of outdoor activity in the test items "shuttle run" (p=0.303), "standing long jump" (p=0.662), "sit and reach" (p=0.830) or "lateral jumping" (p=0.861). Children being active outdoors on 4-6 days per week achieved the best results in the test item "one leg stand" compared to children being active outdoors on a daily basis or on 1-3 days (p=0.017) (Table 1).



Figure 1

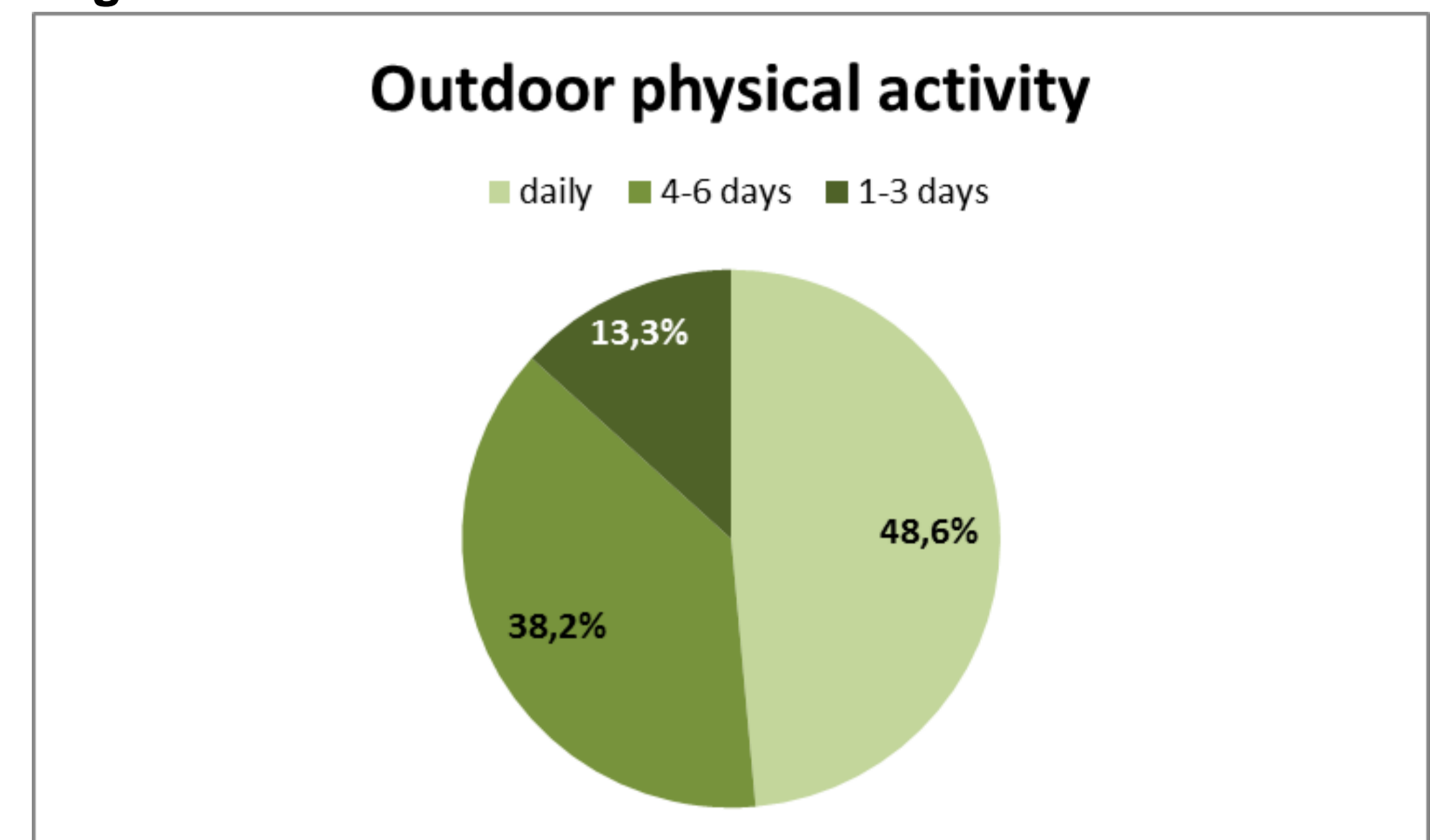


Figure 2 - \*ANOVA

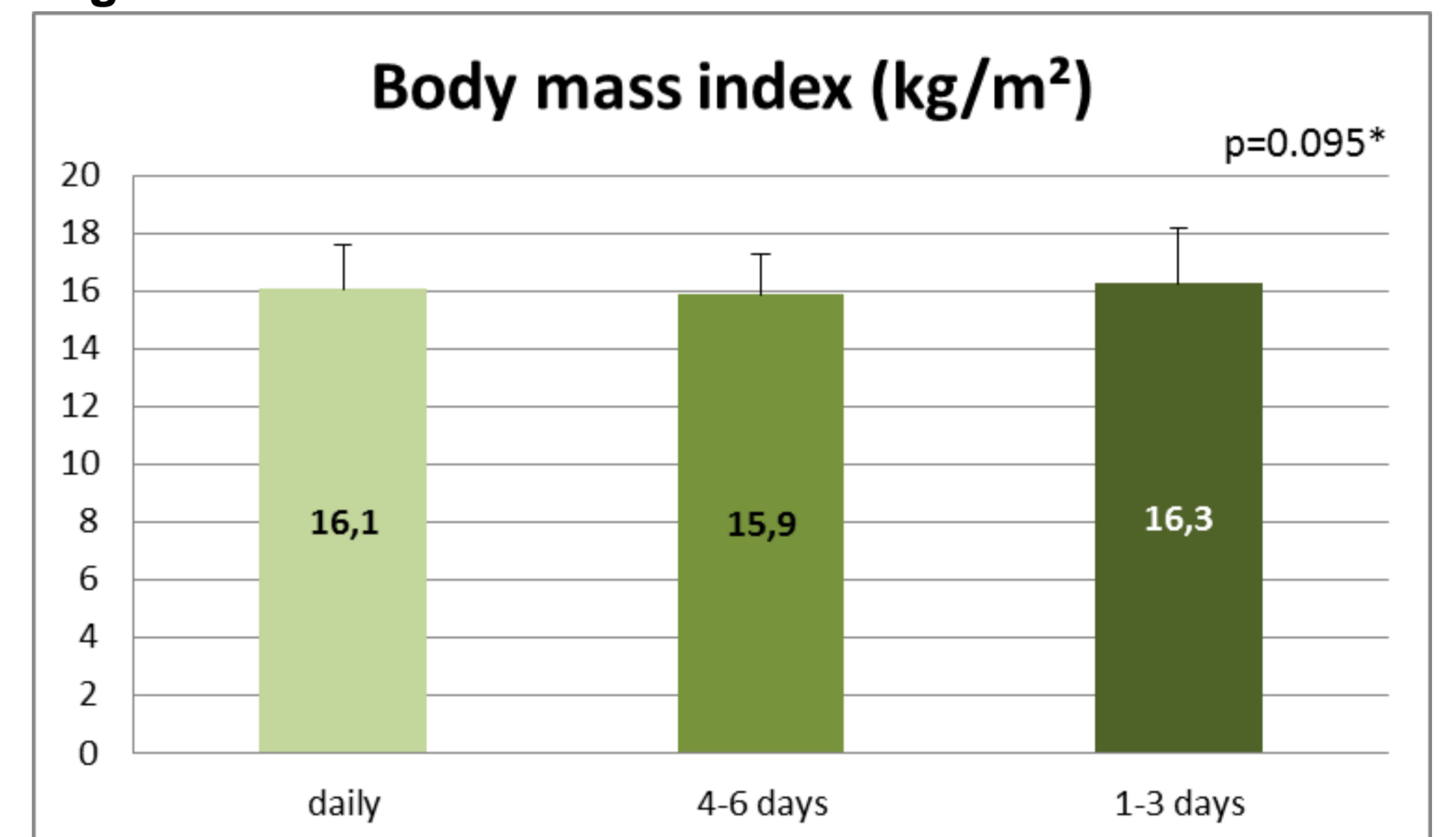


Table 1 - \*ANOVA, \*\*lower values are better

Test item	Outdoor physical activity	Mean ± SD	p-value*
Shuttle run (seconds**)	daily	11.5 ± 2.9	0.303
	4-6 days	11.6 ± 2.5	
	1-3 days	12.0 ± 3.2	
Standing long jump (cm)	daily	70.2 ± 25.5	0.662
	4-6 days	70.6 ± 25.3	
	1-3 days	68.0 ± 27.1	
Sit and reach (cm)	daily	2.8 ± 5.0	0.830
	4-6 days	3.0 ± 5.0	
	1-3 days	2.8 ± 4.4	
Lateral jumping (jumps)	daily	19.3 ± 9.3	0.861
	4-6 days	19.6 ± 9.8	
	1-3 days	19.1 ± 10.5	
One leg stand (contacts**)	daily	14.8 ± 7.7	0.017
	4-6 days	13.0 ± 7.4	
	1-3 days	14.5 ± 8.3	

## Conclusions:

It is an encouraging result that a considerable amount of preschool children is active outdoors on at least every second day up to daily, even in an urban metropolitan area. No relations could be proven between the frequency of outdoor activity and the BMI as well as the results concerning motor performance in 4 out of 5 test items. In this context it clearly has to be stated as a limiting factor that neither the duration nor the quality of the activities have been assessed and that additional factors are associated to the development of overweight and poor motor performance (like nutrition and physical activity in general). Regarding the numerous positive health effects of being physically active, that may be increased if the activity takes place in a natural outdoor environment, it is a public health issue to promote outdoor activities of children.

