

“Reloading my batteries” in grey places or green spaces? Cross-over experiment with adolescents in environments differing in closeness to nature - first results on wellbeing

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Background

School life challenges pupils' wellbeing as well as cognitive skills. Time to recover during a long school-day is crucial. Where should school children and students stay during a rest break to most effectively restore cognitive function? Several studies in adults have identified positive effects of green spaces on well-being and various indicators of health: Cross-sectional studies indicated exposure to natural environments as associated with increased well-being (e.g. de Vries et al. 2003) and improved mental health (e.g. Sugiyama et al. 2008). However, effects of natural environments on adolescents have received little attention so far.

The need for recreational breaks during school hours has since long been recognized. However, the environmental settings during breaks that provide the best opportunity to prevent from deterioration of performance and well-being have not been studied. Positive effects of green spaces on well-being and various health indicators indicate that natural environments could be of particular relevance for retaining performance and wellbeing.

Within a multidisciplinary approach this study investigated effects of staying in different urban environments and green spaces during breaks on well-being, cognitive performance, and cardiorespiratory function of adolescents, funded by the research program “Sparkling Science” (Austrian Federal Ministry of Science and Research).

Methods and material

Healthy pupils (n=64; 16-18 years old) of three schools in Vienna volunteered in a cross-over field experiment. On different days at least one week apart, students stayed in each of three settings (small park in an urban area, a large park, a forest) for one hour during a lunch break. Access times to each site were about 20 minutes from schools.

Wellbeing was assessed by standardized questionnaires (self-condition scale by Nitsch, 1976). Subjects characterize their actual state by 27 attributes. Cognitive performance was tested with d2 Test of Attention, a timed test of selective attention (Brickenkamp & Zillmer 1998). Both, questionnaires and cognitive tests were applied before, during and after the break. Furthermore, the Perceived Restorativeness Scale (PRS) was administered after the break. The PRS is measuring four dimensions of a restorative environment and consisted of 16 items designed to measure qualities of person-environment transactions (being away, fascination, coherence, and compatibility [Hartig et al. 1997]). This measurement allows a distinction between environments concerning their potential for restoration of attention. In addition, satisfaction with the visit and crowding perceptions were asked.

Effects on the cardiorespiratory system were investigated by measurements with peak flow meter and pulse oximeters. Levels of particulate matter (PM₁₀, PM_{2.5}, PM_{0.1}), carbon dioxide, indoor climate factors (temperature, humidity) and noise were determined by standardized measurement procedures.

Results

In total, data from 60 students (30 male, 30 female) were available. The starting point concerning self-condition was virtually the same for all three investigation days after the first measurement - at a comparatively low level. Well-being (esp. readiness for exertion, alertness, recuperation) was higher in all outdoor settings. However, a sustained effect was only found for the near-natural setting of a stay in the forest (Figure 1).

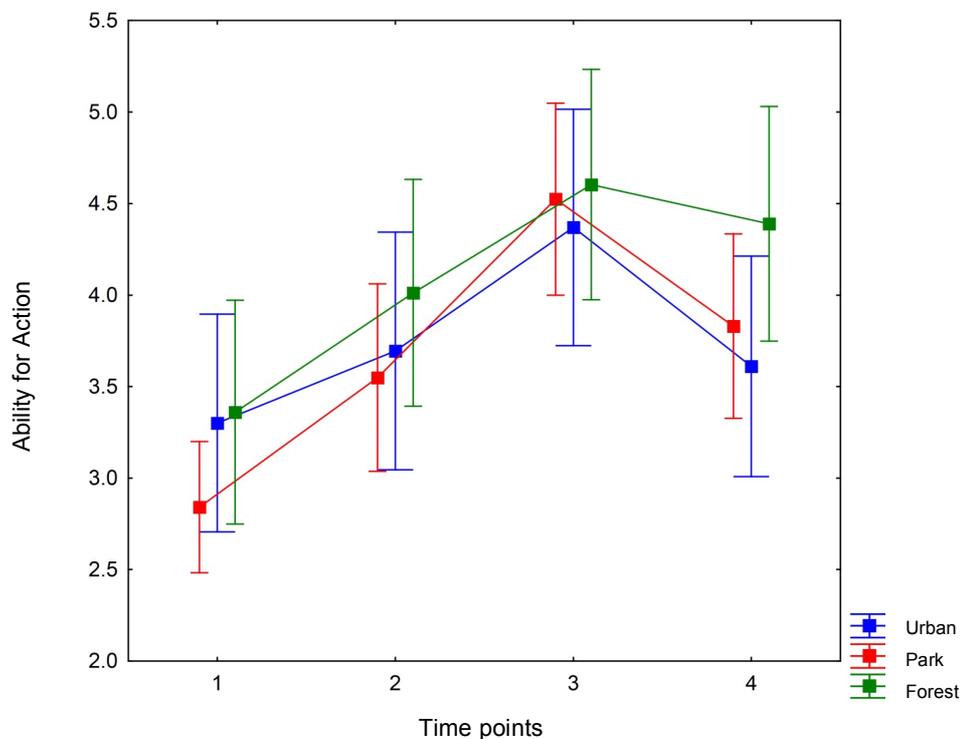


Fig. 1. Mean and 95% confidence interval of the stanine values of the current Ability for Action (Nitsch scale) at the four time points (1=before leaving, 2=arrival, 3=leaving, 4=back at school) and three locations.

Overall, pupils were rather satisfied with their stays at the study sites. The forests received the highest satisfaction scores, while the small urban parks scored the lowest. However, a stay in a larger park often received the same scores as a stay in a forest. Staying in a forest, however, was associated with a more sustained effect on wellbeing as compared to the other environments.

Discussion

Previous studies have suggested positive effects of green spaces on diverse health-indicators. We found such an effect of nature on adolescents' wellbeing, in the sense of recovery from negative mood and reduced readiness to act. Such positive effects are important regarding challenges of every day school life.

As these are preliminary results, further analyses are planned (e.g. including data of d2 tests, PRS, environmental measurements). Furthermore, the students will develop strategies to integrate restorative effects of specific places/activities into their daily resp. school life. Results will be presented to public health officials, city planning authorities and environmental stakeholders.

References

Brickenkamp R, Zillmer E (1998): d2 - Test of Attention. Göttingen, Germany: Hogrefe & Huber, 1998.

de Vries S, Verheij RA, Groenewegen P, Spreeuwenberg, P (2003). Natural environments—healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and Planning A*, 35:1717–1731.

Hartig T, Korpela K, Evans GW, Gärling T (1997): A measure of restorative quality in environments. *Scandinavian Housing & Planning Research* 14:175-194.

Nitsch JR (1976): The self condition scale. Die Eigenzustandsskala (EZ-Skala) - Ein Verfahren zur hierarchisch-mehrdimensionalen Befindlichkeitsskalierung. In: Nitsch JR, Udrys I (eds.) *Beanspruchung im Sport*, pp 81-102, Limpert, Bad Limburg.

Sugiyama,T, Leslie E, Giles-Corti, B, Owen N (2008). Associations of neighbourhood greenness with physical and mental health: Do walking, social coherence and local social interaction explain the relationships? *Journal of Epidemiology and Community Health*, 62