How does Psychological Restoration Work in Children? An Exploratory Study

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childô of restorativeness keeps pace with the performance at the attention test and the preference evaluation. Results are in agreement with Kaplan's Attention Restoration Theory (1995) and the fascination/meditation hypothesis (Kaplan, 2001).

be diẇerent for children; they might actually prefer the school playground because of the activities they can do there during play-time. In this case environmental preferences could be aẇected more by the activity than by the physical characteristics of the place. Play-time is an important aspect of children's school day; accordingly we might expect to Ẑnd a preference for the playground over the classroom and even over the wood. HXe children were not «completely free» to do as they liked in the wood, on the contrary, they were guided. In particular, during the walk they were taught to observe the natural elements present along the trail, to smell and touch the wood and to listen out for animals. From this perspective the walk felt more like a lesson, with the diẇerence that it took place in a totally natural environment. HXe walk in the wood was planned with the aim of evoking fascination in the children, in order to verify whether fascination – i.e. involuntary attention – [4] by exposure to Nature aẇects children's directed attention in the same way as in adults. To this end children's attentional performance was assessed in the wood and compared to the other two settings, playground and classroom, using a tailored version of the Continuous Performance Test [22]. However, fascination can also be evoked by the practice of Mindful Silence [23], i.e. by an activity that cultivates involuntary attention [20]. From this perspective the experience in the wood and the practice of Mindful Silence, though in the classroom, could have the same eẇect on children's attentional performance. Nevertheless, it is interesting to verify how free play in the playground can aẇect children's attentional performance. In addition to connection to Nature, restorativeness and preference assessments and the measurement of attentional

7	I feel part of the natural world like a tree is a part of the forest.

Figure 2: English version of the CNS-ch.

The continuous performance test

The Continuous Performance Test (CPT) [49] was used to measure the children's attentional performance. The CPT is a pencil and paper test comprising three sub-tests containing long strings that differ in terms of the order of characters in the string, character size and the spaces between the characters. The children were required to find three given contiguous letters in each string (Figure 3). The test can be considered a validated measure of sustained attention and inhibition in children, and though it is not sensitive to learning effect [22,49] a different version of the CPT (i.e. novel letter strings) was administered each time.

Sub-test 1

B W O Y F Z O U F R B F Z B K T E I P D

A M Q X L F Z A Q Z A F U J F Z B J R S

V I P N T G F Z B W C H N R K F Z Q F R

Sub-test 2

A Q X F Z B I S D F Z F O T W L Q V F Z M B L V P I F Z B H

the interaction between condition and gender. The interaction between

4.53, p<.001, PT vs. AW: t(39)=3.16, p<.01). The mean values in Table 1 show that blood pressure was lower after MS and after AW than after PT.

As regards maximum blood pressure, the mixed ANOVA showed that boys' blood pressure was higher than girls' in each of the three conditions, in fact the main effects of condition and gender were significant (condition: F(2,76) = 10.48, p< .001; gender: F(1,38)=4.32, p<.05), whereas the condition x gender interaction was not. For minimum blood pressure, neither the effect of gender, nor the condition x gender interaction emerged, but only the main effect of condition, showing that the conditions had the same effect on minimum blood pressure in males and females.

Although in this study diastolic blood pressure values differed significantly among conditions they are normal for children of that age (diastolic blood pressure: from 48-52 to 78-81) [51].

Heart rate

Heart rate was measured in the three conditions. As shown in Table 1, the main effect of the condition was significant. The comparisons revealed significant differences between PT and the other two conditions, PT vs. MS: t(45) = 15.4, p< .001, PT vs. AW: t(45)=12.5, p<.001. There was no significant difference in heart rate when measured in the MS and in the AW condition. As shown in Table 1, heart rate was slower after MS and after AW than PT.

The mixed ANOVA, with gender as the between-subjects factor and condition as the within-subjects factor, showed the main effect of condition only (F(2,76) = 108.32, p<.001), whereas the main effect of gender and the condition x gender interaction were not significant. This means that boys and girls had the same mean heart rate in all conditions.

Considering the two classes included in the ANOVA, the mean heart rate of 4th graders was lower than that of 5th graders'

gender and class, and given the good Cronbach's alpha value, the PRS-ch turned out to be a reliable instrument with good psychometric characteristics.

The most striking result from the CNS-ch is the independence of the assessment from the experimental condition; children's feelings of being or not being connected with Nature were not affected by the

Although this study provides initial evidence that children can discriminate between the restorative value of settings with varying degree of naturalness, and psychological restoration works in children as it does in adults, there are certain limitations. The first limitation is that the study does not provide information about children's attention prior to the study, i.e. there is no attention baseline. Second, although our results show the inhibitory system involved in the CPT task performance benefited from the restorative experience, actually there was no cognitive load to recover from, i.e. no state of mental fatigue was experimentally induced in our children [18]. Finally, as already said in the introduction, in this study there is potential confound

30. Trancik AM, Evans GW (1995) Spaces Ẑt for children: Competency in design 0of daycare center environments. Children's Environments 12: 311-319.
31. Grahn P, Martensson F, Lindblad B, Nilsson P, Ekman A (1997) Outdoors at daycare. City and Country, No 145, NorraSkane Oŵset: Hasselholm, Sweden.
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