Background and Significance

Spatial Working Memory (SWM) is short-term memory for a location or locations in order to complete a task. Several researchers have proposed that spatial selective attention acts as a rehearsal mechanism in SWM (Awh, 1999; Awh & Jonides, 2001).

Distractors presented during the delay of a spatial memory task have been found to influence children’s memory (Schutte et al., 2010).

Neurological overlap between working memory and attention occurs in the same regions of the brain as those implicated with ADHD (Awh, Jonides, & Reuter-Lorenz, 1998; Castellanos et al., 2002; Heinz et al., 1994).

Researchers have found that children diagnosed with ADHD show deficits in Spatial Working Memory (SWM) (Karatekin & Asarnow, 1998).

Attention Restoration Theory (ART) is a cognitive framework concerned with recovery from mental fatigue or directed attention fatigue (Kaplan, 2001).

ART draws on two different mechanisms: (1) deliberately, directed effortful forms of attention and (2) involuntary, effortless forms of attention, including those occurring in natural settings (Kaplan, 1995).

Given the connection between attention and spatial memory, it was hypothesized that time spent in nature should improve spatial memory.

Previous research indicated that for children diagnosed with Attention Deficit Disorder a 20 minute walk in a park enhanced attention on subsequent tasks and was more beneficial than urban or residential walks (Taylor & Kuo, 2009).

This study compared the effectiveness of nature versus urban walks on children who are not diagnosed with ADD/ADHD, to determine whether these children benefit from the hypothesized restorative properties of nature.

The purpose of this study was to examine the effectiveness of a 20 minute nature walk in improving children’s spatial working memory (SWM).

Method

Participants: 16 7-year-olds 16 8-year-olds

Demographic information was collected at the first visit.

Apparatus: A large 20in x 42in (74cm x 107cm) liquid crystal display (LCD) computer monitor (Sharp, Inc.). The monitor was tilted 15 degrees from horizontal. With a resolution of 1024 x 768 pixels. The LCD monitor has a touchscreen overlay (Smartboard) that will track the touch of a stylus. The stylus was used by the children during the Spatial Memory task.

Procedure: Participants completed a spatial memory task, which measured the ability to remember an object's location (e.g., a spaceport) while ignoring a distractor (yellow dot).

Target locations: 20° left of midline (Figure 1a) or 40° right of midline (Figure 1b).

Four delays: no delay, 200 ms, 5, and 10 s. During half of the 5 and 10 s delays trials, a distractor appeared 20° from the target either toward or away from midline.

Target and distractor layout for (a) 20 degree left of midline and (b) 40 degree right of midline.

Results

8-year-olds made more errors in the 40 degree target and urban condition than in the nature condition. Significant walk x target x delay x age interaction 7-year-olds: no significant effects

8-year-olds: walk x target x delay interaction Significant walk x delay interaction at the 40° target No significant effects at the 20° target

Discussion/Future Directions

This study builds on previous research examining the effects of different types of rest activities on children’s attention (Taylor & Kuo, 2009) by showing significantly larger SWM errors following the urban versus nature walks for the 8-year-olds.

Results show promising attention benefits of walks in nature for children without ADD/ADHD, along with an impact of a nature walk on children’s SWM, which has not yet been examined.

However, only an effect for one age group at one target location was significant. Why?

May depend on the level of children's attentional abilities.

Future research will examine whether these effects depend on individual differences in children's inhibitory or attentional control.

Future research will also examine the effects of a nature walk on working memory and attention in preschoolers.

Performance on more self-regulation measurements will be examined including a go/no go task, a continuous performance task and a digit span backwards task.

References

Heidi L. Fleharty, Kathleen Jones, Anne R. Schutte, & Julia C. Torquati
University of Nebraska-Lincoln

The Influence of Rest Activities on Spatial Memory in 7- and 8-Year-Olds.

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