Effects of nature exposure on executive attention in young and older adults
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Introduction
- Natural spaces have been considered a respite from urban environments for centuries.
- Henry David Thoreau's Walden (1854)
- Landscape architecture, eg: Central Park by Frederick Law Olmsted (1873)
- Nature as restorative
  - Stephen Kaplan has repeatedly demonstrated that exposure to nature improves attention when compared to exposure to urban areas
  - Additional studies have shown improved attention following nature exposure in breast cancer patients, children with ADHD, and even college students
- Nature pictures can have the same restorative effects as being in a natural environment.
  - Berto (2005) showed improvement in attention after viewing nature pictures.
  - Berman, Jonides, and Kaplan (2008) found that nature pictures improved a specific type of attention, executive attention as shown through the Attention Network Test (ANT)1.
- Older adults have been shown to have decreased attention in some tasks compared to young adults.
  - Only two studies have investigated the effects of nature on older adults, but the cognitive health of these participants was not reported.
- Study Aims:
  - To replicate the findings of Berman and colleagues with young adults.
  - To determine if nature pictures can improve attention in healthy older adults.

Method
- Participants:
  - 30 Older adults (M age = 69.10, SD = 3.92) and 26 Young adults (M age = 20.54, SD = 2.14)
  - Education Level: Older adults: M = 16.20, SD = 3.66; Young adults: M = 14.20, SD = 0.66
  - Digit Symbol processing: Older adults: M = 54.80, SD = 10.78, Young adults: M = 72.61, SD = 10.90
- All Older adults scored 227 on the Mini Mental State Examination and had self-reported health of 4.45 (SD = 0.57) for overall health on a 5 point scale.

Procedure
- Positive and Negative Affect Scale
- Backward Digit Span
- Picture viewing: Nature or Urban pictures
- Positive and Negative Affective Scale
- Backward Digit Span
- Attention Network Test

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Discussion
- Viewing Nature pictures improved Executive attention in both young and older adults.
- However, we do not know how nature improves this type of attention.
- Many interventions shown to improve performance in older adults require long-term training or practice.
- These results suggest that nature exposure can be a fast and easy way to improve executive attention in older adults.
- We don’t know how long these effects last nor what other types of attention or cognitive functions may be improved by nature.
- While the cognitive benefits of nature may be temporary, these results suggest that brief exposure to nature can have an acute boost of attention for older as well as younger adults.

Results: Attention Difference Scores

Executive Attention Check
- Due to unexpected pre-picture viewing differences in Executive attention, we removed outliers in order to better equate pre-pictures scores.
- We determined a group of participants that fell within a range of the lowest group and the highest group average executive attention difference scores.
- No: Old Nature = 9, Old Urban = 11, Young Nature = 11, Young Urban = 8

Attention Network Test
- The Attention Network Test (ANT) combines flanker and cued reaction time tasks.
- Participants must respond to the central target that is either Congruent (facing the same direction) or Incongruent (facing the opposite direction) as four flanking arrows.
- The ANT can measure:
  - Executive attention: faster responding to congruent vs. incongruent trials.
  - Alerting attention: faster responding when a cue (asterisk) alerts participants to the appearance of a target; and
  - Orienting attention: faster responding when the target appears in the same location as the cue.
- 96 trials/block, 3 blocks/session

Attention Difference Scores
- Difference scores were calculated as the change in each type of attention from pre-picture viewing to post-picture viewing.
  - Executive attention: A 3-way ANOVA showed a significant Pre-/Post-x Age x Picture type interaction, F(1,52) = 6.88, p = .011 and a main effect of Session, F(1,52) = 12.01, p = .001.
  - Old: Nature: t(14) = 3.94, p = .002; Urban: t(14) = 0.48, p = .636.
  - Young: Nature: t(12) = 4.25, p = .001; Urban: t(12) = 0.24, p = .812.
- There were no interactions with age; participants who viewed Nature pictures showed more improvement in Executive attention compared to those who viewed Urban pictures.

Orienting attention: A 3-way ANOVA showed a significant interaction of Age x Picture type, F(1,52) = 6.02, p = .022, there were no effects of nor interactions with Pre-/Post-picture viewing.

Attention difference scores were calculated as the change in each type of attention from pre-picture viewing to post-picture viewing.

Works Cited
- Thoreau, H.D., Walden, 1854; Boston: Ticknor and Fields.