

Attempting to Improve Attention through Executive Function Training

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BACKGROUND

Goals of the Current Study:

- To test whether a training regimen involving multiple executive functions (updating, switching and inhibition of irrelevant information) would show wide transfer to measures of Fluid Intelligence, Working Memory, Switching, Speed of Processing, Attention and Inhibition.
- To test for possible individual differences predictors in the amount of improvements seen at training and transfer.

METHOD

Participants: 108 College of Idaho students were recruited with 45 assigned to Executive Function training, 34 to a mindfulness meditation training condition and 29 to a no-contact control group. The final Ns for completed participation are reported below.

Groups:

Executive Function Training (Attn) n=42:

This group completed four weeks of training which alternated between N-back training (using both spatial and verbal N-back) on odd sessions and training on task-switching on even for a total of 16 sessions of approximately ~45 minutes each.

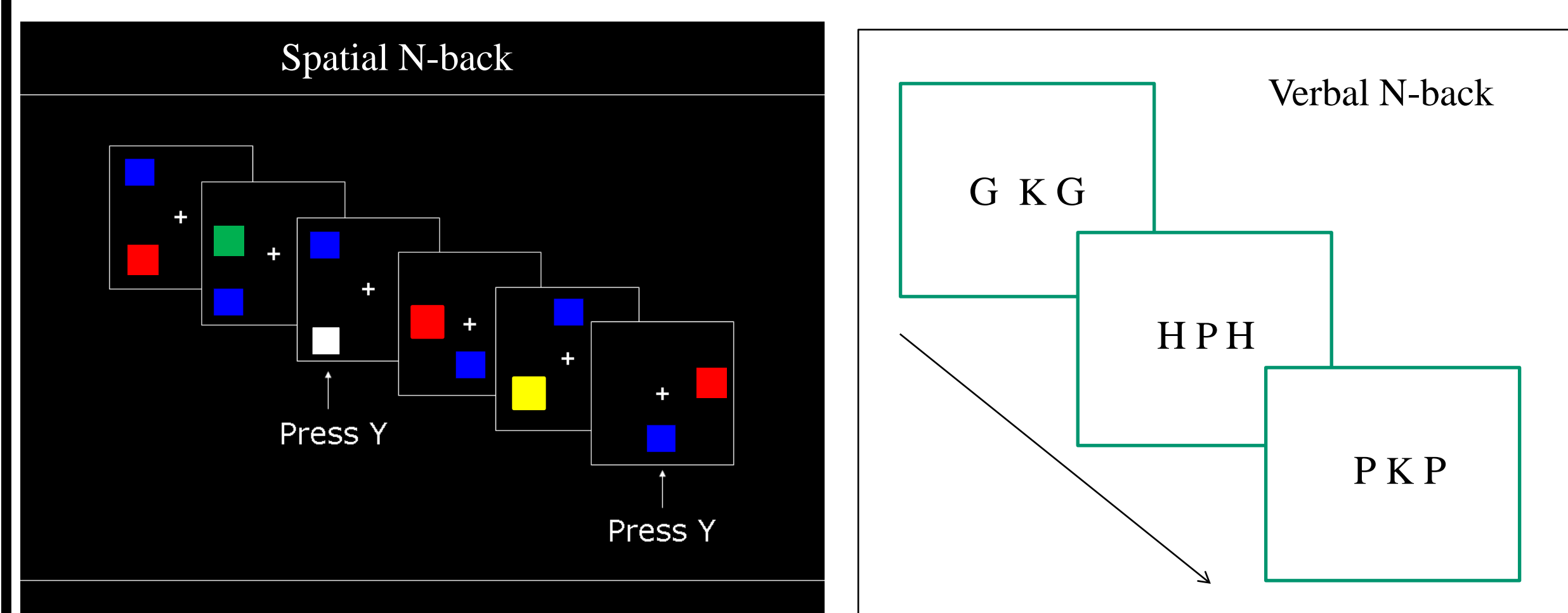
Mindful Meditation (Med) n=25:

Participated in a 6 week mindfulness meditation course with a weekly session with an experienced meditation instructor as well as MBSR based homework assignments.

No contact control (NC) n=23:

This group completed the pre and post-test only.

Executive Function Training: N-back and Task Switching



8 F 50 8	G u 32 G	L b 12 L	9 H 25 9
RED X RED	X O X	GREEN O GREEN	O X O

3 different switching tasks involving making judgments about numbers and letters. All switches predictable, uncued and short preparation (200ms)

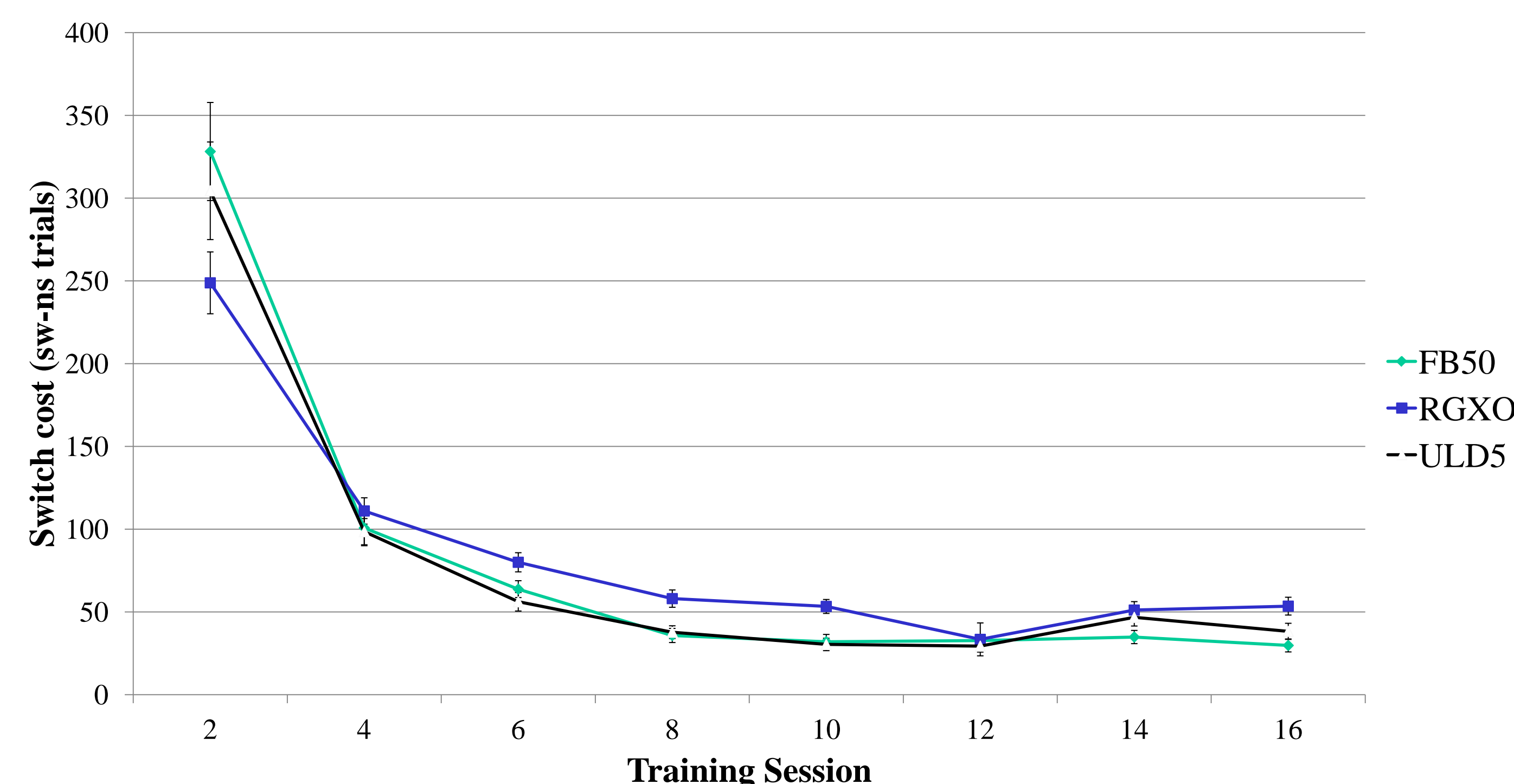
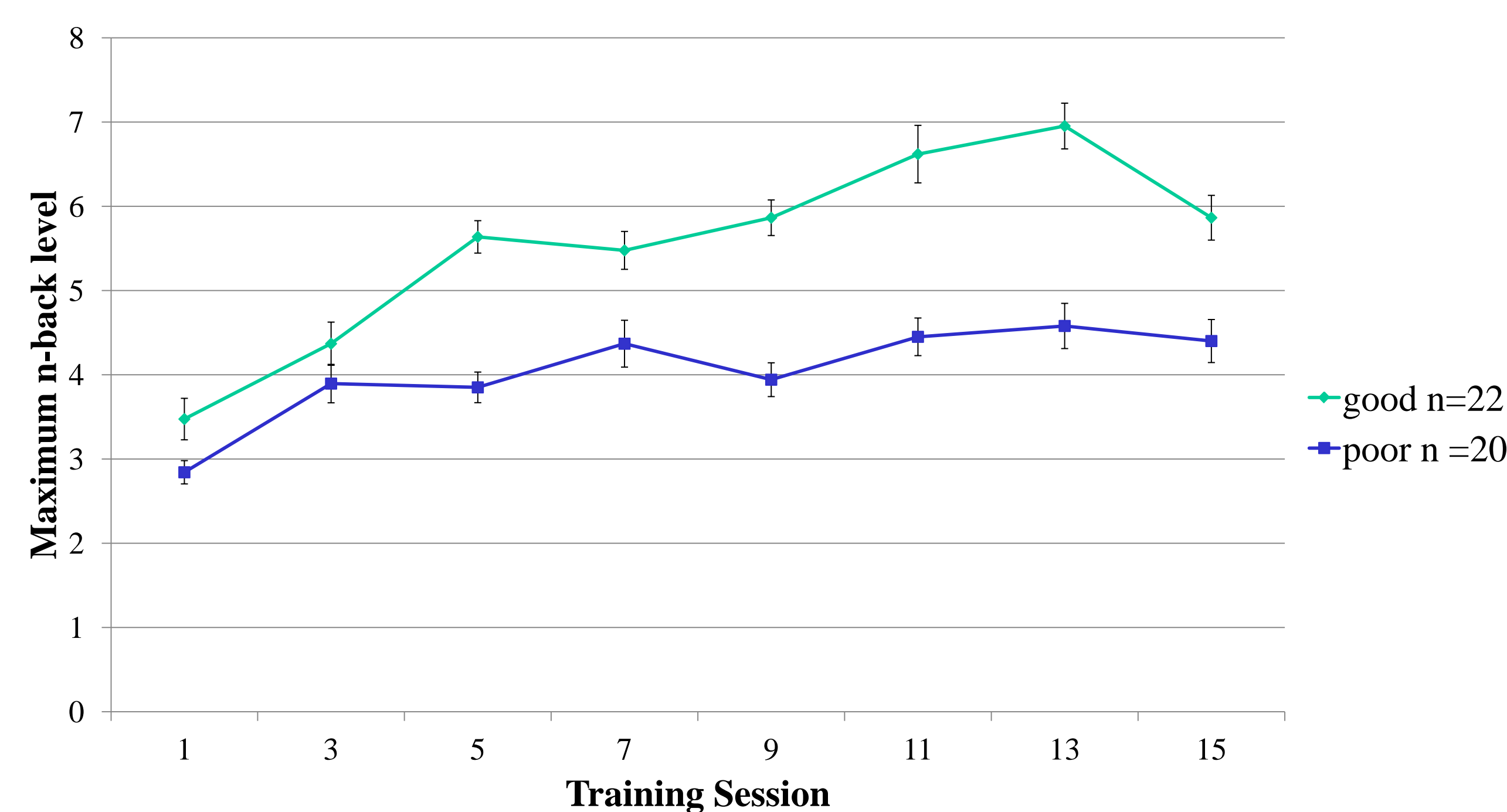
METHOD

Transfer Tasks:

- **Fluid Intelligence:** Standard & Advanced Ravens Matrices
 - **Working Memory:** Reading Span, Backward Digit, Digit-Symbol
 - **Speed of Processing:** Pattern, Digit & Letter Comparison
 - **Attention:** ANT, Attentional Blink, CPT, Flanker & d2
 - **Inhibition:** anti-saccade, Fluency (Verbal & Semantic), Stroop (Word, Counting and Number)
 - **Task-switching:** CVOE task consisting of blocks of predictable and random switching of short (200 ms) and long (1,200 ms) preparatory intervals, Global-Local switching task, Emotional switching task
- Survey Measures:** Grit, Need for Cognition, Empathy, Self-Compassion, Forgiveness, Hope, Cognitive Failures, Mindfulness, Self perceived Stress, Self-control, Big 5 (NEO-AC)

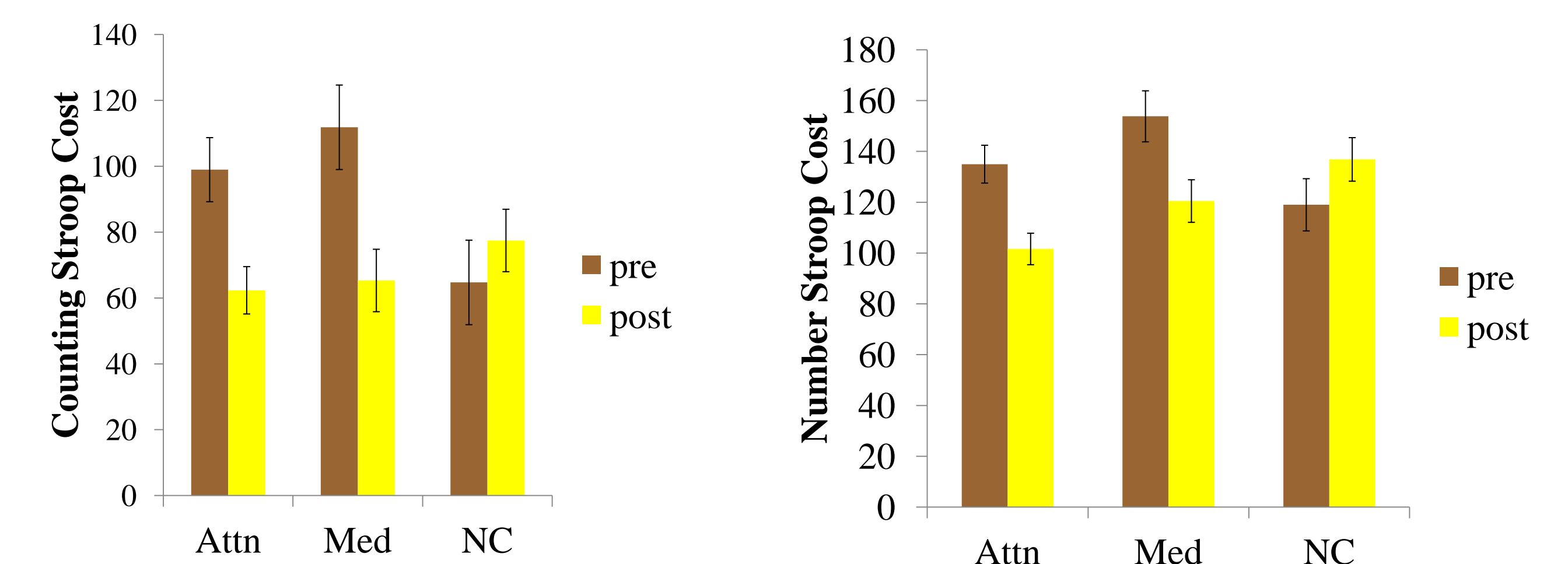
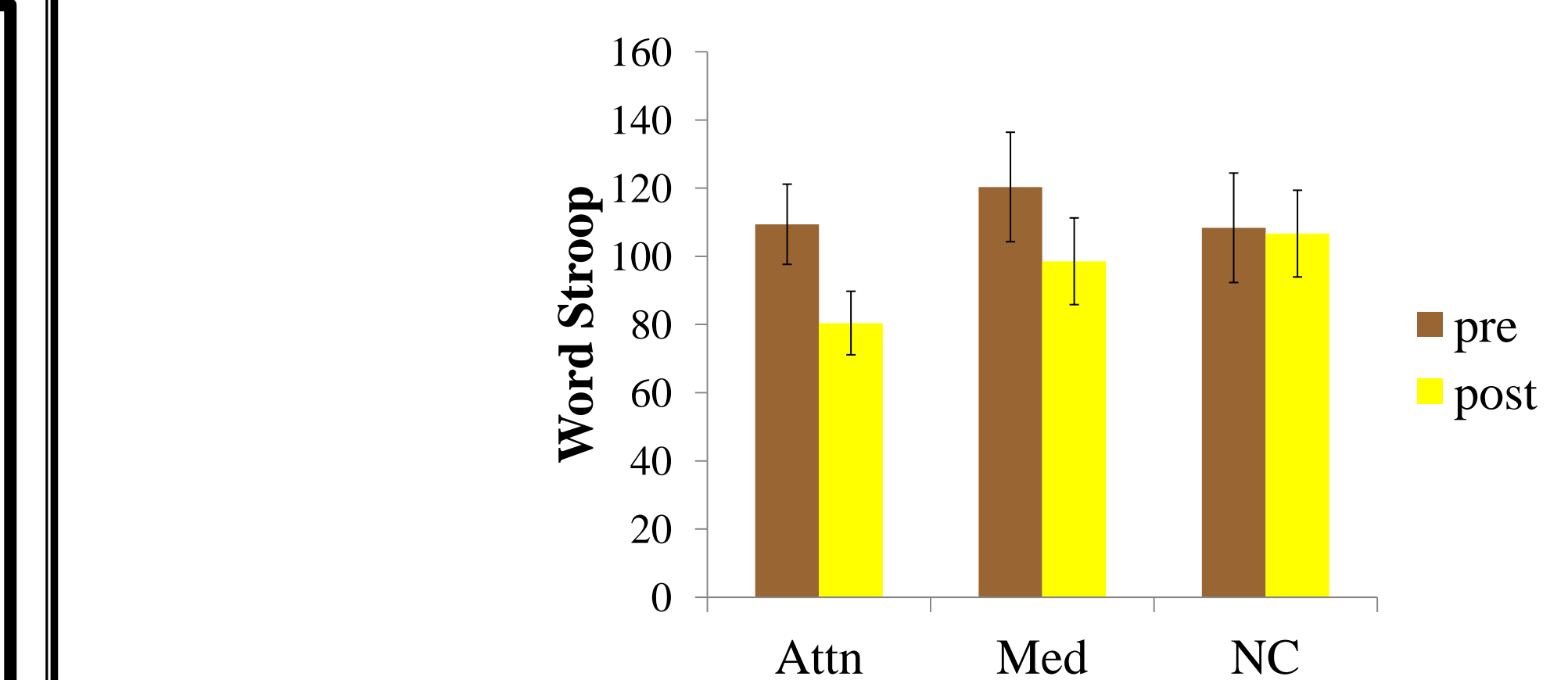
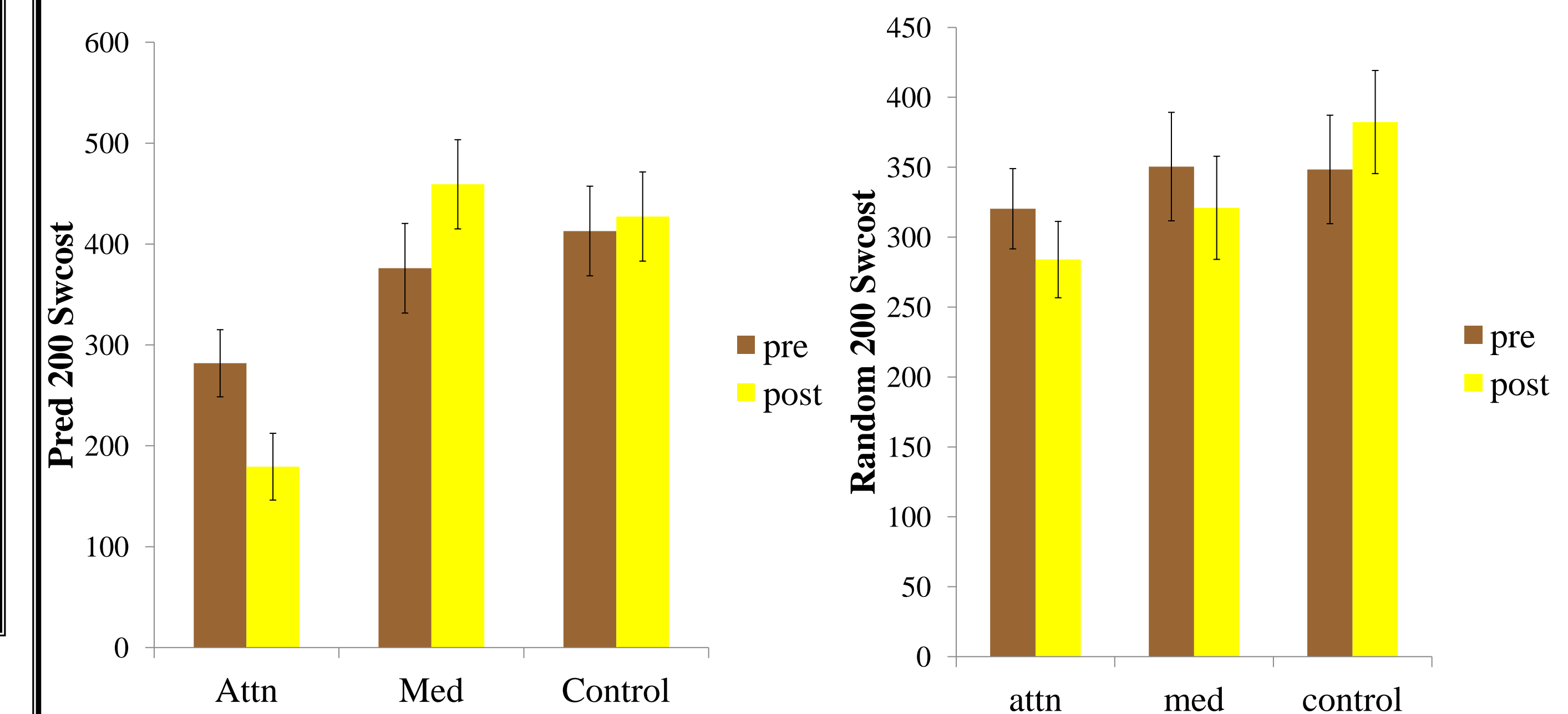
RESULTS

Training Results: Both the N-backs and Switching training tasks showed significant improvement across the training period. For the N-back task, there was a clear split between good and poor trainers.



RESULTS

Transfer Results: The only tasks that showed a group x pre-post test interaction were the predictable switching task (CSI 200) and the Stroop Tasks.



Discussion: Both positive transfer and no transfer results did not change when comparing good and poor trainers on the N-back tasks. The self report measures that best predicted N-back training improvements were Cognitive Failures, $r = -.32$, Stress, $r = -.38$, Neuroticism, $r = -.32$ and Self-Control, $r = .30$ while the very best predictors were the initial measures of performance on Advanced Ravens, $r = .5$, Reading Span, $r = .47$, and Backward Digit Span, $r = .58$. The best evidence for transfer was for the near transfer of predictable switching. We found little evidence for far transfer.

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