Taking Your Brain to the Gym: Does Visuospatial Training Slow Visuospatial Aging?

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Introduction

•As older adults comprise an increasingly large portion of our population (Hertzog, Kramer, Wilson, & Lindenberger, 2008), the importance of finding ways to ameliorate age-related cognitive decline is important for society as a whole as well as for individuals as they grow older.

•Older adults are interested in whether doing crossword puzzles, playing bridge, and similar activities will help them ward off age-related cognitive decline. Current data on this topic is mixed (Salthouse, 2006; Schooler, 2007) so giving advice based on empirical data is unsatisfactory.

•The promising findings with computerized video game training (e.g., Basak et al., 2008; Mahnck et al., 2006; Smith et al., 2009), which the current study extends, may allow professionals to give an affirmative answer based on empirical data when older adults and their adult children ask if there is anything they can do to retain cognitive skills as long as possible.

InSight (Posit Science, 2008)

•Posit Science is a company that released two computer game packages designed to exercise the brain and reduce **negative plasticity,** the unfavorable reorganization of the brain when it is unchallenged.

•The first of two computer programs (the Brain Fitness Program) trains users through auditory-verbal games. Smith et al. (2009) reported significant training effects on verbal neuropsychological tests, but no published work has been done with the second computer program, **InSight.** InSight includes five computer games designed to improve visual processing, visual precision, divided attention, useful field of view, and visual memory (see Figure 1).

Hypothesis

Older adults who exercise their brain using InSight (experimental group) will show improvements in tests of visual memory and processing speed compared to older adults who do not (control group). Neither the experimental nor the control group will show improvements in tests of verbal memory.

References

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Table 1. Mean Baseline and Change Scores in Main Dependent Measures

Measure	Experimental		Control		Group Difference	
	Baseline *M* (*SD*)	Change *M* (*SD*)	Baseline *M* (*SD*)	Change *M* (*SD*)	*p*-value	Effect Size
Verbal Tasks						
RBANS Verbal	76.7 (12.7)	1.4 (8.5)	75.0 (17.8)	-0.8 (4.8)	0.395	0.30
HVLT-R	22.9 (4.7)	0.2 (3.8)	21.7 (7.0)	0.6 (3.5)	0.724	0.12
Visuospatial Tasks						
RBANS Visuospatial	81.1 (14.1)	5.8 (2.0)*	88.6 (13.8)	-0.5 (6.7)	**0.035**	0.76
Clock Drawing	9.2 (1.7)	0.6 (1.0)*	10.1 (1.4)	-0.1 (0.5)	**0.025**	0.81
Processing Speed Tasks						
Trails B-A	79.2 (40.5)	12.3 (40.9)	65.4 (55.3)	1.1 (36.6)	0.341	0.34
WAIS-III Digit Symbol	50.9 (13.3)	3.2 (6.0)*	54.1 (13.6)	0.1 (4.6)	0.109	0.57
Working Memory						
WAIS-III Letter Number	8.1 (1.9)	1.2 (1.5)*	9.1 (2.7)	0.3 (2.1)	0.146	0.63

Note. * designates a significant ($p < .05$) change score.

Methods

Participants

•Participants were recruited through Dr. Ong's medical office and a local retirement facility.

21 in the experimental group

M (SD) age = 78.7 (6.7) yrs

14 in the waitlist control group

M (SD) age = 79.5 (6.4) yrs

Procedure

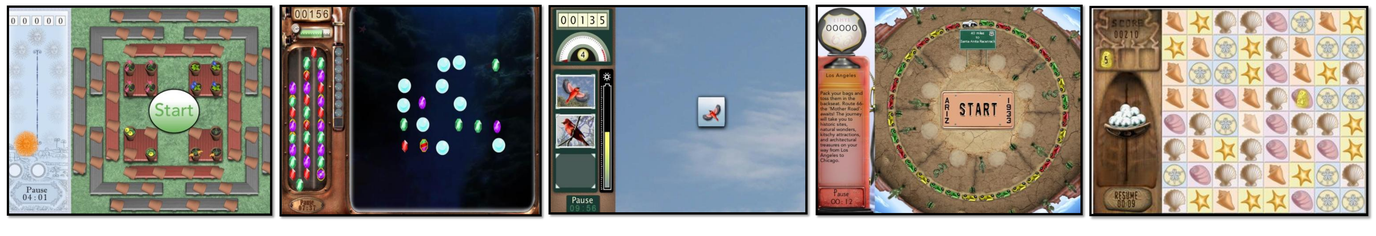
•Neuropsychological testing 1 (baseline)

•40 sessions of InSight for the experimental group, 8-10 weeks of normal life for the waitlist control group

•Neuropsychological testing 2

•40 sessions of InSight for the waitlist control group, 8-10 weeks of normal life for the experimental group

Figure 1. Screen shots from the five InSight games



Results

•Table 1 reports scores on our neuropsychological measures.

•Paired-samples *t*-tests showed significant improvement in the **experimental group** on **visuospatial measures** (RBANS Visuospatial, Clock Drawing), a measure of **processing speed** (WAIS-III Digit Symbol), and a measure of **working memory** (WAIS-III Letter Number Sequencing).

•No significant changes were seen for the **control group** on any measure.

•The comparison of the experimental and control groups' change scores yielded significantly **greater improvements for the experimental group** on the **visuospatial measures** (RBANS Visuospatial, Clock Drawing).

Discussion

•Older adults who completed visuospatial computer-game training showed significant improvement on standardized visuospatial tests; the controls did not.

•Smith et al. (2009) found that older adults who completed auditory-verbal computer-game training improved on standardized auditory-verbal memory tests significantly more than controls did.

•The training groups in both the present study and the Smith et al. study improved on measures of processing speed and working memory, while the control groups did not.

•Taken together, these results are evidence of training specificity across verbal/visuospatial domains as well as a general effect of computer game training on speed of processing and working memory.

•Support was found for cognitive exercise ameliorating age-related cognitive declines.

Acknowledgements

Thanks to the Duke Endowment for funding this project through Davidson Research Initiative grants to AZJ and KGG. Thanks to Hannah Bohbrink, Alexa Burke, Katie Greenfield, Heather Smith, and Sue Wert for their help in running InSight sessions. Thanks to Alexa Burke and Sue Wert for assistance with scoring. Thanks to Nadia Brashier for assistance in running neuropsychological assessment sessions.