Using Cognitive Training to Enhance Working Memory

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INTRODUCTION

Computerized cognitive training can serve as a tool for improving executive functions in school age children. These programs are designed to allow children to practice specific skills related to executive functions such as attention, response inhibition, and verbal and auditory working memory. Such computerized training programs have been shown to be effective in decreasing attention difficulties and improving visuospatial working memory (Klingberg et al., 2005; Rabiner et al., 2010).

Computer-based cognitive training programs fit well with the Response-To-Intervention (RTI) approach that is currently implemented in many school settings. They represent a structured intervention strategy that may be implemented to address a variety of learning concerns that are present in classroom settings. As such, research evaluating the efficacy of cognitive training has important practical value.

METHOD

Participants: Seventeen junior high school students enrolled at the Prentice School in southern California volunteered for this project. Nine were randomly selected to receive cognitive training. The remaining eight participated in an out-of-class activity, serving as a control group.

Procedure: Cognitive training recipients received 20 hours of cognitive training over a 10 week period (i.e., four one-half hour sessions per week for 10 weeks); the remaining eight students participated in an out-of-class activity for 30 minutes, four times per week for a total of 10 weeks. All students were administered the working memory subtests from the Wide Range Assessment of Memory and Learning-2 (WRAML) measure prior to the beginning of cognitive training (or prior to the beginning of the out-of-class activity). Students were again administered the WRAML subtests at the conclusion of the 10 week experience. All training sessions (or out-of-class activity) occurred during the regular school day.

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RESULTS

Figures 1 and 2 show the changes in auditory and visual working memory scores, respectively. Since the two groups were dissimilar on the initial auditory WM score, it was possible that the groups were inherently different. Therefore, the groups were not analyzed together, but with separate t-tests. The t-tests measured the change in both groups in auditory and visual WM. The results are shown in Table 1.

Figure 1. *Auditory working memory scores before and after cognitive training and out-of-class activity sessions*

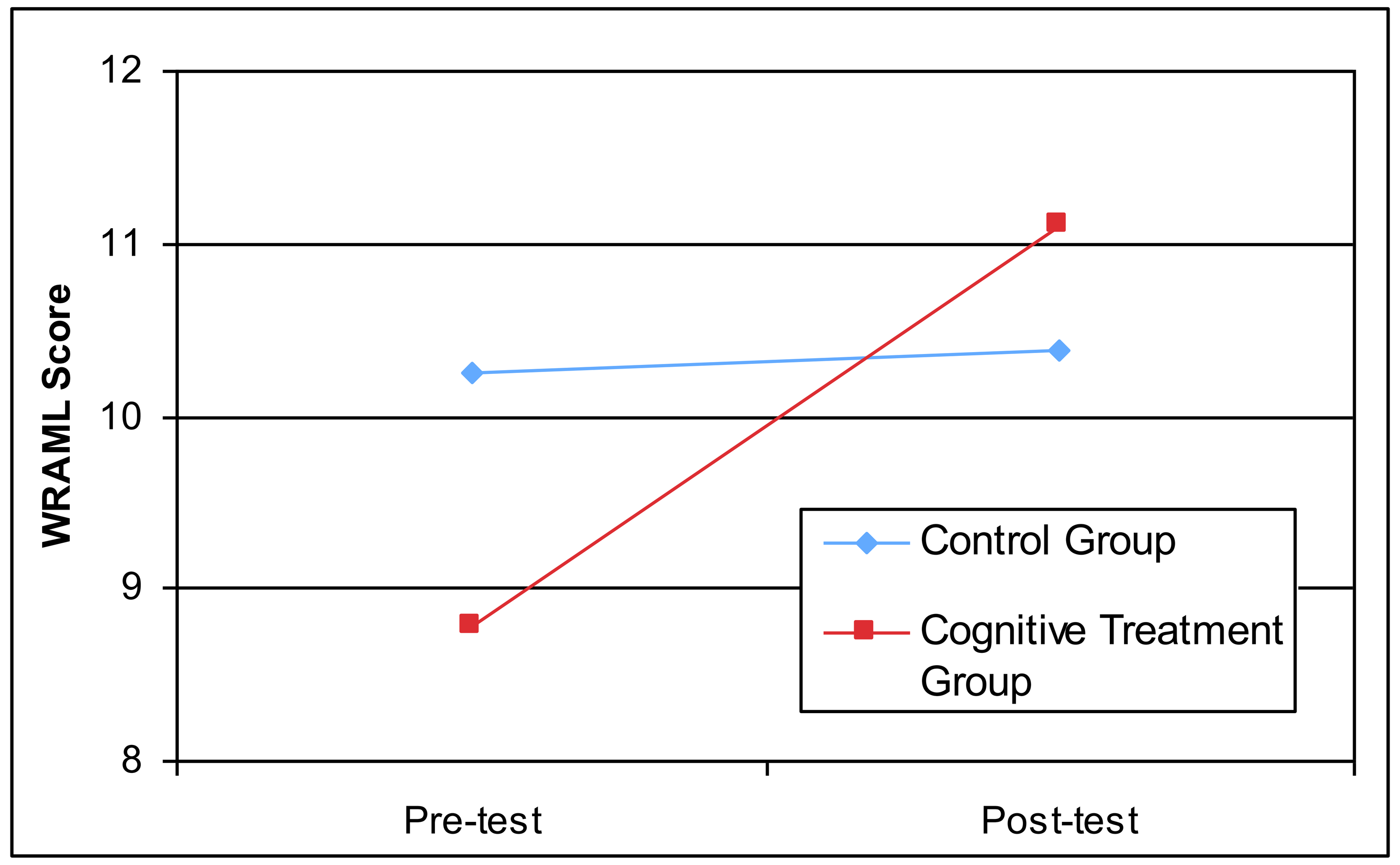

Figure 2. *Visual working memory scores before and after cognitive training and out-of-class activity sessions*

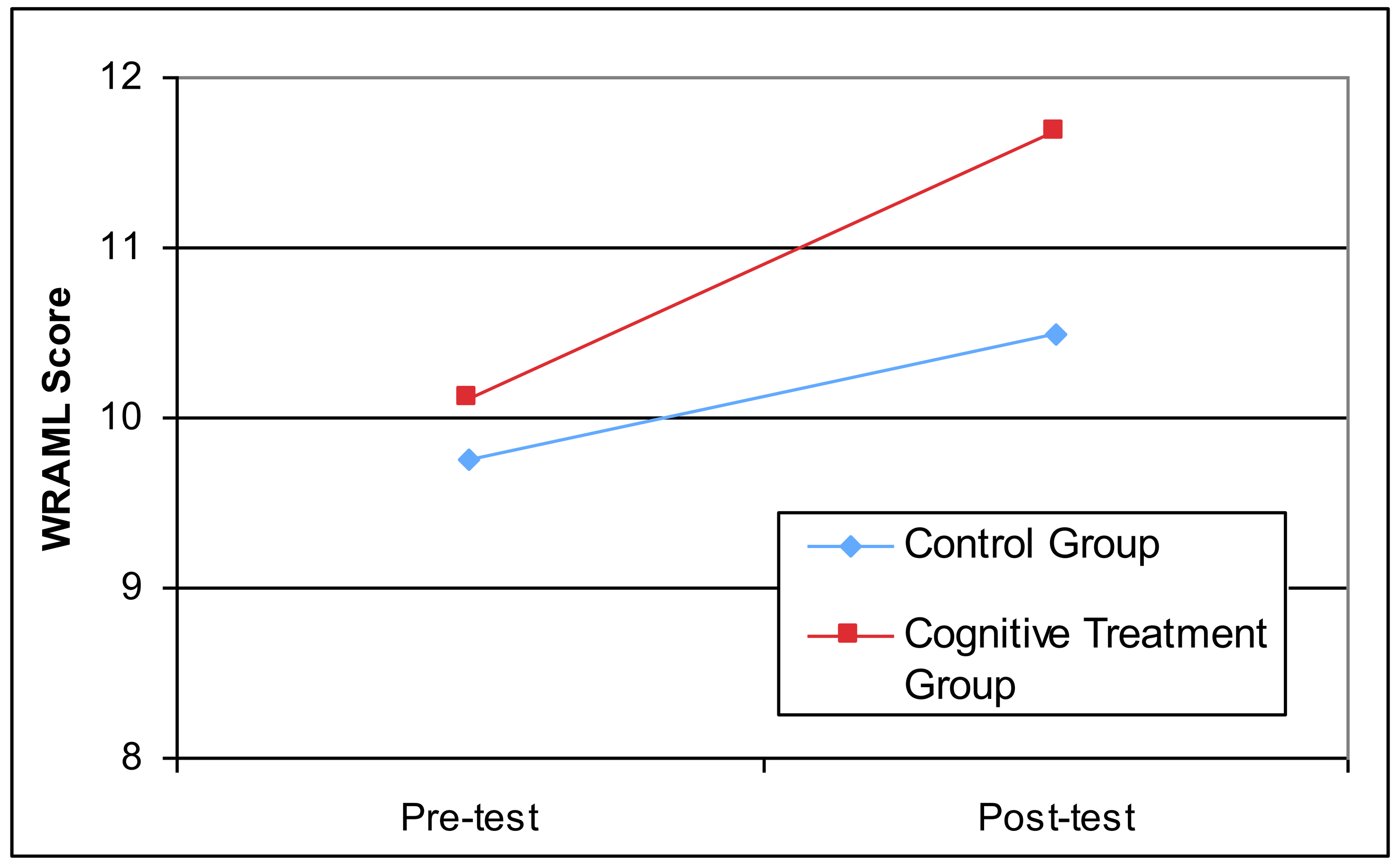

Table 1. *Pre- and Post-Training Differences for Auditory and Visual Working Memory*

		t(df)	p	Cohen's d
Auditory WM	Cognitive Training	5.72(8)	<0.001	0.80
	No Training	0.17(7)	0.87	0.04
Visual WM	Cognitive Training	1.94(8)	0.09	0.69
	No Training	1.03(7)	0.34	0.36

These results show a significant improvement in the cognitive training group in auditory WM but not in visual WM. The control group did not improve significantly on either auditory nor visual WM. Even though the cognitive training group did not reach significance on visual WM change, the effect size (Cohen's d) was medium, as opposed to the small effect in the control group. This indicates that the cognitive training did improve visual WM.

DISCUSSION

The results provide evidence that cognitive training can be an effective strategy for improving working memory. In particular, the significant effect for auditory working memory in the cognitive training group indicates that receiving cognitive training as opposed to an out-of-class activity significantly improved auditory working memory. The results were not significant for visual working memory, but the effect size indicated that the cognitive training group did improve more on visual WM than the control group. These results indicate that cognitive training has merit as an intervention for improving auditory and visual working memory; thus, it may be implemented within RTI. The results of this study should be interpreted with caution due to the small sample size.

REFERENCES

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