

Working Memory and Cognitive Control in Aging: Results of Three Musical Interventions

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ABSTRACT

Background

Successful aging has been described as, “one’s potential to arrive at a level of physical, social, and psychological well-being in old age that is pleasing to both self and others” (Gibson, 1995, p.279). One common barrier to successful aging is decreased performance in cognitive abilities such as executive function and working memory tasks due to age-related cognitive decline. A key challenge is to identify cognitive interventions that may mitigate or reduce potential age-related cognitive decline (Wecker et al., 2005). The supply and demand framework model (Seidler et al., 2010) suggests that motor training includes cognitive demands that could potentially contribute to successful aging. This research examines the effects of different types of musical training namely: gross motor training (group percussion ensemble, GPE) and fine motor training (group piano instruction, GPI) compared to non-motor musical training (music listening instruction, MLI) on working memory and cognitive control in older adults (ages 60-86).

Aims

The aim of this project is to evaluate the effects of musical training on working memory and cognitive control in older adults. We hypothesize that those who receive motor training (GPE, GPI) will demonstrate enhanced working memory and cognitive control compared those not receiving motor training (MLI).

Method

One hundred ninety non-musicians, ages 60-86, were recruited and matched by age, education, and intelligence to two training interventions. Two programs were administered concurrently, in each of three 16-week sessions: (GPI and MLI), (GPE and MLI), and (GPE and GPI). Curriculum for GPI and GPE programs were issued similarly (i.e. similar pieces) A series of standardized cognitive assessments were administered pre and post training. The Auditory Consonant Trigrams (ACT), cued Color Word Stroop, and the Musical Stroop, were used to measure working memory and cognitive control.

Results

One hundred twenty-five participants completed the study. Attrition was due to a need to return to the workforce or unrelated medical issues. Results of a Repeated Measures ANOVA show significantly reduced perseveration errors on the ACT for the GPE group compared to GPI and MLI, $F(2,121)=3.6, p<.05$. The GPI group exhibited a similar pattern of reduced perseveration errors. Results of a Repeated Measures ANOVA on the Musical Stroop Task indicate

significantly reduced errors by the MLI group compared to GPI and GPE, $F(2,109)=3.1, p<.05$.

Conclusions

Musical training may benefit general cognitive abilities. The type of training may predict such benefits. Data suggest that instrumental training enhances working memory performance while music listening instruction may contribute to cognitive control.

Keywords

Older adult, working memory, cognitive control, cognition

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