

The influence of piano training on neural and cognitive functioning in older adults

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Abstract

Introduction: Evidence suggests that the brain is sensitive to remodeling in response to musical tasks and that these changes may have implications for cognitive functioning. For example, neuroplastic changes associated with eight sessions of piano training were observed in young adults via enhancement of the mismatch negativity response, a component of the auditory event related potential (Lappe et al., 2008). In addition to neuroplastic changes in young adults, a study conducted by Bugos and colleagues (2007) evaluated six months of individualized piano instruction in healthy older adults and found that participants in the piano instruction group had increased scores in executive functioning and working memory domains. However, no studies were found which evaluated potential cognitive effects of piano training interventions in a population at risk for cognitive impairment. The proposed investigation seeks to address this question through examining the effects of a six month piano training intervention on neuroplasticity and cognitive functioning in individuals with mild cognitive impairment (MCI). We hypothesize that a complex multisensory intervention (i.e. piano training) will have a greater influence on neural plasticity and behavioral outcomes versus single modal auditory training. **Method:** 20 older adults (age 65-85) with mild cognitive impairment (MCI) who have no prior musical experience will be recruited for this study. Participants will either be randomized into an experimental group where they will undergo six months of piano training or into a music listening control group. In order to evaluate the effects of music at the behavioral level, cognitive function will be assessed before and after training via CNS Vital Signs (CNS Vital Signs, Inc: Morrisville, NC), and

the Advanced Measures of Music Audiation will be used to assess musical aptitude. In addition, the MMN will be measured using electroencephalography (EEG). **Implications:** Incidence of cognitive decline is anticipated to rise as the world's population ages. The purpose of this study is to determine whether a challenging, multisensory task such as piano training can improve cognitive and neural health. Results of this study will help researchers further understand the capacities of older adult neuroplastic changes and how these changes may be associated with behavioral outcomes. Furthermore, if piano training is related to improved cognitive functioning, evidence from this study may influence policies of residential facilities and organizations regarding music programs for older adults.