



Enhancing Neurocognitive Functions in School-aged Children by using Music and Sports?


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Content of the talk


- 01. Study background**
 - Close and far transfer
 - Ongoing studies
- 02. Study paradigm**
 - Research methods: behavioral and group-based
 - Research methods: EEG



Study background

Close transfer:


- Musical skills enhance brain functions which determine auditory, motoric, and crossmodal functions
- Physical activities also enhance brain functions which determine sensory and motor functions
- Both music and sports are linked to better achievement in academic skills



Study background

Far transfer:

- Both music and sports are often linked to better achievements in academic skills
 - Music and phonetic awareness
 - Music and higher-order cognition
 - Sports?




Study background

Far transfer of sports/critical review paper writes

- "Limited evidence was available concerning the effects of physical activity on learning, with only one cross-sectional study meeting the inclusion criteria."
- "Although favorable results have been obtained from cross-sectional and longitudinal studies related to academic achievement, the results obtained from controlled experiments evaluating the benefits of physical activities on academic performance are mixed, and additional, well-designed studies are needed"

Donnelly et al. 2016 Medicine & Science in Sports & Exercise



Study background

- Great majority of the evidence is obtained in
 - Correlational paradigms
 - Cross-sectional studies
 - Bias: Children with hobbies have higher SES and more motivation for learning in general
 - Problem in randomization of participants into hobbies => high drop-out rates
- Need of studies in which music and sports are added to curriculum of all children

Study background



Programs in community settings

- 1) USA, by prof. Damasio and by prof. Kraus
 - Children from low-income neighborhoods
 - Music training with instrumental instruction
- 2) Finland, Helsinki by profs. Juntunen and Tervaniemi
 - Started October 2016
 - Follow-up
 - Part of large 6-yr project www.artsequal.fi

Study paradigm



Pre-intervention tests

Extra curricular lessons in music or in sports

Control class without extra lessons

Post-intervention tests

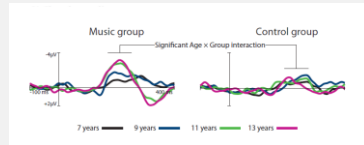
Study paradigm



Research methods in pre- and post-tests

- Behavioral methods/Group tests
- Behavioral methods/Individual tests
- Brain measures/EEG
- In the post-tests, the students will be also asked for their feedback regarding the intervention programs.

Previous EEG studies – Chord stimulation

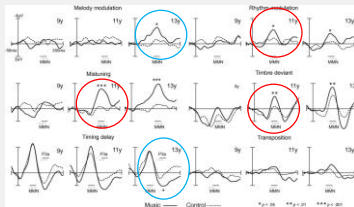


No group differences prior to training

No group differences when non-musical sounds were used

Putkinen et al. (2014)
Developmental Science

Previous EEG studies: Development of the neural discrimination of melodic "mistakes"



Same paradigm used for adult musicians by Tervaniemi et al. (2016) *Frontiers in Psychology*

Putkinen et al. (2014) *Neurobiology of Learning and Memory*



Thank you

