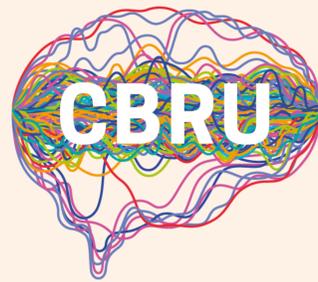


Doctoral Program
Brain & Mind



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI
KASVATUSTIETEELLINEN TIEDEKUNTA
PEDAGOGISKA FAKULTETEN
FACULTY OF EDUCATIONAL SCIENCES

Music May Boost Cognitive Development: Evidence From Longitudinal Studies

Peixin Nie¹ & Mari Tervaniemi¹

¹Cicero Learning and Cognitive Brain Research Unit, Faculty of Educational Sciences, University of Helsinki, Helsinki

Music and Its Cognitive Benefits

“Can music make people smarter?”

--- To some extent, Yes! Music can benefit human's brain in varieties of ways. The cognitive abilities will be enhanced during the music activities.

Executive functions include critical tasks like processing and storing information, controlling behavior, making decisions, and problem solving. These processes help us navigate the world we live in and are essential to efficiently processing information.

Phonological awareness is a skill that allows kids to recognize and work with the sounds of speech language. It is the foundation for learning to read.

Brain plasticity is the brain's ability to change. The brain modify its connections or rewire itself to be able to develop certain function from infancy through to adulthood.



Working memory is a cognitive system that holds information temporarily to process the current task. A good working memory helps people to perform better in learning and thinking.

Music Training in Schools

School-aged children have enhanced cognitive functions after 0.5 – 3 years of music training when compared with non-music trained children.

- Tierney et al (2015) found accelerated neurodevelopment which support the speech processing in music trained adolescents;
- Schellenberg (2004) found small but significant increased full-scaled IQ in musically trained 6-years old children, compared to other group;
- Linnavalli et al (2018) found enhanced linguistic skills in pre-school children who attended music playschool weekly in Finland.
-

- Instrumental: piano/keyboard, violin learning
- Singing/voice lessons
- Fundamental music instructions/music classes

Current Project



Baseline:
Brain activities
Cognitive abilities
Language abilities
.....

1-year after-class training at school:
English/music/passive control

Post-test
Brain activities
Cognitive abilities
Language abilities
.....



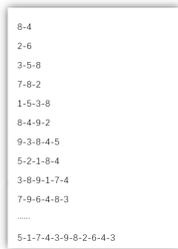
Participants in EEG recording



Block design in intelligent test -- visual spatial ability



Participants doing behavioral test on computer



Digit span in intelligent test -- short memory and working memory

Results and Conclusions

- Effect on digit span task (short term memory/working memory)

RESULTS:

*No significant interactions were found in the total score. Interaction only existed in **backward span task**, but not in forward span task. The results illustrated that **music group increased more on backward digit span task score than the other two groups.***

CONCLUSION:

Music training can enhance children's working memory which requires more executive function and attention, compared with English training and no training.

Reference

- Linnavalli, T., Putkinen, V., Lipsanen, J., Huotilainen, M., & Tervaniemi, M. (2018). Music playschool enhances children's linguistic skills. *Scientific reports*, 8(1), 1-10.
- Schellenberg, E. G. (2004). Music lessons enhance IQ. *Psychological Science*, 15(8), 511-514.
- Tierney, A. T., Krizman, J., & Kraus, N. (2015). Music training alters the course of adolescent auditory development. *Proceedings of the National Academy of Sciences*, 112(32), 10062-10067.