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Does Music Instruction Improve Fine Motor Abilities?

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ABSTRACT: The fine motor abilities of children who participated in two years of piano instruction and those who had never received formal music training were compared before and after the instruction. A significant improvement in fine motor skills was found only for the children who received the lessons, and a significant difference in the speed of response was found between the two groups at the end of the two years of instruction. The innumerable opportunities to assess, refine, and time their motor responses to specific stimuli during musical practice and the availability of constant evaluative feedback (i.e., sound) may allow musicians to improve the accuracy and speed of perceiving and responding to relevant stimuli.

KEYWORDS: children; motor response; music instruction; music education; music practice

INTRODUCTION

Musicians outperform nonmusicians in certain perception tasks that require an accurate and immediate motor response to a visual stimulus.¹ These results have been taken as evidence that music training increases the speed and accuracy of the visual–motor association. Similarly, the anatomical differences in the sensorimotor cortex found between musicians and nonmusicians suggest that extensive music practice affects the organization of this cortical area.^{2–5} Studies that focused on the cortical representation of hand fingers during intensive keyboard practice sessions have indeed shown clear changes over periods as short as five days and as long as two weeks.⁵ No longitudinal research exists on the neurological changes that occur over longer periods of musical practice.

Although a few studies conducted with young children suggest that early music instruction improves performance in visual–motor tasks,^{6,7} others showed no significant fine motor skills improvements after five months of violin instruction.⁸ The effects of instrumental practice on fine motor skills in children have not been studied systematically despite the strong belief among parents and educators that learning to play an instrument improves dexterity and motor control.

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METHOD

Children ($n = 117$) attending 16 public schools who had no formal music instruction, no piano at home, and family annual incomes below \$30,000 were randomly assigned to either the experimental group receiving two years of individual piano lessons weekly or the control group receiving no formal music instruction. Children in the experimental group received acoustic pianos and practiced, as an average, up to 3.5 hours weekly.⁹ The cognitive abilities, academic achievement, musical abilities, self-esteem, and motor proficiency of the two groups were comparable at the start of the project as determined by standardized tests.¹⁰

Fifty-one children in the experimental group and 39 children in the control group completed the fine motor components of the Bruinsky-Oseretsky Motor Proficiency Test before and after the two years of instruction. The total scores of the fine motor test and the scores in subtest 6: Response Speed, subtest 7: Visual-Motor Control, and subtest 8: Upper-Limb Speed and Dexterity were analyzed through ANOVAs with repeated measures.

RESULTS

Significant group (piano/non-piano group) \times instruction (pre/posttest, repeated measures) interactions were found for the total fine motor scores and the response speed subtest scores $F(1,88) = 4.01$ $P < .05$ and $F(1,88) = 13.61$ $P < .001$, respectively. The fine motor skills of the piano group improved significantly more during the two years of the project than did those of the control group, and the differences in Subtest 6 scores between the two groups of children were significant only after the two years of piano instruction. These results suggest that the improvement in motor proficiency was mainly caused by differential scores in the speed subtest which required children to react quickly to catch a rod that was sliding down against a wall. Scores in tasks that measured eye-hand coordination and dexterity were not affected by the lessons.

CONCLUSIONS

Music performance requires accurate and quick motor reaction to visual, aural, and kinesthetic stimuli. When performers practice their instruments, they receive immediate and consistent aural feedback about their motor response to such stimuli. The innumerable opportunities to assess, refine, and time their motor responses to specific stimuli during musical practice and the availability of constant evaluative feedback (i.e., sound) may allow musicians to improve the accuracy and speed in perceiving the stimuli and responding to it.

[Competing interests: The authors declare that they have no competing financial interests.]

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