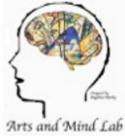


# The Effects of Intensive General Music Class on Kindergartners' Executive Functioning and Self-Perception

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## Introduction

In the field of arts education, correlational findings about extra-musical benefits of music education have been reported. There is some evidence that children with instrumental music education have better executive functioning (Bialstok & DePape, 2009; Dege, Kubicek & Schwarzer, 2011; Holochwost et al., in press) and more positive self-perception (Kokotski & Hallam, 2007; Rickard et al., 2012) than those without music education.

While most studies have examined instrumental training, almost none have examined effects of general music, which 94% of elementary schools in the USA provide (Sparks, Zhang & Bahr, 2015).

Here, we examine potential extra-musical benefits of general music class.

## Method

### Participants

Two cohorts of kindergarten children totalling 203 participated, all of whom applied one of three schools with *El Sistema*-inspired orchestral music programs. At Sites 1 and 2 admission is by lottery; at Site 3 it is first-come first-served. Control children were those who applied but were not admitted; treatment children were those admitted.

### Intervention

All received general music but treatment children received from 2 - 6 times more minutes per week than did control children. General music traditionally includes singing, playing simple unpitched percussion instruments, moving and listening to music, and learning to identify different musical instruments.

	Treatment Sites	N	Time	Control Sites	N	Time
1	Public Charter	35	90	Public Traditional	29	45
2	Public Charter	64	297	Public Traditional	55	45
3	Public Traditional	15	315	Same School	7	45

\*Time is average minutes/week of music class

### Hypotheses

Music group > Control group on executive functions, self-perception and school attitude.

## Research Question

Does increasing the amount of time in general music class for low-income kindergarten students result in increased gains in executive functions, self-perception, and/or relationship to school?

## Method (continued)

### Measures

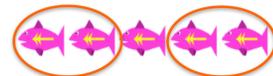
#### Executive Functions

Flanker/Reverse Flanker task (Diamond, et al., 2007)

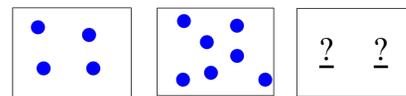
When the fish are blue, press where the MIDDLE fish is facing.



When the fish are pink, press where the OUTSIDE fish are facing.



Dot Counting (Kramer et al., 2014 from Case et al., 1982)



Backward Digit Span (Weschler, 2003)

Hear: "5, 1, 4"  
Say it backwards: 4, 1, 5

Category Fluency (Benton, 1968)

Name as many animals as you can in one minute.

#### Self-Perception

The Pictorial Scale of Perceived Competence and Social Acceptance for Young Children (Harter & Pike, 1983); peer acceptance and cognitive competency sub-scales

This girl isn't very good at puzzles  
This girl is pretty good at puzzles



○ ○ ○ ○  
"Can you tell me which girl is most like you?"

#### Relationship to School

Researcher-designed Likert scale

When I think about going to school, I feel:  
A B C D E F G

## Results

A series of univariate ANOVAs were performed, one dependent measure at a time, testing for main effects of group, site, gender, and cohort, and for two-way interactions between group and site, group and gender, and group and cohort.

**No main effects of group were detected.**

There were some other effects unrelated to the hypothesis, and did not involve group:

Boys outperformed girls in some flanker task analyses (reverse flanker and mixed flanker response times and global switch cost for accuracy), consistent with some previous research (Clayson, Clawson & Larson, 2011).

Sites differed for 2 tasks (dot counting, mixed flanker response time) -- not surprising because our sites differ in proportions of students with high needs concerns (homelessness, emotional/behavioral disorders).

One cohort outperformed the other on one dependent measure (reverse flanker response time).

Our sample size was large enough to detect an effect of group if there had been one, as shown by a power analysis: The *F* test for the main effect of group (numerator *df* = 1) was able to detect an effect that is as small as partial  $\eta^2 = .036$ , which corresponds to Cohen's *d* = 0.386, with .8 power. The estimated effect size  $\eta^2$  for the main effect of group was smaller than .01 for most measures.

## Conclusions and Limitations

Our findings suggest no effect of additional time in general music class on executive functioning, self-perception, and school attitude.

All children received general music. General music (in any amount) may either: (a) not have an effect or (b) both small and large dosages of it may have comparable benefits. Both interpretations are possible.

Because of random assignment we assume no group differences at the beginning of kindergarten, but we cannot be sure due to no pretesting. If the music group began the year behind the control group, the lack of significant differences at the end of the year would yield a different interpretation.

## Future Steps

This study has shown no significant pre-existing differences between groups on our measures at the end of kindergarten. Children in the treatment group will receive intensive *El Sistema*-inspired orchestral instrument training in first grade, while control students will not.

We will follow these children through the end of second grade to test the effects of *Sistema*-inspired orchestral training on the same three dependent variables.

We predict that *Sistema*-inspired orchestral training will improve executive functions more than general music because (a) *Sistema*-type training challenges children to extend beyond their comfort zone, critical for improvements in executive functions (Diamond & Ling, 2016) and (b) playing in an ensemble is likely to enhance feelings of belonging and confidence (Bartolome, 2013; Hogan & Winner, in press; Morrison, 2001) and improving social and emotional well-being is also hypothesized to improve executive functions (Diamond & Ling, 2016). The latter is also predicted to improve self-perception and school attitude more than general music.

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