A Comparison of PSSA Scores between Music and Non-Music Students: Summary Report
April, 2007

Primary Researcher: Dr. Linda Thornton, Chair, PMEA Research Committee and Assistant Professor, Music Education at The Pennsylvania State University (lct12@psu.edu)
Assistant Researchers: Elizabeth Fino-Radin, Beth Gibbs, Yun-Fei Hsee, Dave Knauss, Joseph Scheivert, Rebecca Stuetz Thompson, Sarah Watts

During this time of high-stakes testing in specified academic areas, competition for student time and resources has increased. Since lackluster scores can mean serious consequences for school districts, many schools have shifted their priorities in favor of the subjects being tested.

The effects on music education can be imagined and seen financially, in division of resources, and in particular allocation of student time. Students may be discouraged from participating in after-school musical opportunities for fear of detracting from their studies in tested subjects. Students may also be counseled from participation in voluntary music activities during the school day to encourage further study time. And finally students dependent on pull-out programs for their music instruction, as is common for instrumental music education, are pressured to not miss class time to attend lessons.

However, the time given to music instruction has been examined through a variety of research lenses, and the findings are consistent that music study does not negatively impact success in other scholastic areas. In summary from their literature review, Demorest and Morrison (2000) conclude ". . . music participation does not interfere with academic progress" (p. 39). In fact, Schellenberg (2006) found a positive association with music study and scores on standardized IQ tests. Kinney and Forsythe (2005) found significant gains on state test scores for students involved in a general arts program, with the greatest increases found among low socio-economic status students. Further, the preliminary work of Abeles (2007) indicates elementary students in Newark, NJ who participated in string instruction from second until fourth grade reached proficiency on state tests at a higher rate than all other students in the school district.

Some research studies have focused on the effects of pull-out instrumental lessons. Clearly, this seems to have the potential for the most direct interference with instruction and is of great concern to teachers of students in the PSSA-tested fifth grade level. In the case of sixth grade students (Kvet, 1985) and a broader population of fourth through eighth grade students (Neuharth, 2000), no negative effects were found in standardized measures of academic achievement (Neuharth), for math achievement (Harbursky & Omniewski, 1999) for math, reading and literacy achievement (Kvet), or state test scores (Wallick, 1998) due to instrumental music instruction (see Hash, 2004). Further, Fitzpatrick (2006) found state test scores of lower-socio-economic-status students involved with instrumental music surpassed scores of higher-socio-economic-status students not involved in music by ninth grade.

Research regarding the achievement of high school students has also found no negative effect for music participation. According to Taetle (1999), high school juniors who participated in music had overall better grade point averages than those students who

This study was sponsored by the Pennsylvania Music Educators Association
The Center for the Study of Music Learning and Teaching at The Pennsylvania State University

did not participate in music. Trent (1996) found a similar result when examining standardized test scores and grade point averages of band members who were seniors in high school. Also of note, since Higgins in 1972 similarly noted the positive trend for music students in academic achievement measured by both grade point average and standardized test scores, it may be safe to assume that a relationship between academic success and music participation has remained consistent over time.

The purpose of the present study was to determine if students who participate in voluntary music activities (music students) score differently on the Pennsylvania System of School Assessment (PSSA) than students who do not participate in voluntary music activities (non-music students). If the music student scores are not lower than the non-music student scores, music teachers may be able to encourage administrators, parents, and other interested parties to assist students in their pursuit of musical involvement.

Procedures

Definition of Music Participant. In this report, and in all communications with participating school districts, a music participant is a student who participates in at least one of the following: 1) Voluntary curricular music activities, such as band, choir and orchestra and/or 2) Voluntary extra-curricular music activities, such as show choir, marching band, district ensembles, etc.

Selection of School Districts. All public school districts in Pennsylvania (excluding charter schools, vocational schools, and other specialized districts) were divided geographically by Instructional Unit (IU). Within each IU, the districts were organized by high, middle, or low socio-economic status (SES), based on the percentage of students on free or reduced lunch. Lastly, one-third of the schools in each category (high, middle, or low SES) were randomly selected for participation in the study. A total of 187 districts, approximately one-third of all Pennsylvania public school districts, were selected for the investigation.

Contact with Districts. In late January, 2006, the Pennsylvania Music Educators Association (PMEA) District presidents were sent a list of the schools within their PMEA District that were selected for participation. They were asked to tell teachers in their PMEA district about the project, and encourage participation by the schools that had been selected. In mid-February, letters were mailed to music teachers in the selected districts to inform them of the project and ask for their assistance. Immediately following, formal letters of request for participation were sent to the superintendents of the selected districts. Three weeks later, follow-up emails were sent to the superintendents.

In June, 2006, follow-up emails were again sent to district superintendents who had not yet responded. In July, 2006, PMEA District Presidents were again contacted to distribute information to the selected school districts in their PMEA District.

Results

Responses. The response rate from the 187 contacted districts was low. A total of 36 districts responded to the requests for data. Of those 36 districts, 21 declined the offer to participate. Reasons stated for choosing not to participate included lack of resources (not enough time and/or staff), lack of interest, no means for collecting such data, or advised not to release data. Two districts agreed to participate, but no scores were received, even after several follow-up contacts were initiated. Two districts sent

scores in a format unusable for statistical analysis (categories such as "proficient" and "basic" rather than raw scores). Therefore, this report contains data from 11 responding districts. It is worthy to note that one very large urban school district gave permission to collect data within the district, but very few schools within the district responded. The principals who responded stated that the number of students involved in band, choir or orchestra was so small (10 to 15 from thousands of students) that their data would not be helpful.

Participants. The 11 responding districts yielded scores from a total of 6,984 students. The total number of music participants was 2,001 and non-music participants were 4,983. Six of the responding districts had a total enrollment for the entire district of between 2,000 and 4,000 students. Three districts had a total enrollment of less than 2,000 students, and the remaining two districts had populations close to 10,000 students. The percent of low income students in the responding districts ranged from 9% to 36% (see Tables 1, 2 and 3).

Four responding districts (A, G, I and K) did not send data for all grade levels. The responses from school I reflects just one elementary school in a large district. The analyses for all data, therefore, are divided by grade level.

Table 1. Schools providing data for 5th Grade.

School	Grades Reported	Total Participants	Music Participants	Non-Music Participants	Rounded District Population	% Low Income
A	5	122	15	107	2900	14%
B	5	650	303	347	9700	8%
C	5	152	27	125	2000	36%
D	5	72	17	55	800	30%
E	5	351	160	191	4000	9%
F	5	132	66	66	3000	25%
H	5	229	127	102	3000	11%
I	5	44	30	14	11000	18%
J	5	103	27	76	1400	26%

Table 2. Schools providing data for 8th grade.

School	Grades Reported	Total Participants	Music Participants	Non-Music Participants	Rounded District Population	% Low Income
B	8	868	244	624	9700	8%
C	8	145	53	92	2000	36%
D	8	61	17	34	800	30%
E	8	307	75	232	4000	9%
F	8	319	52	267	3000	25%
G	8	256	18	238	3000	16%
H	8	291	143	148	3000	11%
J	8	106	40	66	1400	26%

Table 3. Schools providing data for 11th grade.

School	Grades Reported	Total Participants	Music Participants	Non-Music Participants	Rounded District Population	% Low Income
B	11	802	103	699	9700	8%
C	11	175	20	155	2000	36%
D	11	56	20	36	800	30%
E	11	314	44	270	4000	9%
F	11	866	244	622	3000	25%
H	11	240	48	192	3000	11%
J	11	101	23	78	1400	26%
K	11	232	85	147	3200	16%

Comparison of Scores. Six statistical tests were performed with the data. Each test was a two-tailed *t* test, which examines differences between two groups of data. A *t* test was performed with the data for 5th grade reading scores (comparing music students and non-music students), 5th grade math scores, 8th grade reading scores, 8th grade math scores and 11th grade reading and 11th grade math scores. For each comparison, the music students' scores were significantly higher than the scores of the non-music students ($p < .001$). Tables 4, 5 and 6 show the average scores of the students.

Table 4. Grade 5 results.*

	# of Participants	Average Reading	Average Math
Music students	773	1415.80	1492.86
Non-music students	1078	1360.45	1449.87

Table 5. Grade 8 results.*

	# of Participants	Average Reading	Average Math
Music students	642	1516.78	1489.13
Non-music students	1688	1380.76	1404.75

Table 6. Grade 11 results.*

	# of Participants	Average Reading	Average Math
Music students	587	1525.64	1487.02
Non-music students	2197	1350.28	1353.03

*Differences between scores are statistically significant at the $p < .001$ level.

Discussion

Limitations of the results. While the statistical analyses revealed significant differences between music and non-music students' PSSA test scores, there are several reasons to view these results with caution. Most importantly, the data represents scores

reported by the school districts that may not have interpreted the definition of "voluntary music participation" in the same way, even with the provided definition. It is possible that some administrators interpreted the definitions more or less broadly based on their school culture or other factors. Further, the sample sizes are very different between the music and non-music participants. For example, in the eleventh grade results, there are close to four times more non-music participants than music participants. While the statistical analysis accounts for unequal numbers in the comparison, such extremes warrant caution in interpreting the results. Lastly, the small sample size (11 total schools) makes generalizing the results somewhat questionable. Again, while the significance is strong, these 11 school districts may or may not be representative of all school districts in Pennsylvania. The total district population and proportion of free or reduced lunch helps to identify the types of schools responding to the inquiry, and can guide the generalizability of the findings.

Conclusions. It would seem that many Pennsylvania students who voluntarily participate in music programs such as band, choir and orchestra perform significantly better on PSSA tests than students who choose not to participate is such activities. This result is consistent with other research in other states and with different achievement criterion (Fitzpatrick, 2006; Kvet, 1985; Neuharth, 2000; Schellenberg, 2006; Taetle, 1999; Trent, 1996).

It is necessary to note that a significant difference between the scores does not mean a cause-and-effect relationship exists. These results do not indicate that students achieved higher scores on their PSSA tests because they were in music. As has been stated in much literature on this topic, there are several reasons that contribute to a possible relationship between academic achievement and musical participation; most notably parental involvement and support in students' education and educational opportunities (see Demorest & Morrison, 2000; Waterhouse, 2006).

Of further interest, or perhaps concern, is the low response rate of school districts. While it is likely many districts did not have the resources to consolidate the data as requested, informal discussions with music teachers as well as the tone of some administrator responses imply that many administrators are extremely wary of sharing test scores. This reluctance could be due to the extreme pressure administrators feel regarding the importance of the test scores and the many sensitive issues related to state testing. Another explanation could be that administrators are not interested in the possible effects of music study and therefore were unwilling to devote time or resources to examine the issue. There are probably vast numbers of additional explanations, as well.

However, as stated at the beginning of this report, the purpose of this study was to examine whether music participation negatively impacts PSSA test scores, and the data clearly show that music students' scores are not lower than those of non-music students. For music teachers in Pennsylvania the most appropriate and positive use of this data is to demonstrate that the time students invest in music participation does not negatively impact PSSA scores, and therefore could be a basis to argue against time being taken from these programs in favor of more PSSA preparation.

References and Suggested Reading

Abeles, H. (2007, March). The effect of string instruction on students' performance on state-mandated achievement tests in mathematics and language arts. Paper presented at the 50th MENC Eastern Division Biennial In-Service Conference, Hartford, CT.

Brandler, S. (2003). Differences in mental abilities between musicians and non-musicians. *Psychology of Music, 31*(2), 123-128.

Costa-Giomi, E. (2004). Effects of three years of piano instruction on children's academic achievement, school performance and self-esteem. *Psychology of Music, 32*(2), 138-152.

Demorest, S. M. & Morrison, S. J. (2000). Special Focus: Music and the Brain: Does music make you smarter? *Music Educators Journal, 87*(2), 33-38, 59.

Fitzpatrick, K. R. (2006). The effect of instrumental music participation and socioeconomic status on Ohio fourth-, sixth-, and ninth-grade proficiency test performance. *Journal of Research in Music Education, 54*(1), 73-84.

Harbursky, B. & Omniewski, R. A. (1999). Does arts infusion make a difference? The effect of an arts infusion approach on mathematics achievement. *Contributions to Music Education, 26*(2), 38-50.

Hash, P.M. (2004). Literature review: Pullout lessons in instrumental music education. *Bulletin of the Council for Research in Music Education, 159,* 1-10.

Higgins, W. (1972). A study of the effect of participation in a high school band on academic achievement and social adjustment. *Journal of Band Research, 9*(1), 12-16.

Kinney, D. & Forsythe, J. (2005). The effects of the arts IMPACT curriculum upon student performance on the Ohio fourth-grade proficiency test. *Bulletin of the Council of Research in Music Education, 163,* p. 1-14.

Kvet, E. (1985). Excusing elementary school students from regular classroom activities for the study of instrumental music: The effect on sixth-grade reading, language, and mathematics achievement. *Journal of Research in Music Education, 33*(1), 45-54.

Lee, B. & Lee W. (2001). Music makes you smarter- Is there any evidence? *Canadian Music Educator, 43*(2), 11-12.

Mark, M. (2002). A history of music education advocacy. *Music Educators Journal, 89*(1), 44-48.

Neuharth, R. H. (2000). A Comparision of Achievement Test Scores of Band and Non-band Students in a Rural Public School. Unpublished Dissertation, University of South Dakota. AAT 9978848.

Racin, L. R. (1999). Research linking music and intelligence: Helpful or harmful to the string profession? *American String Teacher, 49*(1), 86-87, 89-95.

Schellenberg, E. G. (2006). Long-term positive associations between music lessons and IQ. *Journal of Educational Psychology, 98*(2), 457-468.

Taetle, L. (1999). The relationship between fine arts participation and daily school attendance at the secondary level. *Contributions to Music Education, 26*(1), 50-67.

Trent, D. E. (1996). The Impact of Instrumental Music Education on Academic Achievement. Unpublished dissertation, East Texas State University. AAT 9638444.

Wallick, M. D. (1998). A comparison study of the Ohio Proficiency Test results between fourth-grade string pullout students and those of matched ability. *Journal of Research in Music Education, 46*(2), 239-247.

Waterhouse, L. (2006). Inadequate evidence for multiple intelligences, Mozart effect, and emotional intelligence theories. *Educational Psychologist, 41*(4), 247-255.