

A Comparison of State Assessment Scores Between Music and Nonmusic Students

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Abstract

For several years, an emphasis on standardized testing in certain subjects has often resulted in competition for student time and scheduling choices that may not favor music classes. However, a great deal of literature exists to indicate that music students achieve more success than nonmusic students on a variety of academic measures. The purpose of this study was to conduct a statewide comparison of test scores for students involved in voluntary music classes or ensembles and students not involved in such activities. Scores from almost 7,000 students in the three grades tested by the state (5, 8, 11) were generated from a variety of districts throughout the state. Significantly higher scores were found for students involved in music compared with students not involved in music. It would seem music students did not have a disadvantage on the state test, despite the time they spent on musical activities.

Keywords

academic achievement, music participation, music students, state assessment, standardized testing, test scores

The current public school educational climate emphasizes testing in specified academic areas, creating an increase in competition for student time and resources. Since lackluster scores can mean serious consequences for school districts, many schools have shifted their priorities in favor of the subjects being tested (Abril & Gault, 2006, 2008).

The effects on music education can be imagined (and realized) in the form of financial decisions, 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 classroom and study time. And finally, since instrumental music instruction often depends on pullout lesson programs, students could be pressured to miss in-school music lessons in order to remain in regular classes.

However, the time given to music instruction has been examined in many studies, and the findings consistently indicate that a positive relationship exists between music study and measured academic success. In summary from their literature review, Demorest and Morrison (2000) concluded “. . . music participation does not interfere with academic progress” (p. 39). Schellenberg (2006) found a positive association with music study and scores on standardized IQ tests, as did Miksza (2007) in a national, longitudinal study of high school students’ standardized test scores. Kinney and Forsythe (2005) determined significant

gains on state test scores for students involved in a general arts program, with the greatest increases found among low socioeconomic status (SES) students. Furthermore, the preliminary work of Abeles (2007) indicated elementary students in Newark, New Jersey 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. Additional studies elucidate the role of SES in academic achievement and music participation, which further contribute to our understanding of arts participation (e.g., Catterall, Chapleau, & Iwanaga, 2000; Peters, 1973).

Instrumental music instruction specifically has been examined related to a relationship with standardized measures of academic achievement. Fitzpatrick (2006) found state test scores of lower SES students involved with instrumental music “. . . surpassed their higher SES non-instrumental classmates by the ninth grade in all [tested] subjects” (p. 73). Fitzpatrick’s report supported the earlier conclusions of Cobb (1997), Higgins (1972), Taetle (1999), Trent (1996), Underwood (2000), and Zanutto (1997), that high school students participating in instrumental music showed higher levels on various measures of academic achievement than students not participating

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in instrumental music. Focusing on middle school students, Helmrich (2008) found significantly higher achievement in algebra by instrumental students in Grades 6 to 8 compared with the algebra scores of choral students, and both music participation groups scored significantly higher than students not enrolled in school music groups. Furthermore, it was found that fourth-grade students involved in twice-per-week pullout string instruction had statistically higher reading and citizenship scores on the state test compared with students not involved in string instruction; state math and writing scores were not found to be different between the two groups (Wallick, 1998).

Because of the direct interruption of class time in tested subjects, some investigators have specifically targeted the effects of pullout instrumental lessons on non-music academic achievement. Kvet (1985) found no negative effects for sixth graders on their math, reading, and literacy achievement when pulled out of classes for instrumental instruction. Furthermore, Neuharth (2000) examined a broader population of fourth- through eighth-grade students in pullout instrumental lessons and also revealed no detriment to standardized measures of academic achievement (see also Hash, 2004).

Researchers have also examined music instruction and nonmusic academic achievement related to other types of school programs. Perry's (1993) experimental study indicated fourth- and fifth-grade students involved in instrumental instruction showed significant gains in math and reading scores, similar to the significant gains for fourth- and fifth-grade students involved in a parental support group. Furthermore, the gains from both experimental groups were greater than scores of students involved in neither instrumental music instruction nor the parent support group. Miranda (2001) and Schneider (2000) each discovered that students participating in music had overall higher academic achievement (measured by grade point average and standardized test scores) than students involved in athletics. Shropshire's (2007) research, however, indicated high-school students involved in both music and athletics achieved the highest state standardized test scores when compared with students participating in only one of the two activities.

Many of the studies cited thus far indicated that music study, alone or viewed with other factors, was a common presence among students who did well on standardized tests and other measures of nonmusic academic achievement (e.g., Fitzpatrick, 2006; Kinney & Forsythe, 2005). These studies are compelling, yet do not completely control for the many other factors that could influence test scores, such as home environment, parental support, SES, student self-efficacy, and so on in the same manner as experimental studies. However, limited reports exist of actual experimental-type studies in which the researcher implemented a musical treatment with some students and not others to

determine the influence of music participation. Andrews (1997) discovered a program integrating music and reading had a positive benefit on student attitudes but did not increase (nor decrease) achievement in music or reading.

Seeking a cause-and-effect relationship between music and math, Gregory (1988) revealed significant gains in the math achievement scores of third-grade students involved in a researcher-designed music curriculum. Whitehead (2001) found middle and high school students involved in Orff-Schulwerk instruction every day achieved higher math scores than students involved in music instruction once per week and students receiving no music instruction.

In an innovative approach to examine a music and academic achievement relationship, Johnson and Memmott (2006) sought to determine if the quality of music instruction affected the relationship between measured academic achievement and music participation. In general, higher quality music education was associated with higher standardized state test scores. However, the authors noted that a high-quality music education is likely often accompanied by high-quality instruction in other academic areas of a school district.

In the current climate of high-stakes testing, a large-scale examination of a single state's test scores for students involved in school music activities was requested by the Pennsylvania Department of Education Art Area and the Pennsylvania Music Educators Association. 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 (nonmusic students).

Procedures

For the purposes of this study, and in all communications with participating school districts, a music student was defined as a student who participates in at least one of the following: (a) Voluntary curricular music activities, such as band, choir, and orchestra and/or (b) Voluntary extra-curricular music activities, such as show choir, marching band, district ensembles, and so on. While there are other school musical activities available to students, such as guitar or piano classes, the purpose here was to examine courses that are often considered cocurricular (often requiring participation outside of the school day or being pulled out of other classes) and courses that students may elect to continue over many years.

School District Selection

School districts were selected for participation to achieve equal representation in regard to geography and SES. All public school districts in Pennsylvania are divided by the Pennsylvania Department of Education into Instructional

Units (IUs) based on geography and population density. In the present study, the IU organization was used to balance geographic representation in the sample. A list of all school districts (excluding charter schools, vocational schools, and other specialized districts) divided by respective IUs was generated. Within each IU, the districts were sorted into high, middle, or low SES, based on the percentage of students on free or reduced lunch, relative to the schools within the IU. Last, one third of the schools in each category (high, middle, or low SES in each IU) were randomly selected for participation in the study. (Since the SES range was specific to each IU, a “low SES” district in one IU could be equivalent to a “high SES” in another IU, and therefore these designations were not carried through the investigation as a source for comparison among districts). A total of 187 districts, approximately one third of all Pennsylvania public school districts, were selected for the investigation.

Recruitment letters for the study were sent to district superintendents, requesting districts provide lists of scores from the math and reading PSSA tests for Grades 5, 8, and 11 for the specified school year. The letters asked that the math and reading scores each be divided into two lists, one of “music students” and one of “non-music students.” No other information (e.g., gender, SES, etc.) was requested from the district, as the researcher’s Office of Research Protections did not allow collection of such information. An e-mail address and a stamped, self-addressed envelope were included to assist in returning the scores.

In order to assist administrators in identification of students involved in music, information about the study was sent to the music teachers in the districts. In late January, the Pennsylvania Music Educators Association (PMEA) District presidents were sent a list of the schools within their PMEA District selected for participation. Presidents 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 school districts to inform them of the project and ask for their assistance. Immediately following, the letters requesting participation were sent to the superintendents of the selected school districts. Three weeks later, follow-up e-mails were sent to the superintendents.

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

Results

Conducting this study uncovered strong feelings concerning state test scores and the difficulty districts have in

compiling data for analysis. Of the 187 contacted districts, a total of 36 districts responded to the requests for data. Of those 36 districts, 21 declined the offer to participate. Among a wide range of politeness, reasons stated for choosing to not participate included lack of resources (not enough time and/or staff), lack of interest, no means for collecting such data, or “advised to not release data.” Four districts agreed to participate but the researcher did not receive usable scores. Therefore, this report contains data from 11 responding districts. This represents fewer than 6% of the districts originally selected for participation, which means the results reported here may not be generalizable or applicable to any other school 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 (10–15 music students among thousands of students) that their data would not be helpful.

Participants

Of the 11 responding districts, the majority, 6, were of moderate size (2,500 to 4,000 district enrollment). Three districts were small (2,000 or less total enrollment) and the remaining two districts had large enrollments (more than 9,000 students). The percent of low-income students in the responding districts ranged from 8% to 36% (see Table 1 for description of school districts and responding grades). The statewide average for low-income students that same year was 34.9%, therefore it would seem a majority of the scores represent students from average or higher income for the state (Pennsylvania Department of Education, 2012).

The 11 responding districts yielded scores from a total of 6,984 students. The total number of music students was 2,001 (29%) and the total of nonmusic students was 4,983 (71%). The total population of fifth graders was 1,851. Of those students, 773 (42%) were identified as “music students” and the remaining were identified as “nonmusic students.” The total eighth-grade population was 2,330 students, of which 642 (28%) were labeled as “music students.” In the eleventh grade, data were reported for a total of 2,734 students, with 587 (21%) students listed as “music students.”

Comparison of Scores

The data were provided in a variety of formats, determined by the school district supplying the data. It cannot be assumed that the math and reading scores provided were paired; nor can it be assumed that the exact same students were represented in both lists of scores. For example, some schools’ data included scores of “0,”

Table 1. Responding School Districts.

School	Grades reported	Rounded district population	% Low income
A	5	2,900	14
B	5, 8, 11	9,700	8
C	5, 8, 11	2,000	36
D	5, 8, 11	800	30
E	5, 8, 11	4,000	9
F	5, 8, 11	3,000	25
G	8	3,000	16
H	5, 8, 11	3,000	11
I	5 (single building)	11,000	18
J	5, 8, 11	1,400	26
K	11	3,200	16

Note. District population was presented as a rounded figure to maintain confidentiality.

Table 2. Results of Two-Tailed *t* Test Comparing Scores of Musicians and Nonmusicians.

	Music/nonmusic		<i>df</i>	<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>			
5th Grade (<i>n</i> = 1,851)					
Reading	1415.80/1360.45	224.18/237.16	1849	5.07	.000
Math	1492.86/1449.87	188.86/215.39	1849	4.46	.000
8th Grade (<i>n</i> = 2,331)					
Reading	1516.78/1380.76	229.74/273.99	2328	11.17	.000
Math	1489.13/1404.75	198.42/224.76	2329	8.35	.000
11th Grade (<i>n</i> = 2,784)					
Reading	1525.64/1350.28	262.98/342.54	2782	11.53	.000
Math	1487.02/1353.03	246.71/296.58	2782	10.06	.000

Note. The range of possible scores on the PSSA test for both subjects is 700 to 1700. All differences were significant, $p < .000001$.

indicating no score for the test (some schools had more “0” scores in math than reading); other schools’ data did not include any scores of “0,” which indicates the students who did not take one or both tests were not included in the data set. The presence of “0” scores in the data set meant the average scores for each group were slightly lower than if the “0” scores were not present. However, given the large number of scores, this was determined not to be of great concern.

In addition, there was a disparity in the group sizes. There were differences in the number of students in each grade, and the proportion of the population listed as “music students” was different for each grade, noticeably higher in 5th grades compared with the 8th and 11th grades. The proportion of music students and nonmusic students varied widely within each school population as well. Therefore, the data sets for grades were examined separately as were the individual tests (reading and math).

Six two-tailed independent *t* tests comparing music students and nonmusic students’ test scores were performed on the following sets of scores: 5th-grade reading

scores, 5th-grade math scores, 8th-grade reading scores, 8th-grade math scores, 11th-grade math scores, and 11th-grade reading scores. Comparisons were made neither between math and reading scores nor across grade levels. For each comparison, the music students’ scores were significantly higher than the scores of the nonmusic students ($p < .000001$; see Table 2 for results).

Discussion

Eleven districts responded to the requests for PSSA scores sorted by music or nonmusic students. In some cases, as seen in Table 1, a response was received for just one grade level or from just one school in a district. Furthermore, the response rate severely compromises the generalizability of the results. However, nearly 7,000 student score sets were available for analysis, and the results indicated significantly higher scores for students involved in music activities.

While the statistical analyses revealed significant differences between music and nonmusic students’ PSSA test

scores, there are several reasons to view these results with caution. Most important, the data represented scores reported by the school administrators who may not have interpreted the definition of “voluntary music participation” similarly, even with the provided definition (specifically [a] voluntary curricular music activities, such as band, choir, and orchestra and/or [b] voluntary extracurricular music activities, such as show choir, marching band, district ensembles, and so on). It is possible that some administrators interpreted the definitions more or less broadly based on their school culture or other factors.

Furthermore, the sample sizes were very different between the music and nonmusic participants. For example, in the 11th-grade results, there were nearly four times more nonmusic participants than music participants. While the statistical analysis accounted for unequal numbers in the comparison, such extremes warrant caution in interpreting the results. Last, the relatively small sample size (11 total schools) makes generalizing the results questionable. Again, while the significance was strong, these 11 school districts may or may not be representative of all school districts in Pennsylvania or nationally. 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 applicability of the results to other schools (see Table 1).

It would seem that for the responding districts, students who voluntarily participated in music programs, such as band, choir, and orchestra performed significantly better on PSSA tests than students who chose not to participate in such activities. This result was consistent with other research in other states and studies examining different achievement criteria (Fitzpatrick, 2006; Kvet, 1985; Neuharth, 2000; Schellenberg, 2006; Taetle, 1999; Trent, 1996).

Of course, a significant difference between the scores did not mean a cause-and-effect relationship existed. These results did 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 for a possible relationship between various measures of academic achievement and musical participation; most notably parental involvement and support in students' education and educational opportunities (see Demorest & Morrison, 2000; Waterhouse, 2006). Furthermore, the role of SES was not examined in this study. The majority of the responding districts had fewer than 25% of their students receiving free or reduced lunch, which is a lower percentage than the statewide average of 34.9%.

Future research in this area is warranted. As other studies have indicated (Abeles, 2007; Fitzpatrick, 2006; Kinney & Forsythe, 2005), test scores of students from lower SES may have the strongest gain when music study

is a part of their curriculum. A study with a large population such as the current investigation but including SES as a factor, similar to the study of Miksza (2007), could contribute to a richer understanding of the relationship involved between test scores and music study. Although the present research does not demonstrate that music study actually causes higher test scores, future research in a similar vein as Andrews (1997), Gregory (1988), and Whitehead (2001) that strives to examine if a cause-and-effect relationship exists could also further contribute to our understanding of this phenomenon.

In addition, inspection of the means of the current study indicated a possibility that the reading scores for the two groups of students may differ more than the math scores for the two groups in 8th and 11th grades. A large-scale study in which math and reading scores can be definitively attributed to the same students could help examine if reading scores do seem to reflect the greatest difference between the two groups.

This investigation focused on students who participated in band, choir, and orchestra programs in their schools. Since most schools offer other music classes as well, such as guitar, piano, and music appreciation, it would be interesting to pursue whether any type of music class can be related to higher test scores. The attrition in participation in these “traditional” ensembles (42% in 5th grade compared with 21% in 11th grade in the population examined here) was likely due to students selecting out of these musical offerings as they became older; they then may have received music instruction from a variety of required music classes. The “traditional” ensemble attrition, combined with the almost complete lack of participation in such ensembles in the contacted large urban district warrants inclusion of more types of music classes in studies involving secondary-level students in particular.

However, as stated at the beginning of this report, the purpose of this study was to examine whether music students' PSSA test scores were different than nonmusic students' scores, and the data clearly showed that for the responding districts, music students' scores were significantly higher. For music teachers in Pennsylvania, and perhaps other states, the most appropriate and positive use of this data is to demonstrate that the time students invest in music participation does not seem to negatively affect PSSA scores. Through such demonstration, there could be a basis to argue against time being taken from these programs in favor of more standardized test preparation.

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