

## National Levels of School Music Ensemble Participation and Relationships With Academic Achievement

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The multifarious aspects of the teaching and learning of music have not been studied extensively as sociological phenomena (Humphreys, 1996/97). However, the research literature now provides some information about the effects of school music participation on student achievement in other school subjects, at least in the United States (e.g., Fiske, [1998]).

The first advocates of public school music education in the United States justified music's place in the curriculum on non-musical grounds (Birge, 1966; Mark & Gary, 1992). Although some early leading American music educators voiced support for what today philosophers call the intrinsic values of music, non-musical aims dominated in written rationales for including music in the schools until the 1950s.

Political and social trends of the second half of the twentieth century caused American music educators to rethink their rationales for music education. Recent developments have resulted in renewed interest in the non-musical outcomes of music education, exemplified by Elliott's (1995) book on music education philosophy that emphasizes psychological outcomes of music participation and education. Despite the clear need for researchers to examine such outcomes, little research has been done by music educators (Humphreys, 1996/97; Humphreys, May, & Nelson, 1992).

Education researchers have delved into the effects of extracurricular activities on various aspects of students' lives. Among the studies that defined school music-ensemble experiences as part of the extracurricular variable, two large studies (Finn, 1993; OERI, 1986) revealed that the more activities engaged in by students, the higher their academic achievement, a finding that was obtained across racial-ethnic groups and, in one study (Finn, 1993), across gender groups as well.

Several researchers employing causal modeling techniques have found relationships between extracurricular activities and education attainment or educational aspirations, even when socioeconomic status (SES) and academic ability were held constant (Hanks & Eckland, 1976; Otto, 1975, 1976). Burbidge (1991) reported that, in lower grades, girls tend to outperform boys on academic measures. However, the gender differences narrow as children age. Solerzano (1992) reported no significant differences attributable to race or gender of the students in their valuing of education. Similarly, Holland and Andre's (1987) review of research on extracurricular activities and adolescent development suggests significant relationships between extracurricular activities and educational aspirations.

Other education researchers (Elstrom, Goertz, Pollack, & Rock, 1986) reported that school dropouts had lower levels of extracurricular participation than did students who stayed in school. Finally, Marsh (1992) reported that extracurricular participation correlated significantly with 17 of 22 high school senior and post-secondary school outcomes, most of them related to academic achievement.

One large-sample study of arts education (Catterall, 1997) revealed that approximately two-thirds of secondary school arts courses scored in the top two quartiles on standardized academic achievement tests. The author also reported that the school dropout rate for non-arts participants was four times higher than for students involved in several arts courses.

Few music education researchers have examined relationships between music ensemble participation in schools and academic outcomes for students. Anello (1972) found that students with school band and orchestra experience made significantly higher grades in high school mathematics, English, and social science than did nonperforming students, although the differences were not significant when the effects of IQ were held constant. Similarly, Whitener (1974) found no significant differences in overall grade-point average between first-year college students with four or more semesters of high school art or music and those with less (or no) high school art or music experience" (quoted from Humphreys, May, & Nelson, 1992, p. 659).

In a six-month experimental study, Rauscher (1997) found that preschool children who received keyboard training coupled with group singing experiences achieved significantly larger gains scores on a test of spatial-temporal ability than did groups that received singing instruction only, computer instruction only, and a control group. Similarly, Rauscher, Shaw, Levine, Ky, and Wright (1994) reported that listening to a Mozart sonata improved college students' scores on a test of spatial reasoning ability. These researchers investigated spatial-temporal ability because it is thought to correlate with ability in mathematics. Indeed, music listening can change the state of the human brain, as measured by an electroencephalograph (Ridout & Lautbach, 1996).

The purpose of this study was to examine relationships between school music participation in choral and instrumental ensembles—by SES, gender, and race—and a composite measure of academic achievement.

### METHOD

The data sets used for this study were the NELS:88/94 Data Analysis system, with *Additional Systems for High School and Beyond* and the *National Longitudinal Study of 1972* (NCES, 1996), commissioned by the National Center for Education Statistics. The main contractor for the study was the National Opinion Research Center at the University of Chicago. The baseline year data set, developed in the spring of 1988, includes usable data on 24,599 eighth graders from 1052 schools drawn from a universe of approximately 3 million eighth graders enrolled in more than 38,000 schools (NCES, 1990). Most of the same students were questioned again in 1990, 1992, and 1994; those data were beyond the scope of the present study.

The NELS:88 study employed a stratified clustered sample design that was intended to be nationally representative (Spencer et al., 1990), except for Bureau of Indian Affairs schools, and special education, vocational, and overseas personnel schools. In addition, students with severe mental, physical, or emotional handicaps and those with substandard English language skills were excluded from the sample. Altogether, approximately 5.35% of the subjects sampled were excluded. A further exception was that Hispanic and Asian-American students were "oversampled" slightly to compensate for their low numbers in some schools.

We compensated for the effects of cluster sampling through the use of specialized statistical techniques set forth by Lohr (1999) and Rao and Scott (1981). This procedure made the results more conservative, and thereby mitigated somewhat against the large sample sizes in the interpretation of statistical significance and the lack thereof.

Two variables in the NELS:88 data set were choral and instrumental music participation. These served as two of the independent variables in this study. The authors also used a composite variable for SES by quartile provided in the data set, and the variables of gender and race/ethnicity (5 categories). The dependent variable was a composite of academic achievement based on school grades and achievement test scores provided in the data set.

### RESULTS

Data in Table 1 show that, overall, significantly ( $p < .05$ ) more students in school choral and instrumental music groups ranked above the 50th percentile in academic grades than did students not enrolled in these groups. For instrumental students, these results held true for all four socioeconomic quartiles, and the differences were statistically significant in all four quartiles ( $p < .05$ ). The results held true for choral students also, but were statistically significant for the third and fourth quartiles only ( $p < .05$ ).

Similarly, both boys and girls in instrumental classes tended to rank above the 50th percentile in academic achievement more than did their non-music-participating fellow students (see Table 1). The differences were statistically significant ( $p < .05$ ) in both cases. Both boy and girl choral participants also tended to score above the 50th percentile at higher rates than their fellow students, but the differences did not reach statistical significance ( $p > .05$ ).

Finally, a higher percentage of choral students in each of the five racial/ethnic groups placed above the 50th percentile in academic achievement than did non-choral students in each respective group, but the differences were not statistically significant ( $p > .05$ ) except for the white (Caucasian) students (see Table 1). However, instrumental music students in all five racial/ethnic groups were also more likely to be above the 50th percentile in academic achievement, and these differences were statistically significant for all five groups ( $p < .05$ ).

Table 1  
Percentages of participants with grades above the 50th percentile (valid N's range from 21,962 through 22,190)

Ensemble participation	50th%ile (row %)		Odds ratio		Instrumental		Odds ratio
	yes	no	yes	no	50th%ile (row %)	no	
Choral	56.14	53.35	62.45	37.51	62.45	37.51	1.556*
	43.49	46.65	51.70	48.30	51.70	48.30	
Overall							
yes	56.14	53.35	62.45	37.51	62.45	37.51	1.556*
no	43.49	46.65	51.70	48.30	51.70	48.30	
SES: Q1							
yes	56.77	63.23	43.56	56.44	43.56	56.44	1.435*
no	36.42	63.58	34.98	65.02	34.98	65.02	

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samples. The present study overcame at least one weakness in the music education literature on music ensembles: small, unrepresentative sample sizes (Humphreys, May, & Nelson, 1992). Several of the studies cited earlier utilized the large *High School and Beyond* (OERI, 1986) data set (Burbridge, 1991; Ekstrom, Goertz, Pollack, & Rook, 1986; Sterbin & Rakow, 1996), and a few more used the NELS:88 (NELS, 1996) data set (Burbridge, 1991; Finn, 1993; Solorzano, 1992; Sterbin & Rakow, 1996).

Perhaps for the first time in the music education research literature, an analysis was employed in the present study that took the cluster effects of sampling into effect. However, other limitations remain, namely, the lack of experimental controls in this correlational study, which made it impossible to demonstrate causal-and-effect relationships among the variables. Therefore, the findings must remain in the realm of relationships, not causation. Additional studies (in progress) on the NELS:88 data set should reveal certain effects over time.

Table 1 (continued)

Ensemble participation	Choral		Odds ratio	Instrumental		Odds ratio
	50%ile (freq.%)	no		50%ile (freq.%)	no	
yes	49.86	50.14	1.095	55.21	44.79	1.436*
no	47.58	52.42		46.19	53.81	
SES: Q2						
yes	62.36	41.44	1.215*	64.00	35.96	1.497*
no	55.35	44.66		54.30	45.70	
SES: Q3						
yes	75.74	24.26	1.174*	71.90	22.06	1.378*
no	72.68	27.33		71.93	28.08	
Gender: Boys						
yes	52.17	47.83	1.104	57.69	42.31	1.460
no	49.70	50.28		48.28	51.72	
Gender: Girls						
yes	58.29	41.71	1.028	66.36	33.64	1.605*
no	57.73	42.27		55.12	44.88	
Race/Ethnicity: American Indian/Al Native						
yes	40.28	59.72	1.208	40.71	59.29	1.328*
no	35.84	64.16		34.10	65.90	
Race/Ethnicity: Asian/Pacific Islander						
yes	70.14	29.86	1.128	70.49	29.55	1.162*
no	67.56	32.44		67.24	32.75	
Race/Ethnicity: Black						
yes	47.28	52.76	1.100	52.62	48.38	1.363*
no	44.90	55.09		43.92	56.08	
Race/Ethnicity: Hispanic						
yes	48.40	51.60	0.979	52.36	47.59	1.373*
no	46.18	53.81		44.48	55.52	
Race/Ethnicity: White						
yes	58.86	41.14	1.146*	65.12	34.81	1.609*
no	55.52	44.48		53.79	46.21	

\* $p < .05$

#### DISCUSSION

The research literature on music ensemble participation contains relatively few studies on the outcomes of school-based music education, and the vast majority of those studies focus on music-related (intrinsic) outcomes (Humphreys, May, & Nelson, 1992). One of the two major studies that utilized the NELS:88 data set dealt with attitudes toward music and the other arts (Bergonzi & Smith, 1994). Like the present study, the other major study of the NELS:88 data (Carterall, 1997) treated arts participation as the independent variable. The present study confirmed previous findings on relationships among music participation and academic achievement.

None of the studies cited above were experimental in design. Therefore, causation has not been demonstrated. Furthermore, virtually all of these studies employed relatively small and localized subject

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