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Predicting Undergraduate Music Education Majors' Collegiate Achievement

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In order for teachers to guide students in their preparation to be music majors, it would be useful to know those musical components that best predict overall collegiate success. Research has measured collegiate success in terms of grade point average, but many of these studies have tended to be in the general education literature. For example, studies have documented that degree satisfaction (Suhre, Jansen, & Harskamp, 2007), personal background (Betts & Morell, 1999) and participation in formal activities on campus (Fischer, 2007) are statistically significant predictors of collegiate academic achievement. Researchers have also investigated ethnicity issues in terms of collegiate success, with Zwick and Sklar (2005) finding that high school grade point average may be an incomplete predictor of first year grade point average for certain ethnic populations, and Jenkins, Hargurg, Weissberg, and Donnelly (2004) finding that collegiate grade point average did not differ across minority group students' whose parents were native versus those students whose parents were born outside of the United States.

Studies in music have had mixed findings across various age groups for academic achievement. Hedden (1982) found that academic achievement was a statistically significant predictor of music achievement for elementary students, and Barrett (1993) suggested that academic ability may be contingent on aptitude scores for her sample of 6-8 year olds. Costa-Giomi (1999), however, found no differences in elementary students' cognitive scores across those taking piano lessons for three years and those not taking piano. In a study of high school instrumentalists, Gromko (2004) noted that spatial skills were significantly related to sight-reading achievement. With undergraduate music education students, Hearson (1983) found that student teaching success was not significantly related to academic achievement, while a study of music education master's students found that the best predictor of overall grade point average in the degree was performance in the first music education class (Figg, 1980).

Many of the studies that have addressed undergraduate collegiate success in music have approached the topic through the lens of music theory classes. In one series of studies (Harrison, 1990a, b, 1996; Harrison, Asmus, & Serpe, 1994), musical and academic variables were used to predict theory-based achievement. For a group of non-music majors, Harrison (1996) noted that years of performance experience accounted for the most variance in theory grades. For music theory students, music aptitude was the best predictor of aural skills ability (Harrison, Asmus, & Serpe, 1994). For freshman music majors, the math section of the SAT test was a strong

predictor of written theory grades (Harrison, 1990a, b). Musical measures of piano experience and primary instrument family also tended to be strong predictor variables (Harrison, 1990a).

Performance variables such as piano and instrument experiences have also been investigated in terms of other areas of musical development. Daniels (1986) found that being a high school choral student who played a music instrument predicted sight singing achievement, as did having a piano in the students' home, while Weaver (1996) found no significant relationships between playing by ear achievement and grades in written music theory, music history or class piano for collegiate freshmen. With undergraduate instrumental music educators, Humphreys (1986) found piano to be only a weak predictor of auditory performance, and Brand and Burnsed (1981) noted no significant relationship between the predictor variables instrument playing, lessons, and piano and error detection skill. While some researchers have noted that highly skilled students tended to take private lessons (Hamann, 1982, 1983, 1984; Hamann & Sobaje, 1983; Killian & Henry, 2005; Rohwer & Rohwer, 2006), other studies have not found private lesson benefits (May & Elliott, 1980), or have documented qualifying factors. For instance, Sloboda and Howe (1991) found that the more skilled students in their study had taken fewer private lessons in their youth than had the less skilled students.

There is a need for a study to investigate student success in college based on musical factors. Specifically it would be useful to know if similar variables predict collegiate achievement with undergraduate music education majors as have been found to predict music theory achievement for other populations. In addition, while there have been studies conducted on music outcomes related to lessons, music theory, and piano, there is a noticeable dearth of research in the music education literature on music history. Since private lessons on a student's primary instrument, music theory, piano instruction, and music history are all common components of music cores for music majors across the country it would be useful to investigate the predictive nature of these core classes. By understanding the degree to which the linear combination of these variables is predictive of collegiate success (as operationally defined by Grade Point Average [GPA] in this study), high school teachers may be able to guide music students in the types of skills that could align with collegiate achievement. The purpose of the current study was to measure the relationship of predictor variables (Lessons, Music History, Music Theory, and Piano) to collegiate GPA for undergraduate music education majors.

Method

Participants in the current study were 90 music education undergraduate majors from a large southwestern university. The sample size in this study exceeded the sample size numbers set by Cohen (1988) to detect a medium effect size at .05 with power at 80% with four multiple regression predictor variables (Lessons, Music History, Music Theory, and Piano). Each of the 90 students had completed their first music education course, 43 students in the fall, and 47 students in the spring. The 58 males and 32 females were instrumentalists ($n = 69$, with 30 brass, 22 woodwinds, 10 percussionists, and 7 strings) and vocalists ($n = 21$) and were either sophomores ($n = 41$) or juniors ($n = 49$). The students' overall high school GPAs averaged 3.45 ($SD = .43$) and their entering SATs averaged 1152 ($SD = 141.81$).

The dependent variable in the current study was GPA. Student GPA was documented through the students' cumulative GPA over their time in college (two to three years of coursework). The data set for the prediction variable, Lessons, was gathered based on grades in the students' first of seven semesters of lessons on their primary instrument or voice part. The

data set for the prediction variable, Music History, was gathered based on grades in the students' first of four music history courses. The data set for the prediction variable, Music Theory, was gathered based on grades in the students' first of four music theory courses. The data set for the prediction variable, Piano, was gathered based on grades in the students' first of four semesters of class piano instruction.

While the original data set had 92 participant responses, two sets of scores were taken out as outliers, thereby leaving the final data set at $N = 90$. After the removal of the two outliers, an analysis of the assumption of normality showed two non-normal variables, Lessons and Piano, that were subsequently transformed to moderate skewness and kurtosis values. Next, multivariate analysis of residuals distributions, normal probability plots, and independence of residuals tests showed that the assumptions for multiple regression were tenable.

The bivariate correlations (see Table 1) between each predictor variable and GPA were moderate to strong (.48 to .78) and the correlations across the predictor variables were all smaller correlations (.23 to .43) than those found between the predictor variables and the dependent variable, thus documenting that multiple regression was an appropriate statistic to use with this data set.

Table 1

Bivariate Correlations between the Original Variables

	GPA	Lessons	Piano	History
Lessons	.48			
Piano	.61	.42		
Music History	.59	.23	.38	
Music Theory	.78	.29	.43	.38

Based on the correlations, concerns with the independent variables correlating strongly with each other (multicollinearity) were relatively small, with the moderately sharing variables being Music Theory/Piano and Lessons/Piano. It should be noted, then, that the predictive nature of these variables might be attenuated by the relationship between the variables. Further collinearity checks were documented through low VIF levels (all variables at 1.74 or below).

Results

The dependent variable, GPA, ranged from 1.83 to 3.97 ($M = 3.35$, $SD = 4.49$). The predictor variables were Lessons [untransformed descriptive data ranged from 1 (grade of D) to 4 (grade of A), $M = 3.68$, $SD = .61$], Music History [ranged from 0 (grade of F) to 4 (grade of A), $M = 3.02$, $SD = 1.07$], Music Theory [ranged from 0 (grade of F) to 4 (grade of A), $M = 2.74$, SD

= 1.00], and Piano [untransformed descriptive data ranged from 0 (grade of F) to 4 (grade of A), $M = 3.32$, SD = .87].

All four variables were entered into the regression equation simultaneously. The complete model including all variables was significant at $p < .0000001$ (See Table 2). The $R^2 = .79$ and Adjusted $R^2 = .78$ showed little shrinkage and documented that the equation explained 78-79% of the variance in collegiate GPA (See Table 3). Each of the four variables entered the equation significantly ($p < .01$) and the standardized regression coefficient (Beta) documented the explanatory power of the variables to be in the following order: Music Theory (.54), Music History (.27), Piano (.19), and Lessons (.18) (see Table 4). Structure coefficients documented a different order between Music History and Piano than was found with the standardized regression coefficients, with the order being: Music Theory (.88), Piano (.69), Music History (.66) and Lessons (.61). In both the standardized regression coefficient order and the structure coefficient order, Music Theory was the dominant predictor. The different order in terms of the Piano/Music History variables may mean that Piano may be a better predictor than the standardized regression coefficients can document because the variance in Piano was also shared by other predictor variables.

Table 2

ANOVA for the Regression Model

	df	SS	MS	F	p
Model	4	14.13	3.53	79.42	<.0000001
Residual	85	3.78	.04		
Total	89	17.91			

Table 3

Results of the Regression Analysis

	R	R^2	Adjusted R^2	Standard error
Model	.89	.79	.78	.21

Table 4

Results of Variable Weights in the Regression Model

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	Structure Coefficients	Standardized Coefficients Beta	*t*	*p*
Lessons	.61	.18	3.33	.001
Piano	.69	.19	3.22	.002
Music History	.66	.27	4.81	.0000006
Music Theory	.88	.54	9.45	<.000000001

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Discussion

Results for the current study document that the combination of common music core classes (Lessons, Music History, Music Theory, and Piano) can predict, in a statistically significant manner, music education majors' overall collegiate Grade Point Average (GPA). Of the core classes, Music Theory was the strongest predictor of GPA, followed by Music History and Piano, and finally Lessons.

The result from the current study that Music Theory was a strong predictor of GPA is similar to results of studies by Harrison (1990a, b) who found that the math section of the SAT significantly predicted written theory achievement. The finding that academic music classes (Music Theory and Music History) were both statistically significant predictors may mean that these academic music classes may have similar ways of thinking to classes in the general collegiate curricula. If indeed Music Theory and Music History achievement may be related to collegiate thought processes, then it may be beneficial for students who are preparing for college and teachers of students who are preparing for college to consider the variety of ways that students can experience music education prior to college.

For instance, high school students may wish to consider seeking out the diversity of experiences that a normal college music core often provides. In the area of academic music, one of these experiences could include taking an AP Music Theory class. Also, private piano lessons in some areas of the country have sequenced theory curricula that are taught in lessons and then students take theory tests each year for medals. Finally, many community colleges now offer course options for junior or senior high school students. Students may be able to take a college-level music theory course and have it substitute for an elective in their high school requirements. Students who could partake in such an activities may be engaging in musical activities that could align with their future collegiate experiences.

Public school ensemble teachers may be able to aid in their students' exposure to potentially valuable experiences by advocating that AP Music Theory be a class that is taught at their schools, if it is not already. In the case of those schools that cannot feasibly have AP Music

Theory classes and/or in cases where teachers simply want to expose their students to a variety of musical experiences, public school ensemble settings can be structured as viable instructional settings for students to experience the academic side of music in addition to their performance experiences. Ensemble instruction that could highlight theoretical understanding in relation to music being played in the ensemble setting may help engage students in a way of thinking that could broaden their musical experience as well as potentially prepare the students for thought processes that may align with their future collegiate lives. Since music history is not as commonly taught as a class in the public schools, teachers could add music history content into their ensemble curricula. Ensemble music could be studied in its historic context and other music listening examples could be introduced to train critical music listening and thinking skills that may be able to help students grow as future music majors.

The finding that Piano and Lessons were also statistically significant predictors of GPA in the current study is in agreement with some past studies and contrary to others. While piano was found to be a predictor of GPA in Harrison (1990s), other studies found little to no predictive power for Piano (Humphreys, 1986; Brand & Burnsed, 1981; Weaver, 1996). And, while Hamann (1982, 1983, 1984), Hamann and Sobaje (1983), Killian and Henry (2005), and Rohwer and Rohwer (2006) noted benefits related to Lessons, May and Elliott (1980) found no such benefits. The differences between these findings may be related to their outcome variables, their populations, or other extraneous variables. More research on Piano and Lessons may help clarify the variables that are interacting with these musical experiences.

For the current study's sample of music education undergrads, the variables Piano and Lessons were related to overall GPA. Hence, it may be useful for high school students to consider adding these experiences to their traditional public school ensemble participation. Such activities might include weekly piano instruction and primary instrument lessons that could culminate in an assessment, such as a formal jury or an adjudicated performance. Students may then be exposing themselves to activities that could familiarize them with standard collegiate coursework. In this way, students also may become acculturated to standard processes, thereby potentially having the students be more comfortable with collegiate practices when they become undergraduate students.

Universities may be able to assist students in their transition from public school music student to collegiate music major by communicating the common music core requirements for all music majors at their institutions. True we should communicate the core requirements, but I'm not certain how her study addresses this idea. Since students tend to visit colleges of music to audition for acceptance to the program, this may be an opportune time to discuss preparation ideas for success in freshman-year core music classes. Since theory understanding may be a freshman challenge in many colleges of music, universities that have an online theory preparation course may be helping students start their freshman year with an advantage.

Future research that could replicate these findings in other collegiate settings could be valuable. In addition, studies that could look at differences in collegiate achievement based on high school experiences may also add to our understanding of this complex area of inquiry. Studies that can be added to the body of literature concerning success as a music major may help teachers assist students in their transition from public school student into music major, which is a practical and useful goal for the betterment of music education.

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