Arts Education as a Pathway to College:
College Admittance, Selectivity, and Completion by Arts and Non-Arts Students

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EXECUTIVE SUMMARY

The existing research on the value and positive impact of adolescent involvement in the arts, while often examining generic academic benefits of K-12 arts study (e.g., Catterall, 1997; 2009; Deasy, 2002; Gouzouasis, Guhn, & Kishor, 2007; Helmrich, 2010; Miksza, 2007a; 2010; Morrison, 1994; Schellenberg, 2005; Southgate & Roscigno, 2009), has yet to specifically explore arts education as a pathway to college. The social and economic value of attending and completing college has been well documented in the research literature (Hout, 2012; Kane & Rouse, 1995; Marcotte, Bailey, Borkoski, & Kienzl, 2005); as such, it seems reasonable to investigate whether evidence exists suggesting arts education experiences might increase the probability that students will participate and succeed in the college admissions process and in the attainment of postsecondary credentials. The purpose of this study was to examine the value and positive impact of arts education on the college attainment of students in the United States.

Study Methodology

This study was designed to quasi-experimentally compare arts and non-arts students on a variety of outcomes related t to college admissions and attainment using a nationally representative sample of students from the U.S. graduating class of 2004. The sample was drawn from the U.S. Department of Education's Education Longitudinal Study of 2002 (ELS), one of the periodic national longitudinal studies of secondary students conducted by the department's National Center for Education Statistics (NCES), a center within the Institute for Education Sciences (Ingels et al., 2014). ELS has collected data in four waves—initially in 2002 when most sample members were sophomores in high school; again in 2004 when most sample members were graduating seniors; again in 2006 when most sample members were two years past high

school graduation, and most recently in 2012 when most sample members were aged 26. By tracking the same set of nationally representative sample members over time, ELS provides the most recent longitudinal view of high school students in the United States as they moved beyond high school into postsecondary education and the workforce. I identified arts and non-arts students in the sample through the analysis of the sample members' complete high school transcripts, and also made use of the information in ELS's rich set of demographic, academic, and extracurricular variables to help control for selection bias between the populations of arts and non-arts students. This control was achieved through holding these control variables constant through ordinary least squares, logistic, and ordered logistic regression procedures.

Key Findings

Descriptive Findings

- Arts study was exceedingly popular among students in the U.S. class of 2004: **66% of the nation's students graduated high school having earned at least one year's worth of credit in an arts class**.
- Visual art was the most popular choice: **38% of high school students earned at least one credit in the visual arts**.
- Music was the second most commonly elected art: **32% of high school students earned at least one year's worth of credit in music**.
- Theater or drama courses were elected by 9.2% of high school students.
- Dance classes were elected by 4% of students nationally.
- Arts students were 55.12% female and 44.88% male.

- Race and ethnicity were found to be associated with arts enrollment, with white students overrepresented and Black/African American and Hispanic students underrepresented.

Quasi-experimental Findings (after controlling for preexisting differences between arts and non-arts students)

- Arts students were **29% more likely to apply to a postsecondary institution** than were non-arts students.
- Arts students were **21% more likely** than non-arts students **to have attended a postsecondary institution** two years past high school graduation.
- Music students were **20% more likely** to pursue postsecondary study two years past high school than non-music students, and dance students were **70% more likely** to pursue postsecondary study two years past high school than were non-dance students.
- Arts students received scholarships to postsecondary institutions at rates similar to their non-arts peers.
- Arts students pursued **STEM majors** at rates similar to their non-arts peers—that is, they were not *less* likely to pursue STEM degrees, even though they had devoted a portion of their high school choices to arts courses instead of electing additional work in STEM fields.
- Arts students were 2.94 times as likely as non-arts students to pursue arts degrees in college. The effect was most robust for high school music students, who were nearly **2 times as likely as non-music students** to continue their arts study as a major in college.
- Arts students applied to slightly more colleges, on average, than did non-arts students.

- Arts students and non-arts students did not differ in terms of the **selectivity of the colleges to which they applied at or at which they were admitted**. Again, arts students were not at a disadvantage in terms of college selectivity when compared to peers who may have elected to take more STEM or English courses instead of arts courses in high school.

Conclusions

Results from this study suggest that arts students are served well by their arts study when compared to non-arts students on outcomes related to college admission and attainment. Arts students were more likely than non-arts students to participate in the college admissions process—a necessary step on the pathway toward the attainment of a college degree and the attendant social and financial benefits that accrue to college graduates in American society—and applied to more schools than their non-arts peers. As would be predicted by their greater rates of participation in the college admissions process, arts students were also more likely than non-arts students to be attending a postsecondary institution two years past high school graduation. Unsurprisingly, high school arts students were considerably more likely than their non-arts peers to pursue arts majors in college.

Perhaps more importantly than the areas in which arts students were advantaged in the college admission and attainment processes was the fact that in **no outcome investigated were arts students significantly disadvantaged compared to their non-arts peers**. Arts and non-arts students applied to selective colleges at similar rates, were admitted to selective colleges at similar rates, pursued majors in STEM fields at similar rates, earned bachelor's degrees at similar rates and with similar rates of on-time completion, and received graduate degrees at similar rates.

All of these similarities suggest that there is no "opportunity cost" to pursuing arts coursework in high school at the expense of electing non-required, additional coursework in the STEM areas, in history or social studies, or in English and literature. Or, put another way, **arts courses appearing on a high school transcript do not reflect poorly on students in the college admissions process**. Guidance counselors, teacher mentors, and parents who try to restrict a student from the elective pursuit of arts coursework in high school for the fear of not creating a strong college resume are mistaken—there is no arts penalty, and those students who would like to pursue arts coursework in high school should be encouraged to do so without fear of harming their chances in the college application, admission, and attainment processes.

Introduction

Arts educators, and advocates for arts education in the United States, have often found themselves in the position of needing to justify the existence of arts education in the public schools and the importance of arts education to the lives of their students. Early in his career, philosopher Bennett Reimer (1959) famously remarked that arts education "is a field which constantly feels the hot breath of public opinion on its back" (p. 40). Though enumerated as one of the federally identified "core subjects" for the nation's public schools since at least the passage of the *Goals 2000: Educate America Act* in 1994 (Elpus, 2013a), and consistently enjoying broad support in public opinion polls about school curricula (Kratus, 2007), the four visual and performing arts areas of visual art, music, theater, and dance are not universally offered or available at public elementary and secondary schools in the United States (Parsad & Spiegelman, 2012). Students at secondary schools in communities where there is access to arts education have limited availability of elective periods, and, consequently, there is competition among the various arts and non-arts electives for student enrollment and retention (Corenblum & Marshall, 1998; Fredricks & Eccles, 2010; Kinney, 2008). In an attempt to burnish their credentials as they seek admission to postsecondary education, students are often faced with the choice of pursuing arts education by devoting their scarcest resource—time—to the arts or to one of the other opportunities offered to them.

As student choose how to fill their scarce elective time in the school day, a complex calculus of both personal and external wishes and requirements often fuels the decision. Students, parents, or school guidance counselors may feel that certain courses appear more "rigorous" and so should be pursued as resume builders. Students may also feel that their personal tastes, interests, and curiosities might need to be satisfied by their non-mandated

coursework and choose to study certain subjects accordingly. Other choices may be guided by the perception of a real talent or proclivity for one of the elective opportunities offered in the school. Often, particularly in the high school years when the choices offered are the greatest to date and the college admission process looms large and close, the external pressure of preparing for college applications overwhelms the thinking of parents and students. This may lead some to wonder whether pursuing elective arts education puts them at an advantage or disadvantage in the college admissions process.

The social and economic value of attending and completing college has been well documented in the research literature (Hout, 2012; Kane & Rouse, 1995; Marcotte et al., 2005). The National Center for Education Statistics (2012), for example, estimates that young adults aged 25 to 34 who held a bachelor's degree earned a median salary of $45,000 in 2010, compared to just $29,900 for those with a high school diploma or its equivalent and over twice the median salary of $21,000 for those who had not completed high school. College selectivity, too, has been shown to have substantial economic benefits (Thomas, 2003), particularly for students from less economically advantaged and minority racial backgrounds (Dale & Krueger, 2011). Given the importance of postsecondary education to important social and economic outcomes, understanding how arts students fare in the college admission and attainment process is a area worthy of more empirical investigation.

With varying degrees of methodological rigor and control for selection bias, most of the accumulated body of research suggests that arts students, particularly music education students, on average, outperform non-arts students on a variety of educational outcomes (Catterall, 1997; 1998; 2009; Catterall, Chapleau, & Iwanaga, 1999; Catterall, Dumais, & Hampden-Thompson, 2012; Costa-Giomi, 1999; 2004; Fitzpatrick, 2006; Helmrich, 2010; Johnson & Memmott, 2006;

Kinney, 2008; Miksza, 2007b; 2010; Morrison, 1994; Southgate & Roscigno, 2009; Wallick, 1998): With the exception of the Costa-Giomi (1999, 2004) experiment focused on low-income elementary school students in Montreal, each of these studies is observational or quasi-experimental in nature and therefore may suffer from varying degrees of omitted variables bias and/or selection bias. The effect estimates obtained by observational and quasi-experimental studies, including the present one, rely on the strong assumption of conditional independence of the "treatment" (in this case, arts study) on the outcomes (Steiner, Cook, Shadish, & Clark, 2010). Thus, it is important to carefully consider the choice of covariates when comparing arts to non-arts students (Elpus, 2013b; Elpus & Abril, 2011).

The existing research on the value and positive impact of adolescent involvement in the arts, while often examining generic academic benefits of K-12 arts study (e.g., Catterall, 1997; 2009; Deasy, 2002; Gouzouasis et al., 2007; Helmrich, 2010; Miksza, 2007a; 2010; Morrison, 1994; Schellenberg, 2005; Southgate & Roscigno, 2009), has yet to specifically explore arts education as a pathway to college. This particular pathway, through which the benefits afforded to students of the arts may flow, remains an important, yet unanswered question in the existing research. Though a link between arts education and positive postsecondary outcomes has been suggested in prior research, the nature of this link has yet to be empirically analyzed.

The present study extends previous work funded by the National Endowment for the Arts (Elpus, 2013c). One of the most striking findings of that study was the predictive relationship between high school arts education and college attainment. Using evidence from the National Longitudinal Study of Adolescent Health (Add Health), Elpus (2013) found that, by age 30, students who had pursued arts education during high school were 55% more likely to have attended college than were their non-arts peers. Arts students were 30% more likely than non-

arts students to have earned a college degree by age 30. These results were robust to statistical control for observable differences between arts and non-arts students in Add Health. Though not central to the focus of that study, the Elpus (2013) findings support the results of research by Catterall, Dumais, and Hampden-Thompson (2012), which showed that at-risk students hailing from arts-rich schools were more likely to have attended any college than their peers from schools with fewer arts opportunities. Taken together, the Elpus (2013) and Catterall and colleagues (2012) studies suggest that high school arts education and arts experiences are linked to positive college outcomes.

If the observed link between arts education and college attainment is causal, the college admission process is likely a key mechanism through which the effect is expressed. In the present study, I sought to understand the nature of this link by directly exploring the effect of high school arts education on the college admission process. Using nationally representative data from the U.S. Department of Education's National Center for Education Statistics, I estimated the effect that arts education had on college admissions by determining if arts students are more likely to participate in the college admission process, whether they are more successful than their non-arts peers in earning admission offers, and whether their arts education garners them admission at more competitive colleges. A qualitative study of admissions officers at elite colleges (Kilgore, 2009) found that those admissions officers do weigh the artistic accomplishments of applicants as they create their pool of accepted students. The present study will quantitatively investigate the unique value and positive impact of arts education on the admission process by determining the unique effect of arts education on college outcomes while controlling for standardized scores, high school GPA, demonstrated leadership, and the intensity of extracurricular involvement.

Importantly, while some extant research has documented a relationship between arts study and college attainment (Catterall et al., 2012; Kaufman & Gabler, 2004), the present study is the first to estimate the effect of formal high school arts education *coursework* on college outcomes. Both the Catterall et al. (2012) and the Kaufman and Gabler (2004) studies used self-report measures of arts participation. The only curricular offering in these self-report data were music ensembles; the rest were extracurricular school- or community-based arts offerings. The present study will extend this line of research by examining the full range of curricular arts education offerings. This is particularly important for evaluating the effect of visual arts education experience, as the visual arts are rarely included in self-reported survey measures of arts participation.

Purpose and Research Questions Guiding the Study

The purpose of this study was to examine the value and positive impact of arts education on the college attainment of students in the United States. Students who have pursued formal arts education courses in the first three years of high school—that is, prior to applying to college—were compared with their non-arts peers on their participation in the college admission process, their success in the college admission process, the selectivity of colleges applied to and admitted at, choice of major, scholarship receipt, on-time bachelor's degree completion, and total higher education attainment by age 26. Additionally, to contextualize the findings of the present study, college outcomes of arts students were compared with students involved in high school athletics.

To increase the validity of estimates arising from the analyses, statistical control for preexisting differences between arts and non-arts students was employed using regression methods. Specifically, statistical control was applied to determine the effect of arts study on college outcomes holding constant several key quantitative factors commonly involved in the college admission process: standardized test scores, high school GPA, the intensity of students' weekly extracurricular involvement, and a unique "leadership index" reflecting the number of leadership positions held in school-based activities.

The following research questions guided the inquiry:

1. Controlling for preexisting differences between arts and non-arts students, what is the net effect of formal high school arts study on the following elements of the college admission process?
    a. Participation in the college application process
    b. Number of colleges applied to
    c. Selectivity of colleges applied to

d. Percentage of college acceptances received

e. Selectivity of colleges admitted to

f. Scholarships/grants received

g. Likelihood of pursuing a major in the arts

h. Likelihood of pursuing a major in STEM (Science, Technology, Engineering, Math) fields

2. Controlling for preexisting differences between arts and non-arts students, what is the net effect of formal high school arts study on college degree completion?

a. On-time bachelor's degree completion (4 years after high school graduation)

b. Bachelor's degree completion by age 26

c. Postgraduate degree enrollment by age 26

d. Postgraduate degree attainment by age 26

3. Are there differences in the effect of arts study on college outcomes among differences in:

a. Types of arts coursework pursued?

b. High school arts vs. high school sports participation?

Data Source

Overview. Periodically, the National Center for Education Statistics (NCES) within the U. S. Department of Education's Institute for Education Sciences conducts large-scale, longitudinal surveys of nationally representative samples of students in U.S. public and private schools. Once completed, NCES typically issues a few reports on areas of particular interest to

the Institute and the Department and, subsequently, all data from the surveys are made available to researchers for secondary analysis. These data are used by many researchers from the various subfields of education to answer research questions related to issues of education policy, the sociology of education, and the economics of education, among others. The present study made extensive use of several waves of longitudinal, student-level data from the Education Longitudinal Study of 2002 (ELS).

In ELS, data are available for a nationally representative sample of 16,400 American high school students who were sophomores in the spring of 2002, the "base year" of the study. After the base year of data collection in 2002, data were again collected in 2004 (called the "first followup") when most sample members were high school seniors, in 2006 (the "second followup"), when most of the sample was two years past high school graduation, and again in 2012 (the "third followup"), when most recipients were eight years past high school graduation. Complete high school transcripts were collected for a large majority of the sample (n = 14,900) at the first follow-up. The final round of data collection, collection of complete postsecondary transcripts, began in 2013 and at the time of this writing, collection of postsecondary transcripts is currently ongoing.

Restricted-use data. Given the depth of personally identifiable information available in the datasets, data are made available in two versions, a "public-use" version (available online), where certain identifying information has been redacted, excluded, or perturbed, and a "restricted-use" version, with much of this information restored. Restricted use data are available to researchers who have received a license from the U.S. Department of Education Institute for Education Sciences (IES) and executed a non-disclosure agreement. Release of analyses of the restricted-use data to non-licensed persons are embargoed until the analysis has undergone a

disclosure risk review by IES personnel. The present study makes use of restricted data (for example, the transcript data used to identify arts students in the sample are only available in the restricted use datasets). To fulfill the terms of the IES data use license, all reported unweighted sample sizes have been rounded to the nearest 10. Percentages and regression coefficient estimates are reported without rounding.

Sampling and weighting. Like most large survey datasets, ELS did not feature simple random sampling of students, which would have resulted in cost prohibitive data collection—15,000 students selected for the sample would have likely been enrolled in 15,000 different schools. To dramatically decrease data collection costs without a corresponding dramatic loss in the quality of the sample, these surveys are designed with samples that are stratified by region of the country and "clustered" at the school level: NCES randomly samples schools from the various regions of the nation and then probabilistically samples students within those schools, rather than randomly sampling directly at the student level. This kind of sampling, called "complex survey sampling," has been developed by survey methodologists to ease the collection of data for large surveys (Heeringa, West, & Berglund, 2010). Complex sampling introduces "design effects" that bias the results of traditional statistical procedures, which assume simple random sampling and independent observations. Both of these assumptions are violated in complex survey samples, and as such, the statistics employed must be designed or adjusted for use with complex samples.

For ELS, in 2002, the base year, 1,200 schools were initially contacted to participate and 750 agreed. In each participating school, roughly 25 students were probabilistically selected from the school's 2002 10^{th} grade roster. To ensure an adequate number of Hispanic and Asian

students for analyses existed in the sample, NCES oversampled students from these groups. The response rate for invited students was 87.3%.

The present analysis used, among other applied survey data analysis procedures recommended by Heeringa, West, and Berglund (2010), adjusted standard errors robust both to the clustering and stratification of the sample. These adjusted standard errors correct the significance and hypothesis testing procedures that would otherwise have been biased by the violation of the assumption of simple random sampling. The sampling design employed in ELS explicitly clusters the student sample at the school level, since students from one school will tend to be more similar to each other than they are to students from different schools.

Other sampling design features require specific techniques to be employed in the present analyses. For example, NCES over-sampled students from various subpopulations (e.g., the Asian and Hispanic student oversampling mentioned above) to ensure their adequate representation in the sample for analytic purposes. To account for the over-sampling of the subpopulations, NCES provided sampling weights (also called "probability weights") in the datasets that correct for this oversampling when the analyses are properly weighted. NCES also provided sampling weights for schools to ensure that school-level estimates can also be nationally representative. All analyses reported in this dissertation employ the proper sampling weights—specifically, the weight applied to sample members who were respondents in the high school transcript collection phase of the study. This weight, when applied to the analyses, ensures that respondents for whom arts education enrollment data are observable are nationally representative of their graduating cohort. Due to the use of sample weighting procedures, all results reported using properly weighted and complex-design adjustments must be considered estimates.

Variables examined. There are a great deal of variables available in each of the waves of ELS data collection; more than could possibly be adequately incorporated into any one analysis. As such, each analysis must be carefully constructed to select appropriate covariates that help reduce selection bias, but remain scientifically parsimonious and interpretable. For this analysis, I attempt to control for selection bias—that is, the self-selected nature of arts enrollment which is likely linked to other characteristics correlated with the outcomes of interest—by choosing a set of covariates based on past research that have been shown to be related both to K-12 elective arts study that are either theoretically or empirically linked to college outcomes (Elpus & Abril, 2011; Fitzpatrick, 2006; Kinney, 2010; Mizell, 2005; Stewart, 1991).

Specifically, the control variables examined in the analyses were: (1) race/ethnicity, (2) sex, (3) socioeconomic status, (4) 11th grade academic-course grade point average, (5) standardized test scores, (6) participation in interscholastic athletics, (7) hours per week spent on school-based extracurricular activities, and (8) a unique "leadership index" I constructed from ELS extracurricular activity data. Each of these variables was sourced from the ELS base year (sophomore) and first follow-up (senior) wave of data collection. Race/ethnicity and sex were self-reported in initial and all follow-up waves of data collection. To ease the interpretation of the model, I dichotomized race/ethnicity to "White" and "non-White." Socioeconomic status was a continuous, standardized variable, mean of 0 and standard deviation of 1, calculated by NCES from a formula comprising the following factors: mother's and father's highest level of education, mother's and father's occupational prestige, and family income. For standardized test scores, I chose to use scores on the ELS-specific standardized tests of math and reading ability rather than a college entrance exam score because college entrance examination scores are not observable for a large portion of the sample members and the correlation between college

entrance exam scores (where observable) and the ELS-specific standardized test scores was quite large ($r = 0.81$, $p < .001$). The scatterplot of SAT scores and ELS standardized test scores, along with a regression line of best fit, is displayed in Figure 1. Students self-reported their participation in interscholastic athletics and their hours per week spent on school-based extracurricular activities. I constructed the leadership index by summing the number of discrete school-based activities—artistic, athletic, academic, or social—for which sample members indicated they participated as a captain, officer, or other leader.

Outcome variables for all analyses were taken from the second (2 years post-high school) and third (age 26) follow-up waves of ELS. Participation in the college admission process was self reported and determined based on the respondent reporting either a number of postsecondary institutions applied at or attended at the second followup. I computed the percentage of acceptances from the self reports of number of institutions applied to and accepted at. Receipt of scholarships or grants was self reported in the second follow-up. I classified the major of respondents using the degree major they indicated in the second follow-up. Degree earning status was taken from the third follow-up, when most respondents were 26 years old. On-time bachelor's degree completion was classified as a dichotomous variable (yes or no) based on the number of months from the receipt of the high school diploma to bachelor's degree completion. Sample members were classified as "on time" recipients of bachelor's degrees if less than 51 months elapsed between the earning of the high school credential and the bachelor's degree (this allows for four years [48 months] plus an additional two months of summer study, which would still allow the respondent to enter the workforce at the start of the fifth academic year after receipt of the high school diploma. Postgraduate degree attainment by age 26 was self-reported by respondents in the third follow-up.

Transcript Preparation

The first stage of analytic work for the present study was the definition and identification of those student within the ELS dataset who were "arts students." Following the methods employed by past arts education research using NCES data (Elpus, 2013b; 2011; Stewart, 1991), I operationalized an "arts student" based on the high school transcripts that were collected for the vast majority of ELS sample members at the conclusion of their high school careers. Arts students—and those students identified by the disaggregated subareas of music, visual art, dance, drama, film, and arts survey—whose transcripts reflected earned credit for one or more years worth of courses in the visual and performing arts. To be included in the analysis, sample members must have had data available for the base year, for the appropriate follow-up from which the outcome variables were drawn (second or third) and have had complete transcript data available. These conditions were met of a great number of ELS sample members. Results reported later in the monograph indicate the sample sizes for each analysis; sample members for whom data were missing were eliminated from each individual analysis listwise.

The identification of arts students from the dataset followed the procedures established by Elpus (2011; 2013). In the transcript data file, each course taken by a sample member was listed with its verbatim title and assigned to one of NCES's standardized "Classification System for Secondary Courses" (CSSC) codes. In preparing the data sets for analysis, I extracted from the transcript file all entries for those courses coded with CSSC codes ranging from 500000 to 500999, the range for arts courses. The extracted file had thousands of "rows" of data, one for each individual arts course appearing on any transcript; the rows contained the student's unique

identification number, the school's unique identification number, the course title, the number of Carnegie units earned by the student in the course, the grade earned in the course, and the course's CSSC code. Students who had taken multiple arts courses had multiple rows in the dataset, each bearing their unique, anonymized student identification number. From the extraction, I manually reviewed all courses to ensure that no music courses had been improperly coded in the wrong arts subarea. I also conducted an additional manual review courses that had been given the "catch-all" code 500111.

After manual verifying the coding and classification of all arts courses, I created dummy (also called "binary" or "dichotomous") "flag" variables to indicate music study status, the grade level or school year of enrollment for each course, and the arts sub-area of study (i.e., music, dance, theater, visual art, film, or arts survey). Once these "flag" variables were set properly, I collapsed the dataset using the unique student identifier to reduce the list of all *courses* to a list of *students* who had music courses appearing on their transcript. In the collapsing process, any flag that had been set to 1 for any course was retained by student ID and the total number of music credits earned was summed. After collapsing the dataset on student ID, each arts student was listed in one row with 1's or 0's for all the appropriate flags for each type of art area studied and the sum of credits earned in each arts area across all four years of high school. The resulting file, containing variables for the amount and type of art studied for each student who had taken at least one arts course, was merged with extractions from the main dataset that included the outcome measures and chosen covariates by student ID to create the files for analysis.

Empirical Approach

Theoretical Models. The research questions for this study ask if arts study in high school is related to various outcomes in the college admissions and college degree attainment. The basic relationship for outcomes is modeled in Equation (1):

$$CollegeOutcome_i = \alpha + \beta Arts_i + \varepsilon_i \quad (1)$$

Here, $CollegeOutcome_i$ is the outcome of interest for the ith student, α is the intercept in the model, $Arts_i$ is either realized as a binary indicator set to 1 for arts students and 0 for all others (the "binary" analysis) *or* as a continuous measure of the number of Carnegie units earned in the visual and performing arts (the "dosage" analysis). The final term, ε_i, represents the error in the model. If realized as a binary, the coefficient for the $Arts_i$ term represents the mean difference in the outcome between arts and non-arts students. If realized as a continuous measure for the number of years of arts study, the coefficient for the $Arts_i$ term represents the average change in the outcome for each additional year of arts study.

This naive specification of the model is likely flawed, however, as it does not take into account the important covariates, mentioned above, which theory and empirical evidence suggest are related both to the likelihood of pursuing arts coursework and to the college admission and attainment outcomes of interest. Equation (2) shows the preferred model including these covariates:

$$CollegeOutcome_i = \alpha + \beta Arts_i + \delta_{1\ldots k} Controls_i + \varepsilon_i \quad (2)$$

The new term, δ, represents the coefficients on the vector of covariates described above in the "Variables Employed" section. The inclusion of these covariates removes from the estimate of interest, β, the portion of variation in the outcome due not to arts study but rather due to the covariates. This serves to hold the control variable values "constant" and give a "ceteris

paribus" estimate of the effect of arts study on the outcomes and increases the precision of the point estimates on the outcome variable.

Estimation. For all continuous outcomes, the models are estimated using ordinary least squares (OLS) regression. For binary or dichotomous outcomes, the models are estimated using logistic regression. Outcomes measured on ordinal scales were analyzed used ordered logistic regression. For all outcomes, regardless of estimation method, I first estimate the model represented in Equation (1) and then sequentially add covariates to help understand the nature of the bias (upward or downward) on the bivariate relationship between arts study and the outcomes of interest until all the covariates are included. Probability weights for the sample are employed in the estimation to ensure that the estimates are generalizable to the population of U.S. high school students who were sophomores in 2002, most of whom graduated high school in 2004, and had complete transcript data available. Standard errors, and the subsequent statistical inference tests for the significance of the regressors, were adjusted to be robust to the clustering of the sample.

Elimination of dosage analysis from report. Though dosage analysis was originally planned for the present study, a one-unit increase in arts credits was not found to be related to any of the outcomes in the fully controlled models. Consequently, these results are not reported.

Understanding Arts Students in U.S. High Schools: Characteristics of Arts Students and All Students in ELS

In this study, I considered an "arts student" to be any high school student who had earned at least one full year's worth of credit in a visual or performing arts class—including basic "arts survey" courses— on their high school transcript by the time they graduated high school. For the U.S. graduating class of 2004, this condition was met for a great number of students: I estimate that 66% of students nationwide graduated having earned one year's worth of any visual or performing arts credit, while 16.24% of all students enrolled in more than one type of arts course (put another way, 24.33% of arts students pursued coursework in more than one art form). Visual art was, by far, the most commonly elected type of arts study: 38% of high school students earned at least one year's worth of credit in visual arts. Music was the second most commonly elected art: 32% of high school students earned at least one year's worth of credit in music. Theater or drama courses were a distant third: 9.2% of students took one year of theater courses in high school. About 4% of students nationally earned a year's worth of credit in dance courses. Approximately 1% of students took an arts survey course. Film courses, by far the least common arts course pursued, were only taken by a fraction of a percent: 0.22% of students earned credit in a film course.

Among all students in the population, regardless of arts status, the proportions of race and ethnicity were: 61.02% White, 14.14% Black or African American, 15.36% Hispanic, 3.8% Asian, 4.54% Multiracial, 0.98% Native American/Alaska Native, and 0.15% Native Hawaiian/Pacific Islander. The population of students, whether enrolled in arts or not, was split fairly evenly in terms of sex: 50.22% were female and 49.78% were male. In the population,

again without regard to arts status, 30.47% of students attended urban schools, 50.13% attended suburban schools, and 19.4% attended rural schools.

Arts students identified their races and ethnicities as follows: White 63.82%, Black or African American 12.56%, Hispanic 14.21%, Asian 3.89%, Multiracial 4.56%, Native American/Alaska Native 0.83%, Native Hawaiian/Pacific Islander 0.13%. Rao-Scott adjusted chi-square analysis indicates that race/ethnicity and arts status were associated, $F(6, 2310) = 9.26$, $p < .001$. Females comprised 55.12% of arts students while 44.88% of arts students were male. Sex was associated with arts status, $F(1, 390) = 122.36$, $p < .001$.

Arts students were distributed among school urbanicities in proportions similar to the total population of students: 31.13% of arts students were from urban schools, 49.45% of arts students were from suburban schools, 19.42% were from rural schools. Rao-Scott adjusted chi-square analysis indicated that school urbanicity and arts status were **not** associated, $F(2, 780) = 0.81$, $p = .443$.

Though I classified as an "arts student" any student who had earned at least one credit of arts coursework, the average arts student earned 1.72 credits of arts coursework on their transcript ($SE = 0.03$, 95% CI [1.67, 1.77]) by graduation. Students who pursued more than one art form were 65.67% female and 34.33% male. Sex was associated with pursuing multiple art forms $F(1, 390) = 101.78$, $p < .001$. Students pursuing multiple art forms identified as 66.72% White, 10.52% Black or African American, 12.91% Hispanic, 4.01% Asian, 4.95% Multiracial, 0.66% Native American/Alaska Native, and 0.23% Native Hawaiian/Pacific Islander. Race and ethnicity were associated with pursuing courses in multiple art forms, $F(6, 2220) = 4.50$, $p < .001$.

Characteristics of Visual Arts Students in ELS. As mentioned earlier, visual arts courses were pursued by 38% of high school seniors from the U.S. class of 2004. Females comprised 51.7% of visual arts students and males were 48.3%. The deviation from 50/50 was significant, $F(1,390) = 4.14$, $p = .04$. The race and ethnicity breakdown of visual arts students was: 63.26% White, 11.06% Black or African American, 7.92% Hispanic, 4.14% Asian, 4.23% Multiracial, 1.06% Native American/Alaska Native, 0.14% Native Hawaiian/Pacific Islander. Rao-Scott adjusted chi-square analysis suggests that race was associated with visual arts enrollment, $F(6, 2310) = 5.68$, $p < .001$. School urbanicities of visual arts students did not significantly differ from the population distribution, $F(2, 750) = 1.27$, $p = .28$. Students in urban schools were 31.58% of visual art students; students in suburban schools were 50.56% of visual arts students, and students in rural schools were 17.86% of visual arts students.

Characteristics of Music Students in ELS. Of the 32% of high school students who earned credit in music (either a performance-based ensemble class or a general music course), 58.74% were female and 41.26% were male. The deviation from 50/50 was significant, $F(1, 390) = 101.27$, $p < .001$. Music students reported their race/ethnicities as follows: White 67.15%, Black or African American 14.09%, Hispanic 9.79%, Asian 3.92%, Multiracial 4.37%, Native American/Alaska Native 0.56%, Native Hawaiian/Pacific Islander 0.12%. Race/ethnicity was associated with music enrollment, $F(6, 2200) = 13.03$, $p < .001$. Unlike visual arts, school urbanicity was associated with music student status: 30.49% of music students attended urban schools, 46.8% of music students attended suburban schools, and 22.7% of music students attended rural schools. Suburban students were slightly underrepresented and rural students were commensurately slightly overrepresented when compared to the distribution in the population of all students, $F(2, 770) = 5.69$, $p = .004$.

Characteristics of Theater Students in ELS. Among the 9.2% of all students who enrolled in a formal theater course, 63.27% were female and 36.73% were male. The deviation from 50/50 was significant, $F(1, 390) = 55.63$, $p < .001$. The race and ethnicity composition of theater students was: 65.11% White, 11.74% Black or African American, 14.16% Hispanic, 2.02% Asian, 6.35% Multiracial, 0.49% Native American/Alaska Native, and 0.12% Native Hawaiian/Pacific Islander. Race was associated with theater enrollment, $F(6, 2250) = 3.30$, $p = .004$. Theater students attended schools in the various urbanicities at rates similar to the total population ($F[2, 760] = 2.15$, $p = .12$): urban 35.06%, suburban 47.10%, and rural, 17.84%.

Characteristics of Dance Students in ELS. Dance students comprised roughly 4% of all students in the population. As might be reasonably hypothesized, the overwhelming majority of dance students were female. The female to male ratio of dance students in the U.S. class of 2004 was 90.76% female to 9.24% male. The association between sex and dance enrollment is, of course, statistically significant ($F[1, 390] = 88.09$, $p < .001$). Race/ethnicity was associated with dance enrollment as well; however, unlike the other visual and performing arts, Hispanic students and Asian students were overrepresented among those in dance while White students were underrepresented when compared to the proprtion of each in the total population, $F(4, 1540) = 7.46$, $p < .001$. The racial composition of dance students was: 50.98% White, 10.79% Black or African American, 26.67% Hispanic, 6.13% Asian, 5.20% Multiracial, 0.15% Native American/Alaska Native, and less than .0001% Native Hawaiian/Pacific Islander. School urbanicity was associated with dance enrollment status, with students attending urban and suburban schools overrepresented among dance students and students attending rural schools underrepresented: 36.7% of dance students attended urban schools, 52.52% attended suburban schools and 10.79% attended urban schools. The association between school urbanicity and

dance enrollment, likely reflecting the uneven availability of dance classes, was significant: $F(2, 770) = 3.16$, $p = .04$.

Understanding Arts Education as a Pathway to College

Participation in the College Admission Process. Not all students in the United States intend to enroll in a postsecondary institution upon completing high school. Among all students in the U.S. class of 2004, 75% applied to at least one postsecondary institution. Among arts students, the percentage was slightly higher than the average among all students: 77% of all arts students applied to at least one postsecondary institution, while only 70% of non-arts students applied to at least one postsecondary institution. Table 1 presents the results of logistic regression models examining the association between arts study and participation in the postsecondary application/admission process. Prior to controlling for observable differences between arts and non-arts students, arts students were **67%** more likely to apply to a postsecondary institution than were non-arts students. Though the controlled models (2) through (4) show that some of this arts advantage is do to population differences between arts and non-arts students—in model (4), the estimates for all the control variables are statistically significant. However, even with all controls entered into the model, **arts students were still 29% more likely than non-arts students to apply to college**, regardless of socioeconomic status, sex, race, GPA, standardized test scores, participation in interscholastic athletics, hours per week on extracurriculars, and the student's leadership index. Disaggregated analyses did not indicate a differential effect based on type of arts studied. Though the magnitude of the odds ratio on athletic participation appears larger than the odds ratio for arts study, a Wald test on the estimates suggest they are not statistically significantly different from each other, $F(1, 390) = 0.99$, $p = .32$. This means that *both* artists and athletes enjoyed an advantage over non-arts

students and non-athletes (controlling for participation in the other category), but that the advantage did not significantly differ between artists and athletes.

Attendance at any postsecondary institution (2 years past high school). Approximately 73.61% of students in the U.S. class of 2004 had attended a postsecondary institution by 2006, when the majority of the sample was two years past high school graduation. Among arts students, the proportion who had attended a postsecondary institution by this time was 76.40%, while among non-arts students, only 67.81% had attended a postsecondary institution by this point. Logistic regression analyses, presented in Table 2, show that the observed difference was statistically significant. Students who had pursued arts coursework in high school were **21% more likely** than non-arts students to have attended a postsecondary institution than were non-arts students 2 years past high school graduation, even when controlling for SES, race, GPA, standardized test scores, athletic participation, extracurricular activity intensity, and leadership demonstrated in high school activities and sports. Although the estimated odds ratio for athletic participation appears greater than that for arts study, a Wald test suggests the estimates are not statistically significantly different from each other, $F(1, 390) = 2.55$, $p = .11$. Disaggregated analyses, reported in Table 3, suggest that the effect *was* differential across the various types of arts: music students were **20% more likely** to have attended a postsecondary institution than were non-music students, and dance students were **70% more likely** to have attended a postsecondary institution than were non-dance students.

Receipt of a scholarship at first postsecondary institution. I estimated that 68.25% of arts students earned a scholarship or grant at their first attended postsecondary institution, compared to 65.04% of non-arts students. Logistic regression analyses, reported in Table 4, suggest this difference was not statistically significant once controls were included in the model.

Thus, arts students did not earn scholarships or grants at their first attended postsecondary institution at rates different from the population of non-arts students. This result indicates that arts students were neither more, nor less likely, to earn these scholarships even though arts students had chosen to take arts courses instead of other options.

Pursuit of a STEM major in college. Among all students who attended a postsecondary institution, 39.63% chose to pursue a major in one of the STEM (science, technology, engineering, or math) fields. Among high school arts students, the percentage who pursued a STEM major was 38.55%; among non-arts students the rate was 42.31%. Logistic regression analyses, reported in Table 5, show that after controlling for population differences between arts and non-arts students, arts students pursued STEM majors at rates statistically indistinguishable from their non-arts peers. Thus, **arts students were not less likely to pursue STEM fields than non-arts students.** Disaggregated analyses showed no difference among the various arts types.

Pursuit of an Arts major in college. Among the entire population, only 6.5% pursued a college major in the arts. This includes 8.09% of students who had graduated with arts credit and only 2.62% of students who did not earn arts credit in high school. Perhaps unsurprisingly, those with earned high school credits in the arts were significantly more likely than non-arts students to major in an arts field: as seen in Table 6, arts students were 2.94 (294%) more likely to major in an arts area than were non-arts students. Table 7 shows the analysis on the likelihood of pursuing an arts major disaggregated by arts discipline. As seen in Table 7, **Music students were nearly 2 times more likely than non-music students to pursue an arts degree in college, visual arts students were 58% more likely than non-visual arts students to pursue an arts degree, and theater students were 81% more likely than non-theater students to pursue an arts degree in college.**

Number of Colleges Applied To. Arts students applied to an average of 2.18 postsecondary institutions, non-arts students applied to an average of 1.83 postsecondary institutions, while the grand mean of applications across arts and non-arts students was 2.06 colleges. The slight difference between arts and non-arts students remains statistically significant even when all controls are included in the analysis, as demonstrated in Table 8. The advantage in number of applications for arts students was not significantly different than the advantage for athletes, $F(1,390) = 3.82$, $p = .051$. Disaggregated analyses (reported in Table 9) suggest the advantage for arts students is driven by the visual arts students, who apply to 0.17 more schools on average than do non-visual art students.

Selectivity of Colleges Applied To. Postsecondary institutions applied to and attended by ELS sample members were ranked in terms of their selectivity from lowest (inclusive two year institutions) to highest (highly selective four-year institutions) on a six-point ordinal scale. I used ordered logistic regression to estimate the effect of arts study on the selectivity of colleges applied to. As seen in Table 10, there was no statistically significant difference between the selectivity of colleges applied to by arts and non-arts students—arts students were neither at a disadvantage or advantage to non-arts students—once other factors related both to college applications and arts enrollment were included in the model. (Initially, the uncontrolled "naive" regression shows a spurious advantage for arts students.) Table 10 also shows that athletes were 27% more likely than non-athletes to apply to more selective postsecondary institutions and that this difference was statistically significant. A Wald test showed that the advantage for athletes was significantly larger than that for arts students, $F(1, 390) = 8.73$, $p = .003$.

Selectivity of Colleges Admitted At. Similar to the college application analysis, I used ordered logistic regression to estimate the effect of arts study on the selectivity of colleges to

which sample members were admitted. Table 11 presents the results of this analysis. In the fully controlled model, arts students were neither more nor less likely to be admitted to more selective colleges than were non-arts students. The advantage enjoyed by athletes—athletes were 38% more likely to be admitted to more selective colleges than non-athletes, even after controlling for race, SES, sex, GPA, standardized test scores, extracurricular involvement, leadership, *and* arts enrollment—was significantly different from zero *and* significantly greater than the estimate for arts students ($F[1, 390] = 14.53$, $p < .001$).

Percentage of Applied-To Colleges Admitted At. There was no statistically significant difference for arts and non-arts students on the percentage of applied schools to which sample members were admitted. There was also no statistically significant difference for athletes on the percentage of applied schools to which sample members were admitted. The results of this analysis are reported in Table 12. Only race (an advantage for White students), SES (a slight disadvantage for more affluent students), GPA (an advantage for better performers), standardized test scores (an advantage for higher scorers), and extracurricular involvement (a slight disadvantage as hours of ECA involvement increased) were significantly related to the percentage of acceptances.

Ever Dropped out of High School. The naive regression suggests that arts students were 30% less like to drop out of high school school than were non-arts students; however, this result lost practical and statistical significance in the controlled models. Arts students were not significantly more or less likely to drop out of school than non-arts students. Interestingly, in the fully controlled model, athletes were 39% less likely than non-athletes to have ever dropped out of high school. The analysis is reported in Table 13.

Receipt of a Bachelor's degree by age 26. The naive regression suggests that arts students were 30% more likely to earn a four year college degree than were non-arts students; however, the estimate in the fully controlled model showed that arts students were neither more nor less likely than non-arts students to earn a four year college degree once SES, race, GPA, test scores, extracurricular involvement, athletic participation, and leadership were included in the model. As seen in Table 14, high school athletes were 21% more likely than non-athletes to earn a bachelor's degree by age 26, a result that was obviously significantly greater than the arts estimate.

On-Time Completion of the Bachelor's degree. I classified "on time" completion of a bachelor's degree as the awarding of a four-year college degree no more than 50 months following the earning of the high school diploma. This accounts for four academic years of college plus one summer, as students who complete in the summer are often permitted to "walk" in a May or June graduation and enter the workforce in the September four years past their high school graduation—often, concurrently with their peers who completed the bachelor's degree 48 months following the earning of their high school diploma. Though the naive regression shows that more arts students than non-arts students earned their bachelor's degree on time, the fully controlled model suggests this advantage was not due to arts study but instead due to race, socioeconomic status, sex, high school GPA, standardized test scores, extracurricular involvement, leadership, and athletic participation, each of which significantly predicted on-time bachelor's degree completion. As displayed in Table 15, arts students were *not* at a disadvantage to non-arts students, but lagged behind high school athletes, who had an 18% greater likelihood of completing their bachelor's degree on time than did non-athletes.

Earning of a graduate degree by age 26. Table 17 displays the results of the analysis of the effect of high school arts study on the receipt of a graduate degree by age 26. Though the naive regression shows that more arts students than non-arts students earned graduate degrees by age 26, the controlled models suggest this observed difference was due to demographic differences between arts and non-arts students and not any unique added effect of arts study. Art students were neither more nor less likely than their non-arts peers to earn graduate degrees once these demographic differences had been held constant in the regression. Similar to arts students, there was no advantage (or disadvantage) for high school athletes on the earning of a graduate degree by age 26.

Conclusions and Next Steps

Results from this study suggest that arts students are served well by their arts study when compared to non-arts students on outcomes related to college admission and attainment. Arts students were more likely than non-arts students to participate in the college admissions process—a necessary step on the pathway toward the attainment of a college degree and the attendant social and financial benefits that accrue to college graduates in American society—and applied to more schools than their non-arts peers. As would be predicted by their greater rates of participation in the college admissions process, arts students were also more likely than non-arts students to be attending a postsecondary institution two years past high school graduation. Unsurprisingly, high school arts students were considerably more likely than their non-arts peers to pursue arts majors in college.

Perhaps more importantly than the areas in which arts students were advantaged in the college admission and attainment processes was the fact that in **no outcome investigated were arts students significantly disadvantaged compared to their non-arts peers**. Arts and non-arts students applied to selective colleges at similar rates, were admitted to selective colleges at similar rates, pursued majors in STEM fields at similar rates, earned bachelor's degrees at similar rates and with similar rates of on-time completion, and received graduate degrees at similar rates. All of these similarities suggest that there is no "opportunity cost" to pursuing arts coursework in high school at the expense of electing non-required, additional coursework in the STEM areas, in history or social studies, or in English and literature. Or, put another way, **arts courses appearing on a high school transcript do not reflect poorly on students in the college admissions process**. Guidance counselors, teacher mentors, and parents who try to restrict a student from the elective pursuit of arts coursework in high school for the fear of not creating a

strong college resume are mistaken—there is no arts penalty, and those students who would like to pursue arts coursework in high school should be encouraged to do so without fear of harming their chances in the college application, admission, and attainment processes.

Implications for Arts Education Policy. Since I find no opportunity cost relative to the college admissions or attainment process for the taking of arts education courses in high school, high schools should be encouraged to provide a rich arts education experience for all students. High schools seeking to streamline their course offerings, either for budgetary or philosophical reasons, are likely doing a disservice to their students if there is a paring back of arts course offerings. Arts education does not decrease a students' chance of earning admission to a highly selective college, and may provide an important aesthetic and emotional outlet for students who are highly motivated academically. Policies that encourage the availability of rich arts course opportunities may promote engagement in the college application process, and may help provide the non-cognitive skills associated with postsecondary success (Lleras, 2008; Schmitt et al., 2009).

Implications for Arts Educators. Arts educators rarely report that their motivation for entering the profession is to develop skills or dispositions in their students unrelated to the discipline at hand. That is, arts teachers don't become arts teachers to improve college outcomes for their students—they become arts teachers in order to deepen their students' understanding of, knowing about, and knowing within the various art forms to which the teachers have chosen to dedicate their lives and their professional careers. However, recruitment of students, particularly at the secondary level, is often a legitimate concern of arts educators, who, by virtue of teaching elective subjects, may find that their full time employment status is directly linked to the number of students electing to enroll in their courses. From a recruitment standpoint, this study provides

evidence that arts educators can use when confronted by parents, students, or guidance counselors who believe that arts study ought to be foregone in order to make room for additional coursework in English, literature, history, or the STEM fields in order to burnish a student's portfolio of credentials for college admission. Evidence from this study clearly suggests that students who do not pursue the arts but instead "double up" in math, science, or other school subjects are **not** at an advantage to arts students when the time for applying and being admitted to selective colleges comes.

Implications for Future Research. Some of the findings of this study provide some confirming and some disconfirming evidence to analyses of other large datasets regarding some outcomes. Earlier work with the National Longitudinal Study of Adolescent Health (Elpus, 2013c), specifically, suggested that high school arts students attended postsecondary institutions and earned bachelor's degrees at greater rates than did their non-arts peers. The present study confirms the earlier finding about postsecondary *attendance*, but provides disconfirming evidence challenging the earlier finding about bachelor's degree attainment. In the present study, arts students *did* attend postsecondary schools at greater rates than their non-arts peers, but did *not* complete four-year degrees at greater rates than their non-arts peers. Completion rates in the present study were the same for arts and non-arts students. More research is needed to sort out the contradictory evidence. It is possible, for example, that either the Add Health finding *or* this ELS finding regarding bachelor's degree completion is a *cohort effect*—that one or both results, while representative of the nation at the time of their data collection, are not representative of the entire nation across time. Future research using other longitudinal data could help determine to what extent either the present ELS finding or the earlier Add Health finding is due to such a cohort effect.

Future research is also needed examining arts students and the college admissions process specifically. The present study demonstrates that arts students participate in the college admissions process at greater rates than their non-arts peers and apply to slightly more colleges, but this study does not elucidate *why* arts students are more engaged in the college admissions process. Future research, perhaps using qualitative methods, might better explicate the reasons that arts students are more engaged in the transition from high school to college.

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Table 1

Logistic Regression models for the Effect of High School Arts Study on Participation in the College Application Process

	(1) Naive Model b /*t*/*p*	(2) + SES & Sex b /*t*/*p*	(3) + Prior Academics b /*t*/*p*	(4) + Extracurriculars b /*t*/*p*
Arts student	1.67***	1.44***	1.30**	1.29**
	(6.26)	(4.25)	(3.03)	(2.91)
	.000	.000	.003	.004
White		0.80*	0.48***	0.50***
		(2.29)	(7.08)	(6.63)
		.023	.000	.000
SES		3.31***	2.38***	2.18***
		(19.20)	(12.97)	(11.66)
		.000	.000	.000
Male		0.50***	0.60***	0.55***
		(9.16)	(6.54)	(7.44)
		.000	.000	.000
GPA			1.94***	1.77***
			(13.23)	(11.20)
			.000	.000
Std. test score			1.06***	1.06***
			(11.50)	(10.88)
			.000	.000
Athlete				1.45***
				(4.26)
				.000
ECA (hrs/week)				1.18***
				(5.37)
				.000
Leadership index				1.22**
				(2.88)
				.004
n	10,750	10,750	10,750	10,750

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 2

Logistic Regression models for Effect of High School Arts Study on Attending a Postsecondary Institution by 2-years after High School Graduation

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.56***	1.35***	1.22**	1.21*
	(6.48)	(4.17)	(2.66)	(2.52)
	.000	.000	.008	.012
White		1.03	.62***	.65***
		(.48)	(6.07)	(5.67)
		.628	.000	.000
SES		3.17***	2.33***	2.16***
		(21.37)	(14.76)	(13.60)
		.000	.000	.000
Male		.58***	.69***	.64***
		(8.89)	(5.52)	(6.49)
		.000	.000	.000
GPA			2.02***	1.87***
			(16.16)	(13.99)
			.000	.000
Std. test score			1.06***	1.06***
			(14.31)	(13.58)
			.000	.000
Athlete				1.43***
				(4.82)
				.000
ECA (hrs/week)				1.12***
				(5.00)
				.000
Leadership index				1.19***
				(3.37)
				.001
n	10,710	10,710	10,710	10,710

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3

Logistic Regression Models for Effect of Disaggregated High School Arts Study on Postsecondary Attendance 2-years past High School Graduation

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + ECA b / *t* / *p*
Music student	1.76***	1.47***	1.26**	1.20*
	(7.31)	(4.80)	(2.78)	(2.16)
	.000	.000	.006	.032
Visual art student	1.02	.97	.98	1.02
	(.22)	(.41)	(.29)	(.24)
	.827	.684	.772	.810
Theater student	1.45**	1.13	1.07	1.06
	(3.04)	(.99)	(.53)	(.43)
	.003	.323	.596	.665
Dance student	1.87***	1.79**	1.73*	1.70*
	(3.50)	(2.73)	(2.30)	(2.18)
	.001	.007	.022	.030
Film student	2.21	1.40	.62	.62
	(.99)	(.38)	(.52)	(.56)
	.325	.705	.604	.575
Arts survey student	1.55	1.60	1.28	1.31
	(1.20)	(1.58)	(.81)	(.84)
	.231	.115	.419	.399
White		1.04	0.63***	0.65***
		(.59)	(5.90)	(5.52)
		.553	.000	.000
SES		3.14***	2.32***	2.15***
		(21.12)	(14.66)	(13.51)
		.000	.000	.000
Male		0.60***	0.71***	0.66***
		(8.08)	(4.91)	(5.94)
		.000	.000	.000
GPA			2.01***	1.87***
			(15.96)	(13.88)
			.000	.000
Std. test score			1.06***	1.06***
			(14.16)	(13.49)
			.000	.000
Athlete				1.42***
				(4.76)
				.000
ECA (hrs/week)				1.12***
				(4.90)
				.000
Leadership index				1.19***
				(3.35)
				.001
n	10,710	10,710	10,710	10,710

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4

Logistic Regression Models for Effect of High School Arts Study on College Scholarship/Grant Receipt

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.16*	1.14	1.10	1.08
	(2.06)	(1.79)	(1.20)	(.98)
	.040	.073	.230	.329
White		.88	.72***	.72***
		(1.71)	(4.09)	(4.05)
		.088	.000	.000
SES		.84***	.72***	.69***
		(3.50)	(6.15)	(6.66)
		.001	.000	.000
Male		.79***	.85*	.82**
		(3.48)	(2.29)	(2.71)
		.001	.023	.007
GPA			1.44***	1.36***
			(6.93)	(5.77)
			.000	.000
Std. test score			1.01**	1.01*
			(2.71)	(2.36)
			.007	.019
Athlete				.97
				(.42)
				.678
ECA (hrs/week)				1.08***
				(3.68)
				.000
Leadership index				1.13**
				(3.07)
				.002
n	6,060	6,060	6,060	6,060

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Logistic Regression Models for Effect of High School Arts Study on Pursuing a College STEM field Major

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	0.94	0.96	0.92	0.93
	(.84)	(.53)	(1.12)	(1.00)
	.401	.600	.262	.317
White		.76***	.66***	.66***
		(3.60)	(5.33)	(5.32)
		.000	.000	.000
SES		.92	.85**	.85**
		(1.60)	(3.26)	(3.11)
		.110	.001	.002
Male		.95	1.01	1.01
		(.75)	(.13)	(.18)
		.454	.895	.860
GPA			1.40***	1.44***
			(5.75)	(6.15)
			.000	.000
Std. test score			1.01	1.01
			(1.55)	(1.76)
			.123	.080
Athlete				1.12
				(1.31)
				.190
ECA (hrs/week)				.96
				(1.75)
				.081
Leadership index				.95
				(1.39)
				.165
n	5,460	5,460	5,460	5,460

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 6

Logistic Regression Models for Effect of High School Arts Study on Pursuing a College Arts Major

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	3.05***	3.07***	3.03***	2.94***
	(5.58)	(5.52)	(5.43)	(5.28)
	.000	.000	.000	.000
White		1.01	.97	1.02
		(.06)	(.23)	(.14)
		.953	.819	.886
SES		1.16	1.12	1.16
		(1.40)	(1.06)	(1.34)
		.161	.292	.180
Male		1.14	1.16	1.20
		(.90)	(.94)	(1.18)
		.368	.348	.239
GPA			1.11	1.09
			(.91)	(.75)
			.366	.454
Std. test score			1.00	1.00
			(.24)	(.08)
			.807	.938
Athlete				.49***
				(4.14)
				.000
ECA (hrs/week)				1.03
				(.72)
				.471
Leadership index				1.13*
				(2.06)
				.040
n	5,460	5,460	5,460	5,460

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7

Logistic Regression Models for Effect of Disaggregated High School Arts Study on the Likelihood of Pursuing a College Arts Major

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + ECA b / *t* / *p*
Music student	2.07***	2.07***	2.05***	1.95***
	(5.29)	(5.23)	(5.04)	(4.56)
	.000	.000	.000	.000
Visual art student	1.53**	1.54**	1.55**	1.58**
	(2.88)	(2.89)	(2.92)	(3.07)
	.004	.004	.004	.002
Theater student	1.86**	1.84**	1.85**	1.81**
	(3.09)	(3.03)	(3.05)	(2.91)
	.002	.003	.002	.004
Dance student	1.40	1.48	1.48	1.50
	(1.21)	(1.42)	(1.42)	(1.45)
	.227	.158	.155	.149
Film student	2.63	2.51	2.36	2.56
	(.93)	(.88)	(.82)	(.90)
	.355	.377	.412	.368
Arts survey student	1.01	1.02	1.01	0.99
	(.02)	(.04)	(.03)	(.02)
	.987	.971	.978	.985
White		1.00	0.96	1.01
		(.02)	(.29)	(.09)
		.987	.773	.927
SES		1.14	1.10	1.14
		(1.24)	(.88)	(1.16)
		.217	.378	.247
Male		1.16	1.18	1.22
		(1.02)	(1.05)	(1.26)
		.310	.294	.207
GPA			1.11	1.09
			(.93)	(.79)
			.353	.429
Std. test score			1.00	1.00
			(.26)	(.03)
			.797	.974
Athlete				.50***
				(4.00)
				.000
ECA (hrs/week)				1.03
				(.65)
				.518
Leadership index				1.12
				(1.86)
				.064
n	5,460	5,460	5,460	5,460

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 8

Linear Regression Models for Effect of High School Arts Study on Number of Colleges Applied To

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	0.35*** (6.07) .000	0.24*** (4.61) .000	0.16** (3.18) .002	0.14** (3.05) .002
White		-0.55*** (10.07) .000	-0.83*** (16.03) .000	-0.81*** (15.66) .000
SES		0.86*** (19.90) .000	0.56*** (12.74) .000	0.49*** (10.60) .000
Male		-0.33*** (6.55) .000	-0.20*** (4.14) .000	-0.26*** (5.39) .000
GPA			0.40*** (15.30) .000	0.30*** (11.86) .000
Std. test score			0.03*** (11.04) .000	0.03*** (10.05) .000
Athlete				0.27*** (5.90) .000
ECA (hrs/week)				0.13*** (9.23) .000
Leadership index				0.13*** (4.17) .000
n	10,710	10,710	10,710	10,710

Notes. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 9

Linear Regression for Effect of Disaggregated High School Arts Study on Number of Colleges Applied To

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + ECA b / *t* / *p*
Music student	0.28***	0.16**	0.05	0.01
	(5.02)	(3.17)	(.95)	(.10)
	.000	.002	.342	.919
Visual art student	0.16**	0.14*	0.14**	0.17***
	(2.66)	(2.59)	(2.96)	(3.62)
	.008	.010	.003	.000
Theater student	0.23*	0.05	0.02	0.01
	(2.43)	(.55)	(.27)	(.12)
	.016	.586	.787	.902
Dance student	0.36**	0.22	0.17	0.17
	(2.96)	(1.85)	(1.50)	(1.64)
	.003	.065	.134	.101
Film student	1.06	0.80	0.43	0.42
	(1.92)	(1.57)	(.87)	(.99)
	.056	.118	.383	.324
Arts survey student	-0.03	-0.02	-0.15	-0.12
	(.09)	(.06)	(.50)	(.42)
	.929	.955	.619	.678
White		-0.55***	-0.83***	-0.81***
		(10.00)	(15.92)	(15.55)
		.000	.000	.000
SES		0.86***	0.56***	0.49***
		(19.72)	(12.79)	(10.69)
		.000	.000	.000
Male		-0.32***	-0.20***	-0.26***
		(6.17)	(4.01)	(5.30)
		.000	.000	.000
GPA			0.40***	0.30***
			(15.40)	(12.00)
			.000	.000
Std. test score			0.04***	0.03***
			(11.05)	(10.11)
			.000	.000
Athlete				0.27***
				(5.86)
				.000
ECA (hrs/week)				0.13***
				(9.36)
				.000
Leadership index				0.13***
				(4.31)
				.000
n	10,710	10,710	10,710	10,710

Notes. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 10

Ordered Logistic Regression Models for Effect of High School Arts Study on Selectivity of Colleges Applied To

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.21**	1.10	0.99	0.98
	(3.21)	(1.59)	(.10)	(.25)
	.001	.112	.922	.800
White		0.98	0.56***	0.55***
		(.45)	(9.95)	(9.98)
		.654	.000	.000
SES		2.74***	1.97***	1.88***
		(25.21)	(16.29)	(14.67)
		.000	.000	.000
Male		.93	1.09	1.02
		(1.37)	(1.62)	(.33)
		.173	.106	.738
GPA			2.00***	1.83***
			(16.89)	(14.82)
			.000	.000
Std. test score			1.07***	1.06***
			(17.01)	(16.66)
			.000	.000
Athlete				1.27***
				(3.89)
				.000
ECA (hrs/week)				1.15***
				(8.33)
				.000
Leadership index				1.15***
				(4.63)
				.000
n	9,210	9,210	9,210	9,210

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 11

Ordered Logistic Regression for Effect of High School Arts Study on Selectivity of College Acceptances

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.26***	1.13*	1.01	1.00
	(3.80)	(2.02)	(.22)	(.02)
	.000	.044	.827	.982
White		1.20***	.62***	.61***
		(3.40)	(7.74)	(7.93)
		.001	.000	.000
SES		2.83***	1.94***	1.85***
		(25.65)	(15.45)	(13.97)
		.000	.000	.000
Male		.87**	1.01	.95
		(2.87)	(.17)	(1.00)
		.004	.866	.318
GPA			2.30***	2.11***
			(18.40)	(16.32)
			.000	.000
Std. test score			1.09***	1.09***
			(21.37)	(21.34)
			.000	.000
Athlete				1.38***
				(5.37)
				.000
ECA (hrs/week)				1.13***
				(7.56)
				.000
Leadership index				1.18***
				(5.30)
				.000
n	8,930	8,930	8,930	8,930

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 12

Linear Regression Models for Effect of High School Arts Study on Percentage of College Acceptances

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.02	-.01	-.46	-.41
	(1.24)	(.01)	(.58)	(.52)
	.216	.993	.561	.605
White		9.98***	8.14***	8.11***
		(11.82)	(9.26)	(9.25)
		.000	.000	.000
SES		-0.77	-2.42***	-2.20***
		(1.51)	(4.35)	(3.87)
		.132	.000	.000
Male		-1.99**	-1.45*	-1.09
		(2.86)	(2.07)	(1.52)
		.004	.039	.128
GPA			2.47***	2.88***
			(4.51)	(5.17)
			.000	.000
Std. test score			0.22***	0.23***
			(3.92)	(4.03)
			.000	.000
Athlete				0.17
				(.20)
				.839
ECA (hrs/week)				-1.01***
				(4.11)
				.000
Leadership index				0.14
				(.33)
				.739
n	9,180	9,180	9,180	9,180

Notes. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 13

Logistic Regression Models for Effect of High School Arts Study on Ever Dropped Out

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	0.70**	0.84	0.98	0.96
	(2.65)	(1.32)	(.12)	(.26)
	.008	.186	.905	.798
White		0.48***	0.75	0.73*
		(5.05)	(1.86)	(2.07)
		.000	.064	.039
SES		0.46***	0.67***	0.73**
		(8.19)	(3.40)	(2.68)
		.000	.001	.008
Male		1.88***	1.27	1.36*
		(4.41)	(1.57)	(2.02)
		.000	.117	.044
GPA			0.26***	0.28***
			(11.57)	(10.97)
			.000	.000
Std. test score			0.97**	0.97**
			(3.26)	(3.29)
			.001	.001
Athlete				0.61**
				(2.96)
				.003
ECA (hrs/week)				0.94
				(1.23)
				.219
Leadership index				0.83
				(1.33)
				.184
n	9,810	9,810	9,810	9,810

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 14

Logistic Regression for Effect of High School Arts Study on Bachelor's Degree Attainment

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.30***	1.10	0.89	0.88
	(4.37)	(1.60)	(1.67)	(1.77)
	.000	.110	.097	.078
White		1.39***	0.79**	0.79**
		(4.89)	(3.15)	(3.05)
		.000	.002	.002
SES		2.99***	2.06***	1.95***
		(24.04)	(13.86)	(12.48)
		.000	.000	.000
Male		0.68***	0.86*	0.81**
		(6.49)	(2.12)	(2.90)
		.000	.035	.004
GPA			3.05***	2.84***
			(21.93)	(20.28)
			.000	.000
Std. test score			1.06***	1.06***
			(13.67)	(13.10)
			.000	.000
Athlete				1.21**
				(2.79)
				.006
ECA (hrs/week)				1.16***
				(7.92)
				.000
Leadership index				1.05
				(1.49)
				.136
n	9,810	9,810	9,810	9,810

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 15

Logistic Regression for Effect of H.S. Arts Study on On-Time Bachelor's Degree Completion

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.38***	1.11	0.88	0.88
	(4.23)	(1.32)	(1.41)	(1.45)
	.000	.187	.160	.149
White		1.38***	0.78**	0.78**
		(3.85)	(2.80)	(2.83)
		.000	.005	.005
SES		2.94***	1.86***	1.77***
		(21.90)	(11.09)	(9.98)
		.000	.000	.000
Male		0.55***	0.64***	0.61***
		(8.56)	(5.53)	(5.97)
		.000	.000	.000
GPA			3.20***	2.96***
			(16.31)	(15.06)
			.000	.000
Std. test score			1.07***	1.07***
			(12.40)	(11.92)
			.000	.000
Athlete				1.18*
				(2.00)
				.046
ECA (hrs/week)				1.12***
				(5.13)
				.000
Leadership index				1.07*
				(2.07)
				.039
n	9,810	9,810	9,810	9,810

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

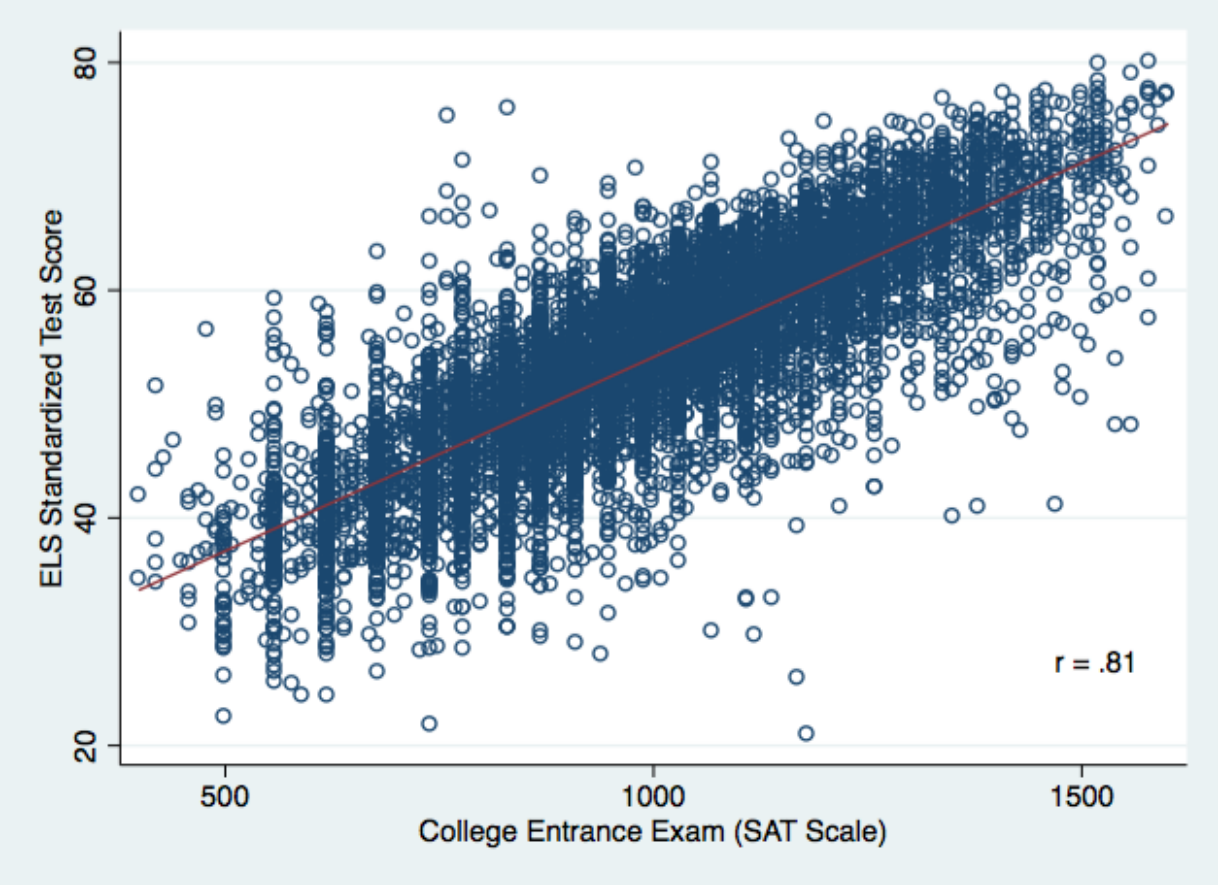
Table 16

Logistic Regression for Effect of H.S. Arts Study on Earning of Graduate Degree by Age 26

	(1) Naive Model b / *t* / *p*	(2) + SES & Sex b / *t* / *p*	(3) + Prior Academics b / *t* / *p*	(4) + Extracurriculars b / *t* / *p*
Arts student	1.41***	1.12	.91	.91
	(3.45)	(1.08)	(.83)	(.90)
	.001	.279	.409	.370
White		1.25*	.80*	.79*
		(2.41)	(2.38)	(2.45)
		.016	.018	.015
SES		2.70***	1.73***	1.66***
		(14.93)	(7.06)	(6.31)
		.000	.000	.000
Male		0.53***	0.63***	0.61***
		(7.34)	(5.05)	(5.46)
		.000	.000	.000
GPA			3.19***	2.94***
			(11.31)	(10.25)
			.000	.000
Std. test score			1.05***	1.05***
			(6.87)	(6.41)
			.000	.000
Athlete				1.12
				(1.11)
				.267
ECA (hrs/week)				1.12***
				(4.56)
				.000
Leadership index				1.07
				(1.44)
				.151
n	9,810	9,810	9,810	9,810

Notes. Estimates reported as odds ratios. Significance tests adjusted for the complex sampling design. *t*-statistics (in parentheses) reported using absolute values. ECA = extracurricular activities. * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 1


ELS Standardized Test Score
20
40
60
80
500
1000
1500
College Entrance Exam (SAT Scale)
r = .81