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Abstract

The study provides new information on the relationships between students' socioeconomic backgrounds, utilization of college enhancement strategies, and subsequent four-year college enrollment. Enhancement strategies represent student behaviors used to bolster the competitiveness of a college application, such as Advanced Placement exams and a variety of extracurricular activities. By drawing on two national datasets that span the 1990s (NELS) and the 2000s (ELS), the study uncovers how these relationships have changed during a period marked by escalating demand for college and growing class inequality. The findings provide evidence of class adaptation (Alon 2009) based on the combination of increased use of college enhancement strategies among higher SES students and increased influence of enhancement strategies in predicting selective college enrollment. Implications are discussed in terms of the higher education system and pervasive social inequality.

Among the most difficult challenges we face as a society is social inequality, for which our postsecondary education system acts at once as the problem, by propagating disadvantages through disparate access to opportunities, and the solution, by serving as the key mechanism for social mobility. Countervailing trends are apparent in the steady growth over the past three decades in postsecondary participation rates among students from all backgrounds and in the increasingly competitive process of gaining admission to college—specifically to selective colleges—which favors students from higher socioeconomic backgrounds (Alon 2009; Engberg 2012; Hoxby 2009).

It is well documented that students from higher socioeconomic status (SES) families are more likely to attend college, and to attend more selective institutions (Engberg 2012; Grodsky and Jackson 2009; Karen 2002; Paulsen and St. John 2002). Researchers have pointed to the superior academic preparation of high-SES students, attendance at higher performing schools, and relative abundance of social, cultural, and financial resources, as primary reasons for system-wide stratification (Bastedo and Jaquette 2011; Hoxby and Avery 2012).

Some of the most promising explanations of class-based stratification in higher education are those focused on the mechanisms employed by higher status groups to maintain their social advantages, particularly when confronted with increasing postsecondary access of students from all backgrounds (Alon 2009; Bastedo and Jaquette 2011; Lucas 2001). For example, Alon's research suggests the cycle of inequality in higher education unfolds according to combinations of program exclusions (such as college admissions requirements) and student adaptations (such as purchasing college prep services to enhance performance on standardized tests). Others have similarly pointed to advantages associated with specific student behaviors during the college application process, such as Advanced Placement (AP) exams, and a variety of extracurricular activities. Espenshade and Radford (2009) identified such behaviors as "enhancement strategies" (p.39), which data from the 1990s and 2000s indicate are

increasingly important considerations among college admissions personnel (Clinedinst, Hurley and Hawkins 2011).

The broader U.S. context includes a postsecondary education system marked by rising demand for college, fueled by increasing numbers of college-admissible high school graduates, and escalating costs of attendance. Despite dramatic expansion, the postsecondary system has not sufficiently kept up with demand, resulting in what Alon and Tienda (2007) have labeled the "college squeeze." Under these circumstances, colleges compete with one another to identify and attract the most meritorious and diverse student body, while students increasingly rely on college selectivity rankings and the knowledge that selective schools consider a host of factors such as test scores, high school grades and rank, and extracurricular activities when making admissions decisions. Institutions continuously seek new and innovative ways to market their "brand" of education to desirable students, while well-positioned students and their families work to build portfolios that optimize their chances of gaining admissions to the most desirable schools. Against this backdrop, researchers and policymakers will benefit from an improved understanding of the factors associated with how today's students gain admission to college, and to selective institutions in particular, and how current trends are defining educational opportunity and/or reproducing social inequality.

Our purpose in conducting the present study was twofold. First, we sought to identify the relationships between students' socioeconomic backgrounds, utilization of college enhancement strategies during high school, and subsequent college enrollment. We investigated these relationships among nationally representative samples of four-year college applicants and among a subset of applicants to selective institutions. Second, by drawing on two national datasets that span the 1990s and the 2000s, we sought to uncover how these relationships may have changed during a period marked by dramatic escalation in college costs, demand for college, and growing class inequality.

Conceptual Framework

The study is based on two related assumptions. Our first assumption is that as educational attainment increases among students from all backgrounds, socioeconomically advantaged groups will draw from their understanding of the higher education system and other social institutions in securing a better education. In other words, those with socioeconomic advantage may maintain their status position by securing "quantitatively similar but qualitatively better education" (Lucas 2001, p. 1652). The second assumption is that, over time, inequality in higher education expands, declines, or is maintained according to combinations of admission exclusions (such as academic or other admissions requirements that apply equally to all students) and adaptations (such as channeling resources into performing well on standardized tests such as the SAT to help gain access to the most desirable institutions) (Alon 2009). Drawing on Lucas's (2001) Effectively Maintained Inequality (EMI) model and Alon's (2009) Comprehensive Scheme for the Evolution of Class Inequality in Higher Education, it follows that during periods of postsecondary expansion, socioeconomically advantaged groups will leverage different strategies to secure advantages in the college admissions process.

Lucas's (2001) EMI model emphasizes that as educational attainment has increased among students from all socioeconomic strata, family backgrounds play a different, more subtle role in maintaining social inequality through education. For example, as access to postsecondary education has increased broadly, the greater differentiation across types of postsecondary education choices is better understood and more often utilized among students from higher-SES backgrounds.

Applying Lucas's EMI framework to the transition from high school to college, it follows that higher-SES students would be more likely to have access to, and thus employ, strategies that enhance their college admissibility, aside from the school attended, grade level, or even academic performance. EMI provides a compelling rationale for the

pervasiveness of educational inequality that counters many of the limitations of competing sociological frameworks, including Muller and Karle's (1993) Life Course Perspective and Raftery and Hout's (1993) concept of Maximally Maintained Inequality (MMI), which do not sufficiently recognize that educational transitions accompany distinctions in the types of experiences afforded to students of varying socioeconomic resources, and the ways in which parents and students use their social standing to maintain educational advantages.

An abundance of research has identified that academic achievement (such as that which is signaled by standardized assessments) serves to mediate the influence of socioeconomic status (Davies and Guppy 1997; Hearn 1984, 1991; Karen 2002). Alon (2009) posits that the concomitant rise in college tuition and emphasis on standardized assessments in the college admissions process restricts college access for students from lower socioeconomic backgrounds, particularly in terms of access to selective institutions. Alon estimated postsecondary enrollment models using nationally representative data from the 1970s, 80s, and early 90s, yielding results in support of the conclusion that adaptive behavior among higher socioeconomic students form the "cornerstone to building a comprehensive theory regarding the evolution of inequality."(p.749).

The concept of *habitus* was used by McDonough (1997) to examine the organization of high schools and the ways in which students' college choice processes are shaped by the interaction among organizational structures and the social class of high schools. Focusing on the high school socioeconomic context in combination with school-level guidance and admissions norms, McDonough's case studies revealed that the college application and admissions processes of students within low-SES schools were constrained by the resources of the school, particularly those related to the guidance counseling process. Independent of academic merit, it appears that the socioeconomic qualities of high schools delimit the range of choices available to students and thereby influence students' ability to negotiate the college choice process. Ultimately, these

differences act to accentuate existing disadvantages among students from lower social classes.

Building on the conceptual underpinnings of Lucas (2001), Alon (2009), and McDonough (1997), the present study examines if college enhancement strategies may serve to create and/or maintain inequality in the educational system in the United States during the 1990s and 2000s. Enhancement strategies are distinct from academic performance and quality of school attended, yet are still deemed meritorious during admissions decisions either directly (e.g., via extracurricular activities and AP exams), or indirectly (e.g., scoring higher on admissions tests after taking expensive test preparatory tools) (Clinedinst et al. 2011). Furthermore, we expand upon Alon's (2009) study which drew on data up to the early 1990s, by examining the role of SES in college enrollment models in 1990s and 2000s.

College Enhancement Strategies

In attempting to understand patterns of stratification in postsecondary admissions and enrollment, researchers have noted that many institutions, particularly highly selective colleges, are increasingly relying on test scores in determining students' admissibility (Alon 2009; Alon and Tienda 2007). The growing reliance on test scores reflects a definition of merit that generally protects and serves the interests of the dominant group in society. However, there are non-academic activities that may also be considered meritorious, such as volunteerism (Wells and Lynch 2013) and other extra-curricular activities. These non-academic indicators of merit are likely to be used in admissions decisions, especially at selective institutions (Stevens 2007). Students may also use strategies in attempting to improve traditional measures of academic merit by taking part in test preparation activities. As Espenshade and Radford (2009) have explained, these types of actions may be thought of as "enhancement strategies" (p.39) in gaining admission to selective colleges and universities.

For the present study, we adopt a broad definition of what constitutes an admission enhancing strategy by examining the following five specific strategies: whether a student 1) took or plans to take an AP exam, 2) utilized SAT preparatory instruction (a course or tutoring), 3) utilized SAT preparatory self-study materials (books, videos, or computer programs), 4) participated in extracurricular activities, and 5) participated in a volunteer activity. While these admission enhancement strategies may be most salient in students' pathways into selective institutions, we presume they may also enhance their likelihood of enrollment across the full spectrum of four-year institutions.

Academic Preparation and Standardized Examinations

In order to improve their academic profile, students may try to enhance their college applications by taking part in SAT or ACT preparation activities in the hopes of improving their scores. Not only do test preparation activities cost money and are therefore more accessible to higher-SES students, but low-SES students may perceive the value of the tests differently than their higher-SES peers in terms of admissions and in relation to their academic preparation (Deil-Amen and Tevis 2010). In addition to class-based differences, perceptions about standardized exams and preparation also may exist by race/ethnicity (Walpole, McDonough, Bauer, Gibson, Kanyi and Toliver 2005).

Advanced Placement (AP) is another means of attempting to bolster college applications. AP offers students the opportunity to take college-level coursework while still in high school, culminating with the AP exam. However, the evidence on the influence of AP on college outcomes in mixed. While positive outcomes have been reported, such as better academic performance or higher graduation rates (Hargrove, Godin, and Dodd 2008), questions have been raised over the causality of such relationships (Klopfenstein and Thomas 2009). Nevertheless, students who complete AP credits are commonly assumed to have a competitive advantage when seeking college admissions, and during the 1990s and first decade of the 21st century, college admissions personnel indicate that AP exams have become an increasingly important factor in

admissions decisions (Clinedinst et al. 2011). Despite increased access to AP in recent decades (College Board 2010), there continues to be stratification by race/ethnicity and income-level for those that participate in AP courses and exams (Klopfenstein 2004).

Extracurricular Activities and Student Leadership

Participation in the extra-curriculum comprises another set of strategies to improve the likelihood of college admission. The extra-curriculum may include a variety of activities involving student engagement beyond the classroom. While type of activity and intensity of involvement may vary, studies have indicated that some specific extra-curricular involvement are related to positive educational outcomes, including college enrollment generally (Marsh 1992; Marsh and Kleitman 2002) and selective enrollment specifically (Kaufman and Gabler 2004). While higher-SES students have more access to extra-curricular activities, there is evidence that low-SES students may benefit more from involvement (Marsh 1992; Marsh and Kleitman 2002). Extracurricular involvement may be a factor in student resilience, whereby vulnerable students exceed expectations for their educational attainment (Peck, Roeser, Zarrett and Eccles 2008).

Volunteerism is an additional way students may attempt to set themselves apart in the admissions process through activities outside of the academic curriculum. The years we investigate in the present study (mid-1990s—mid-2000s) coincide with a period marked by overall increases in volunteerism among high school-aged youth (Dote, Cramer, Dietz and Grimm 2006; Grimm, Dietz and Foster-Bey 2006). There are disparities to this involvement, however, at both the individual and school levels (Wells and Lynch 2013), such that Spring, Dietz, and Grimm (2007) found that only 27 percent of students from disadvantaged backgrounds had a parent serving as a volunteer role model, versus 44 percent of students from non-disadvantaged backgrounds. Despite the differences, research has indicated that lower-income individuals may report greater perceived benefits from volunteering (Morrow-Howell, Hong and Tang 2009).

Hypothesis and Research Questions

The extant literature suggests access to college enhancement strategies may be a critical factor for maintaining patterns of stratification among students from the lowest and highest socioeconomic backgrounds, despite continued gains in academic achievement across all students groups (Bastedo and Jaquette 2011). Following Alon's (2009) conceptualization of adaptation, such strategies enhance college applications and fuel socioeconomic disparities in participation and access. We therefore hypothesize that, over a time period marked by expanding college enrollment rates and costs, class-based adaptation will be evident through: 1) increasing use of college enhancement strategies between 1990s and 2000s among higher SES students, and 2) increased influence of such strategies on college enrollment. The study was designed to address the following three research questions:

(1) To what extent are college enhancement strategies related to four-year college enrollment in general and selective college enrollment in particular?

(2) To what extent do the relationships between college enhancement strategies and four-year enrollment differ by student SES?

(3) To what extent have the relationships between college enhancement strategies and enrollment, as well as differences by student SES, changed between the 1990s and the 2000s?

Methods

Data and Variables

Data for this study came from two sources, the National Educational Longitudinal Study (NELS:88/94) and the Educational Longitudinal Study (ELS:2002/06). While there are some differences in administration of each dataset (e.g., NELS began with a cohort of eighth graders and ELS began with a cohort of tenth graders), both were designed by the

National Center for Educational Statistics (NCES) to longitudinally examine students'
transitions from secondary school into postsecondary education and the workforce. For
details about NELS and ELS questionnaires, sampling and methodological strategies, see
Curtin, Ingels, Wu, Heuer and Owings (2002) and Ingels, Pratt, Rogers, Siegel and Stutts
(2005), respectively. Additional data from the Barron's Admissions Competitiveness
Index were utilized to obtain information on the selectivity of colleges for the years when
NELS and ELS students were entering higher education.

For each dataset, the 12th grade cohort served as our basis for selecting an analytic
sample. Given the complex, multi-stage sampling strategy employed by NCES to achieve
national representation, the study's results are generalizable to 12th grade students in their
respective cohorts. We restricted the sample for analysis in two different ways: first, to all
students who applied to a four-year institution, and second to only students who applied
to a selective institution. We excluded from our analyses students who only applied to
two-year institutions to maintain focus on those admission enhancement strategies
typically aligned with four-year institutions.

Dependent variables. Our primary interest was to examine the roles of
enhancement strategies and SES on college enrollment. Therefore, we created a
dichotomous variable indicating whether a student enrolled in a 4-year public or private
non-profit institution within 2 years of each cohort's typical high school graduation year,
thus including slightly delayed enrollees. When examining the subsample of applicants to
selective institutions, we create a similar binary dependent variable indicating whether a
student enrolled in a selective institution. Selectivity was determined by whether a
student applied/enrolled at an institution labeled as "most" or "highly" selective in the
Barron's Admissions Competitiveness Index dataset.

Independent variables. Measures of college enhancement strategies were based
on six dichotomous variables. Five included whether or not a student: 1) took or planned
to take an AP exam, 2) utilized SAT preparatory instruction (a course or tutoring), 3)

utilized SAT preparatory self-study materials (books, videos, or computer programs), 4) had a leadership role in extracurricular activities, and 5) reported any volunteering activity. From these five variables, we created an overall measure of admission-enhancing strategy use by counting how many of the five possible strategies a student used. Our sixth independent variable represented those students who used four or five strategies, which was considered to be "high strategy use." This design builds on Espenshade and Radford's (2009) approach to examining strategies individually and in total to uncover the influence of more intensive involvement among students.

The other independent variable of interest was SES, for which we used a composite variable derived from parental income, parental educational attainment, and parental occupation as reported by parents in a survey (in 1988 for NELS and 2002 for ELS). This variable is standardized such that is has a mean of zero and a standard deviation of one. Rather than examine disaggregated SES components as utilized in some studies of college pathways (Paulsen and St. John 2002; Wells and Lynch 2012), we employed an aggregate measure of SES to serve as an overall measure of wealth and to reflect a student's overall orientation toward college (Adelman 2002; Perna 2006; Terenzini, Cabrera and Bernal 2001).

Control variables. Our control variables included the student's gender and race/ethnicity, as these are known to be stratifying factors for college admissions/enrollment. We also controlled for a students' college expectations as well as academic achievement, represented by a standardized composite test score from English and math exams administered by NCES. To control for the potential influence of peers we controlled for peers' college aspirations as well.[1] To control for school factors, we included variables for the student's high school program (general, college prep, or vocational-technical), the control of the high school (public, private or Catholic), school-SES (proxied by the percentage of students on free or reduced lunch), urbanicity, and geographic region.

Missing data. We used multiple imputation (MI) to handle missing data under the assumption that data were missing at random (MAR) (Allison 2002; van Buuren, Brand, Groothuis-Oudshoorn and Rubin 2006; see also Manly and Wells in press).[2] This allows us to retain a full sample of the 12th grade cohort (N=11,660 for NELS and N=13,370 for ELS) and to diminish any biases that may accompany listwise deletion (Peugh and Enders 2004; Schafer and Graham 2002).[3] We created 50 imputations in both NELS and ELS (see advice from Graham, Olchowski and Gilreath 2007; White, Royston and Wood 2011) using the *mi impute chained* command in Stata v.12, with a conservative 10 burn-in iterations chosen after visual inspection of convergence plots. All variables, including the dependent variable (see Graham 2009), were included in the imputation models, along with the primary sampling unit and the appropriate weights for each dataset (Heeringa, West and Berglund 2010). Rubin's (1987) pooling rules were used to combine the statistical results across the imputed datasets for all results presented.

Statistical Analysis

A benefit to using these two datasets from NCES is that they contain a similar set of variables, enabling parallel analyses across different time-periods. Exploiting this feature, our analytic plan consisted of three parts.

First, for both NELS and ELS data, we descriptively analyzed measures representing college enhancement strategies, as well as four-year and selective college enrollment. Mean values are presented for the full analytic sample, and for each SES-group, among students who applied to a four-year institution as well as the subsample who applied to a selective college.

The SES-groups that we utilized for the analysis were derived from SES-quartiles of the sample of students in the full, generalizable 12th grade cohort, rather than the analytic subsamples. The categories of low-SES, mid-low SES, mid-high SES, and high-SES, therefore, were not equal in size for the four-year or selective applicant subsamples. The descriptive results showed how enhancement strategies were accessed and utilized

differently across social classes at a given time (as presented *within* the NELS and ELS descriptive tables), as well as how each changed over time (by comparing information *between* the NELS and ELS tables).

Second, we used multivariate regression to investigate the influence of SES and college enhancement strategies on four-year and selective college enrollment by estimating two identical logistic regression models. One model included all five admission enhancement strategies as individual measures. The other model captured college enhancement strategies as a single, combined measure of overall "high" strategy use to investigate the effects of using multiple strategies, the effects of which may be masked when each strategy is analyzed as individual variables. All models included the control variables described above and odds ratios were used to identify effect sizes (Long, 1997).

The third part of our analysis examined if the estimated effects of enhancement strategies differed by students' SES. We calculated predicted probabilities based on pooled results from the multiply imputed dataset.[4] We first compared predicted probabilities of enrollment based on use vs. non-use of each type of strategy, across the full range of SES values. For each predicted probability, we assigned mean values for all variables in the regression equation. For models where at least one enhancement strategy and SES were statistically significant predictors, we then calculated the associated group difference by subtracting the relevant probabilities, and graphed the difference with a 99% confidence interval (Long 2009).[5] A group difference should be interpreted as statistically significant when the lowest bound of the confidence interval was greater than zero. Comparisons of results between the 1992 and 2004 cohorts informs our examination of how inequality found by SES group may have been maintained, diminished, or increased over time.

Results

Descriptive analysis

Mean values for each of the college enhancement and enrollment variables are shown in Table 1 (the 1992 cohort) and Table 2 (the 2004 cohort) in total, and broken down by SES quartile. The tables indicate that among high school graduates who applied to four year institutions, there were significant SES differences in utilizing enhancement strategies, including AP exams, SAT prep instruction, volunteerism, and extracurricular leadership activities. This finding held true in terms of overall high use of strategies, and for both the 1992 and 2004 cohorts (where "high use" measures students who utilized 4 or 5 strategies). The only exception among the enhancement strategies was that no significant SES differences were identified in terms of SAT self-study materials for either cohort. In terms of four-year college enrollment, we identified significant differences by SES at both time periods.

Among high school graduates who applied to selective four-year institutions, we identified fewer significant differences by SES, while the differences we did find were more often present among the 2004 cohort of high school seniors versus their 1992 counterparts. For students who applied to selective college at either time period, use of SAT prep strategies (instruction and self-study) did not differ by SES category. Similar to the pattern found among all four-year applicants, SES differences were uncovered in terms of college enrollment (here measured as enrollment at a selective, four-year college) for both 1992 and 2004 cohorts.

[Insert Table 1 here]

[Insert Table 2 here]

Comparing the use of enhancement strategies across the two cohorts, Figures 1 and 2 show those that changed significantly between 1992 and 2004, within each SES category. Among the larger sample of four-year college applicants (Figure 1), use of enhancement strategies increased from 1992 to 2004 overall, and individually for each strategy other than extracurricular leadership. Furthermore, high overall strategy use, AP exams, SAT self-study, and volunteering increased the most among the highest SES

students. While the percentage of students who reported having extracurricular leadership experiences decreased across the two decades, the smallest decrease occurred among the highest SES students. Utilizing SAT preparatory instruction increased significantly from 1992 to 2004 for every SES category other than for the highest SES students.

[Insert Figure 1 here]

A less clear pattern appeared across SES categories when examining the subsample comprised only of selective college applicants (Figure 2). Comparing the subsample of students across the two cohorts indicated overall use of enrollment strategies did not change for the two highest SES categories, and decreased significantly among the lowest SES students. For the highest SES students, AP exams and volunteering appeared as increasingly prevalent strategies, while extracurricular leadership activities significantly decreased across cohorts. Low SES students reported significantly lower use of four out of the five strategies (SAT instruction, SAT self-study, volunteering, and extracurricular leadership) in 2004 than in 1992.

[Insert Figure 2 here]

Across the full set of descriptive analyses, among the statistically significant differences we identified, four distinct trends emerged: 1) within each cohort, use of enhancement strategies was most often greater among the highest SES quartile than for each of the other three SES quartiles; 2) among selective college applicants and within each cohort, fewer SES group differences appeared, and there were no significant differences in strategy use between the bottom two SES-groups (low and middle-low); and 3) within-SES differences in use of enhancement strategies between 1992 and 2004 indicated a pattern of increasing use for higher SES students among the full sample of college applicants, while a much less clear pattern emerged among selective college applicants. Building on these descriptive findings, we next turn attention to the regression results addressing the unique effects of enhancement strategies on enrollment outcomes.

Regression analysis

In conducting our regression analyses, we first used enhancement strategies as the independent variables of interest, along with SES and academic background variables, to predict enrollment among all four-year applicants and among those applicants who sought admission to a selective institution. Table 3 contains results from the model specified with each individual enrollment enhancement strategy, while Table 4 contains results from a parallel set of regression results that included the overall, composite measure of enhancement strategy use. The first two columns of each table show results from the 1992 (NELS) cohort, with the remaining two columns showing results from the 2004 (ELS) cohort.

For the 1992 cohort, only SAT preparatory instruction (courses or tutoring) yielded a significant influence on the likelihood of four-year college enrollment, while none of the enhancement strategies proved predictive among selective college applicants (see Table 3). For the 2004 cohort, completing an AP exam and participating in extracurricular leadership activities significantly increased students' odds of enrolling by roughly 1.5 times compared to students who did not participate in the activity. As with the earlier cohort, none of the enhancement strategies significantly predicted likelihood of enrollment among selective college applicants.

Accompanying the above results, we found that among all college applicants, students from higher SES backgrounds were significantly more likely to enroll in a four-year institution in both 1992 and 2004, though the size of the SES effect diminished in the later cohort (*Odds Ratio*(*OR*)= 1.482, *p*<0.01 vs. 1.380, *p*<0.01). In addition, the significant effect of SES held true among selective college applicants in the 1992 cohort (*OR*=1.664, *p*<0.01), but not in the 2004 cohort. Standardized test scores significantly increased the likelihood of enrollment among all four-year applicants, as well as among selective college applicants, for both 1992 and 2004 cohorts (effects ranged in size from *OR*=2.104, *p*<0.001 among all four year applicants in 1992 to *OR*=1.799, *p*<0.001 among 2004 selective applicants).

[Insert Table 3]

When treated as a single, overall measure, a high level of enhancement strategy use significantly increased students' odds of enrollment among all four-year applicants among both cohorts (1992 cohort: $OR=1.504$, $p<0.01$; 2004 cohort: $OR=1.987$, $p<0.001$). Furthermore, high strategy use emerged among the 2004 cohort as a significant predictor of selective college enrollment for students who had applied to at least one selective college or university, such that students who reported high use of admission enhancements had odds of enrolling at a selective institution nearly double those of applicants who used fewer than four strategies ($OR=1.984$, $p<0.01$).

Among socioeconomic and academic background variables, estimated effect sizes and statistical significance mirrored those described above for the models that included the individual enhancement strategies, with the exception of standardized test scores. Test scores, while significantly predictive of enrollment in 1992, were not significantly associated with likelihood of enrollment among the 2004 cohort of students.

[Insert Table 4]

Predicted probabilities

To further examine the relationships between high and low use of admission enhancement strategies, SES, and college enrollment, we converted the regression results into predicted probabilities. We then graphed at different SES levels the influence of high and low strategy use on the probabilities of enrollment, allowing one to visually identify the relative influence of overall strategy use and to observe how relationships have changed between the 1990s and 2000s.

Figure 3 presents the variation in the predicted probabilities of college enrollment by students' SES, highlighting three main findings. First, significant differences exist in the probabilities of enrollment between students who engaged in high versus low use of enhancement strategies among all four year applicants (in both the 1992 and 2004 cohorts), and among selective college applicants from the 2004 cohort. Second, the

magnitude of the differences in enrollment probabilities was inversely related to students' SES. In other words, the enrollment premium associated with high strategy use diminished as students' SES increased. Third, among selective college applicants, high use of enhancement strategies clearly emerged over time to be a significant and large predictor of college enrollment, particularly for students at the lower end of the SES distribution. Evident by the lower left and lower right panels of Figure 3, engaging in high versus low strategy use significantly increased enrolment probabilities among the 2004 cohort of selective college applicants, but not among the 1992 cohort. Thus, it appears that among the 1992 cohort of selective college applicants, the relative strength of association between SES and probability of enrollment (see the relative steeper plotted lines in the bottom left panel of Figure 3) overpowered the influence caused by high use of enhancement strategies, whereas among the 2004 cohort, a less pronounced relationship between SES and the probability of enrollment (see the relatively flatter plotted lines in the bottom right panel of Figure 3) accompanied a sizable enrollment effect of high strategy use.

[Insert Figure 3]

Discussion & Implications

This study examined the influence of enhancement strategies on four-year college enrollment, with an emphasis on the predictive power of these strategies over time and across different socioeconomic designations. In keeping with Lucas's (2001) EMI theory and Alon's (2009) framework for examining class inequality, we hypothesized that class-based adaptation would be evident through the increased use of college enhancement strategies among higher SES students, combined with an increased influence of such strategies on college enrollment. The research questions we examined specifically addressed the relationships between college enhancement strategies and likelihood of enrollment for students of differing SES and decade of high school graduation. By analyzing the use of enhancement strategies among students from different SES strata

during a time period marked by increasing college demand and costs, the results provide evidence that partially supports the claim that enhancement strategies operate as adaptations that maintain—or even expand—social standing through postsecondary educational transitions. Below we summarize and discuss our main findings.

Who utilizes college enhancement strategies?

Based on the descriptive findings, there exists a clear and consistent pattern in which high-SES four-year college applicants are associated with higher use of enrollment strategies compared to the other SES groups. In both 1992 and 2004, when there were evident SES differences, invariably the highest-SES students more often used the strategy relative to lower SES students. Among the full sample of four-year college applicants, the highest-SES group also experienced the greatest increase in strategy use in several cases. Even when changes between the 1992 and 2004 cohorts were greater for other SES groups (such as SAT instructional preparation), the overall rate of use remained significantly higher for the top SES quartile of students.

When focused on selective college enrollment among only those students who applied to a selective college, the finding remains; where SES differences were uncovered, the highest SES students most often used the strategy. And while the comparisons of the 1992 and 2004 cohorts of high school graduates who applied to selective colleges lacked a clear pattern by SES, high overall use of enrollment strategies declined only among the lowest SES students, while remaining the same or increasing among all others. These findings reveal that at the most basic level, the SES differences in utilizing college enhancement strategies are not only unequal, but also exhibit a skewed inequality where the most socioeconomically advantaged students are increasingly accessing college enhancement strategies.

Enhancement strategies' influence on enrollment

From a multivariate perspective, we examined if enhancement strategies were related to four-year college enrollment, in total and in terms of selective college

enrollment. Some, but not all, enhancement strategies indeed significantly predicted college enrollment above and beyond the influence of control variables that included measures of academic expectations and achievement. In particular, extracurricular leadership activities and AP exams predicted four-year enrollment among the 2004 cohort, while SAT instructional preparation predicted four-year enrollment among the 1992 cohort.

The findings add to past evidence on the positive influence of extracurricular activities, particularly among students from lower SES or otherwise adverse backgrounds (Marsh and Kleitman 2002; Peck, Roeser, Zarrett and Eccles 2008), and the apparent stratifying influence of disparate access to AP exams (College Board 2010; Klopfenstein 2004). However, volunteering failed to predict enrollment, contrary to past evidence that has shown greater perceived benefits of volunteering among lower income students (Morrow-Howell et al. 2009).

The increasing influence of extracurricular leadership and taking AP exams among all four-year college applicants aligns with a recent report by the National Association for College Admission Counselors (Clinedinst et al. 2011), where, for example, approximately 7.4% of admissions counselors rated extracurricular activities with "considerable importance," with an additional 42.3% rating these activities with "moderate importance." Although these trends have been stable over the last 17 years, there is variation in relation to institutional type, with private colleges showing a significant and positive correlation to the importance admission counselors place on extracurricular involvement (Clinedinst et al. 2011). Interestingly, none of the individual enhancement strategies we examined predicted enrollment among selective college applicants, suggesting that enhancement strategies are less differentiating for more academically competitive students' pathways to selective colleges.

Considering the fact that many students utilize multiple college enhancement strategies during high school, it is important to note that overall high strategy use

appeared to be a strong predictor of enrollment in both the 1990s and 2000s, and emerged as a significant predictor of selective college enrollment within the more recent cohort. In other words, for selective college applicants, overall high use of enhancement strategies is an increasingly important factor for selective college enrollment, and may be the result of increasing competition for enrollment slots at selective colleges and universities that has occurred in recent decades (Alon and Tienda 2007; Engberg 2012; Hoxby 2009). It may also be evidence of institutional exclusionary practices as described by Alon (2009).

The shifting role of SES

Among all four-year college applicants, SES was a significant predictor of college enrollment, strongly indicating that coming from a higher SES household improves the likelihood of enrolling in a four-year postsecondary institution even after accounting for academic achievement, various enhancement strategies employed, and other demographic variables. This finding confirms much of the extant research on differences in college enrollment rates by socioeconomic backgrounds (Engberg and Wolniak 2010; Grodsky and Jackson 2009; Karen 2002; Paulsen and St. John 2002; Perna and Titus 2005), and highlights that SES, in and of itself, continues to be a stratifying force in postsecondary enrollment, though one that appears partially offset amidst the strengthening influence of enhancement strategies between the 1990s and 2000s.

When focusing on selective college enrollment, the effect of SES has taken an interesting turn, from one that was a statistically significant predictor of enrollment in the 1990s, to one that did not yield statistical significance in the subsequent decade. This finding may be related to Bowen, Kurzweil and Tobin's (2005) conclusion that SES is less of a stratifying factor in students' pathways into elite colleges. Given the emergence of high overall use of enrollment strategies as a significant determinant of college enrollment in the 2000s, it appears that the influence of SES may be operating through the combined use of numerous enhancement strategies. Whereas in the 1990s SES, but not high overall use of enhancement strategies, exerted a significant influence on college

enrollment, the relative influence of these two measures switched in the 2000s such that high overall strategy use, but not SES, yielded a significant influence on college enrollment.

Our descriptive results indicated that while high overall strategy use increased by a statistically non-significant 10 percent (53 to 63) across the two decades for high SES students, it decreased by a statistically significant six percent (43 to 37) for the lowest SES students. It may be that the combined use of multiple enhancement strategies is not necessarily an emerging adaptive strategy among high SES students and families, as Alon (2009) described, but a waning or unsustainable factor among students from low SES backgrounds. Nevertheless, enhancement strategies uniquely and increasingly advantage high SES students' and therefore represent an important mechanism for continued class-based inequality among students in pursuit of selective college enrollment.

Given the changes in the higher education system observed over the time period examined—marked by increasing demand, costs, and competition—our study provides empirical evidence that support Lucas's conceptualization of EMI, whereby socioeconomically advantaged families will employ different strategies over time to maintain their advantages. By demonstrating that college enhancement strategies are both more often utilized by higher SES students, we have provided empirical support for Alon's (2009) notion of class-based adaptation. Furthermore, by demonstrating that high overall use of college enhancement strategies are increasingly predictive of college enrollment, in combination with reports of shifting admissions practices (Clindedinst et al. 2011), our findings also suggest that higher education institutions—particularly selective institutions—are increasingly rewarding such qualities in students and thereby practicing institutional exclusions (Alon 2009). Because such exclusions benefit students from higher SES backgrounds who more often utilize such strategies, these practices serve to reinforce class-stratification in college enrollment.

Taking into account the entirety of the study's findings and the generalizable quality of the data examined, there exists an important need to improve access to the kinds of strategies known to enhance college enrollment for high school students from all SES backgrounds, and particularly those from lower-SES schools. By targeting schools that are under-resourced and unable to offer or promote such enhancement activities for their students, targeted programs could have a positive influence. For example, while a program such as GEAR UP targets students early and in their school environment, it is primarily focused on academic preparation. Complementary programming that encourages participation in enhancement strategies could help to close resource and opportunity gaps. For example, programs like the National College Advising Corps have had positive influence on college attendance among low-income students through a nation-wide consortium of advisers in underserved high schools who provide assistance in areas such as registering to take SAT/ACT exams, visiting college campuses, and completing the FAFSA (Bettinger et al. 2012). Among the program's positive results is increased prevalence of taking SAT or ACT test prep courses. Building off of our findings, it follows that a similar program could be aimed at early high school students and focused on increasing opportunities across the full set of college enhancement strategies, particularly AP exams and extracurricular leadership opportunities for low-SES students.

Our results also call for careful examination among admissions personnel of the possible stratifying influence of an institution's admissions practices. While there has been some recognition that SAT scores are correlated with students' backgrounds, a similar recognition is not often made regarding non-academic factors. Some institutions are beginning to emphasize non-cognitive factors such as resiliency and coping, while tipping the balance away from performance-based criteria in favor of more holistic admissions practices (Camara and Kimmel 2005; Sedlacek 2004). Strategies such as these are promising developments that could be extended to account more intentionally

for the inequities revealed in our study. The findings showing sustained inequality in enhancement strategy use, alongside past research showing similar gaps in academic preparation, feed into the conversation of admissions preferences based on SES. Amherst College, for example, has reported success in expanding its low-SES student population after expanding its recruiting efforts in combination with revising its definition of merit (Rubin, 2011).

Overall, results from the present study point to the need for continued research on the kinds of specific practices or experiences that may serve as mechanisms for sustained or even increased system-wide, class-based stratification. Amidst increasing accountability pressures and waning public funding for colleges and universities, it is imperative that we maintain focus on the causes and consequences of the problem and work to promote promising intervention programs that target high school students, in combination with college admissions practices. Only then will we have a chance to reduce the cycle of inequality and empower the higher education system to fulfill its role as an instrument of social mobility through equality of opportunity.

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TABLE 1. Mean Values on Key Variables by SES Quartile: 1992 High School Seniors

	Total (%)	1. SES Low (%)	2. SES Mid-low (%)	3. SES Mid-high (%)	4. SES High (%)	SES group differences
All Four-Year Applicants (*N*=5670)						
Enhancement strategies						
Take AP exam	28.9	18.6	20.3	24.0	39.1	4>3, 4>2, 4>1
Used any SAT prep instruction	34.2	29.4	27.9	32.0	40.0	4>3, 4>2, 4>1
Used any SAT prep self-study	66.2	70.6	63.3	66.1	66.3	None
Volunteered	58.9	46.3	52.9	57.1	66.5	4>3, 4>2, 4>1, 3>1
Extracurricular leadership	51.0	42.2	50.4	48.1	55.8	4>3, 4>1
High overall use of strategies	20.2	11.0	14.2	16.8	27.9	4>3, 4>2, 4>1, 3>1
Enrollment in 4-year college	80.1	63.5	71.7	81.1	88.0	4>3, 4>2, 4>1, 3>2, 3>1
Selective College Applicants (*N*=970)						
Enhancement strategies						
Take AP exam	66.3	53.7	45.0	53.9	73.3	4>3, 4>2
Used any SAT prep instruction	47.0	41.4	37.5	43.1	49.6	None
Used any SAT prep self-study	73.5	80.0	62.1	74.4	74.5	None
Volunteered	76.6	71.5	60.7	69.1	81.1	4>2
Extracurricular leadership	65.6	63.2	62.5	59.1	67.9	None
High overall use of strategies	47.7	43.5	35.7	35.5	52.8	4>3
Enrollment in selective 4-year college	69.3	59.4	44.4	52.1	77.8	4>3, 4>2

NOTES. All SES group differences reported are significant at $p<0.01$. Reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license agreement.

SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study (ELS:2002/06).

TABLE 2. Mean Values on Key Variables by SES Quartile: 2004 High School Seniors

	Total (%)	1. SES Low (%)	2. SES Mid-low (%)	3. SES Mid-high (%)	4. SES High (%)	SES group differences
All Four-Year Applicants (*N*=7360)						
Enhancement strategies						
Take AP exam	42.2	30.5	32.9	39.9	57.6	4>3, 4>2, 4>1, 3>2, 3>1
Used any SAT prep instruction	36.9	31.9	32.1	34.9	45.1	4>3, 4>2, 4>1
Used any SAT prep self-study	69.1	67.1	66.8	68.8	72.3	4>2
Volunteered	73.8	61.4	68.5	73.1	85.3	4>3, 4>2, 4>1, 3>2, 3>1, 2>1
Extracurricular leadership	44.2	34.2	40.3	44.6	52.4	4>3, 4>2, 4>1, 3>1, 2>1
High overall use of strategies	28.4	18.2	21.0	25.7	41.8	4>3, 4>2, 4>1, 3>2, 3>1
Enrollment in 4-year college	74.6	57.0	67.5	76.3	88.0	4>3, 4>2, 4>1, 3>2, 3>1, 2>1
Selective College Applicants (*N*=1380)						
Enhancement strategies						
Take AP exam	77.8	60.3	65.9	70.5	86.7	4>3, 4>2, 4>1
Used any SAT prep instruction	47.2	38.0	41.9	42.1	52.1	None
Used any SAT prep self-study	75.6	68.6	70.0	78.2	77.2	None
Volunteered	85.3	63.8	79.8	81.0	91.8	4>3, 4>2, 4>1, 3>1
Extracurricular leadership	59.9	41.3	56.0	60.9	63.4	4>1, 3>1
High overall use of strategies	54.5	37.2	39.1	49.5	63.3	4>3, 4>2, 4>1
Enrollment in selective 4-year college	73.2	55.8	62.3	68.9	80.5	4>3, 4>2, 4>1

NOTES. All SES group differences reported are significant at *p*<0.01. Reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license agreement.

SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study (ELS:2002/06).

FIGURE 1. Statistically Significant (*p*<0.01) Changes in Enhancement Strategy Use Between 1992 and 2004: All Four-year Applicants
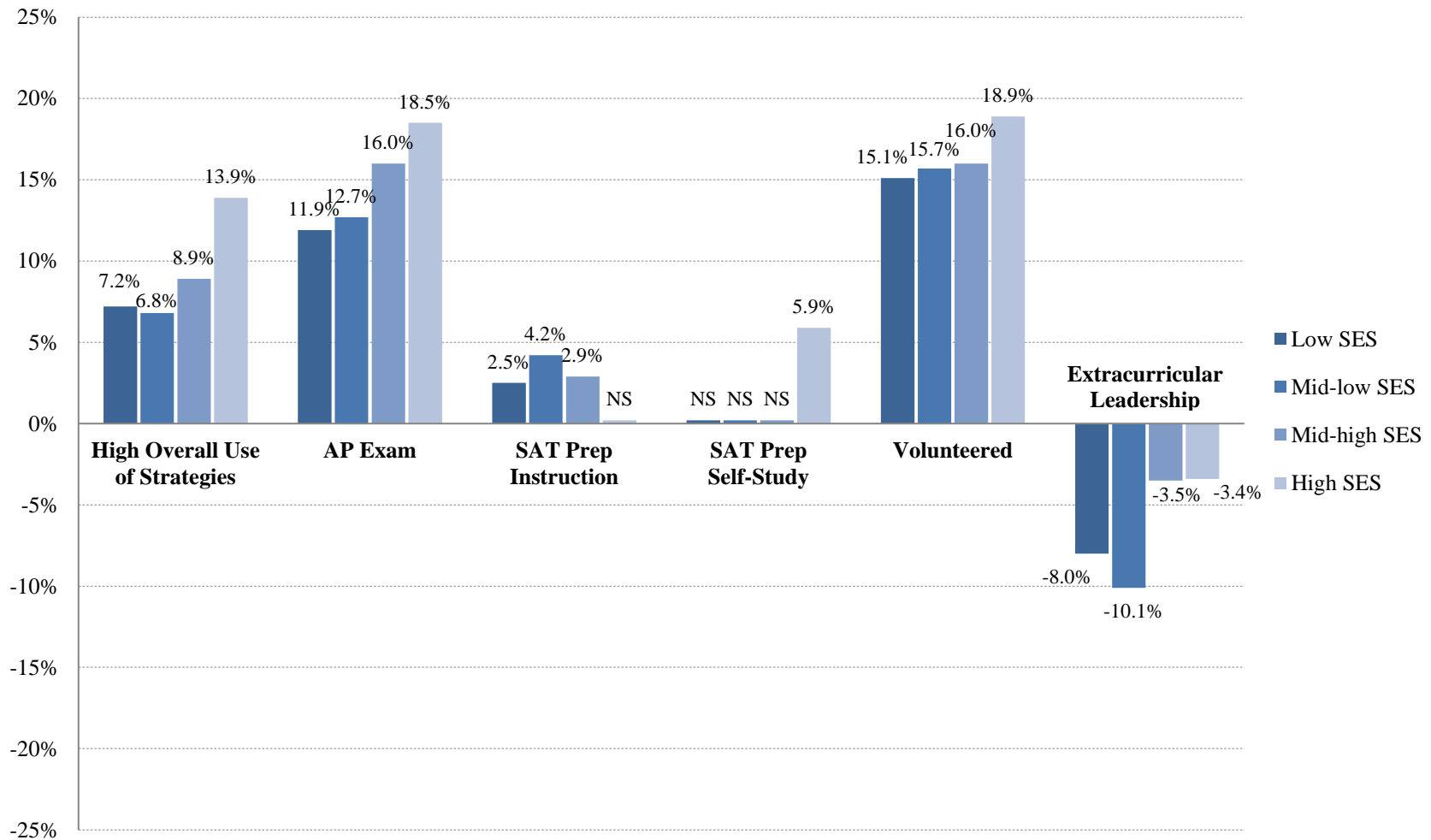
NOTES. "NS" denotes 1992 –2004 mean differences that were not statistically significant at *p*<0.01 within the associated SES category. N_{1992} = 5670, N_{2004} = 7360. Reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license agreement.

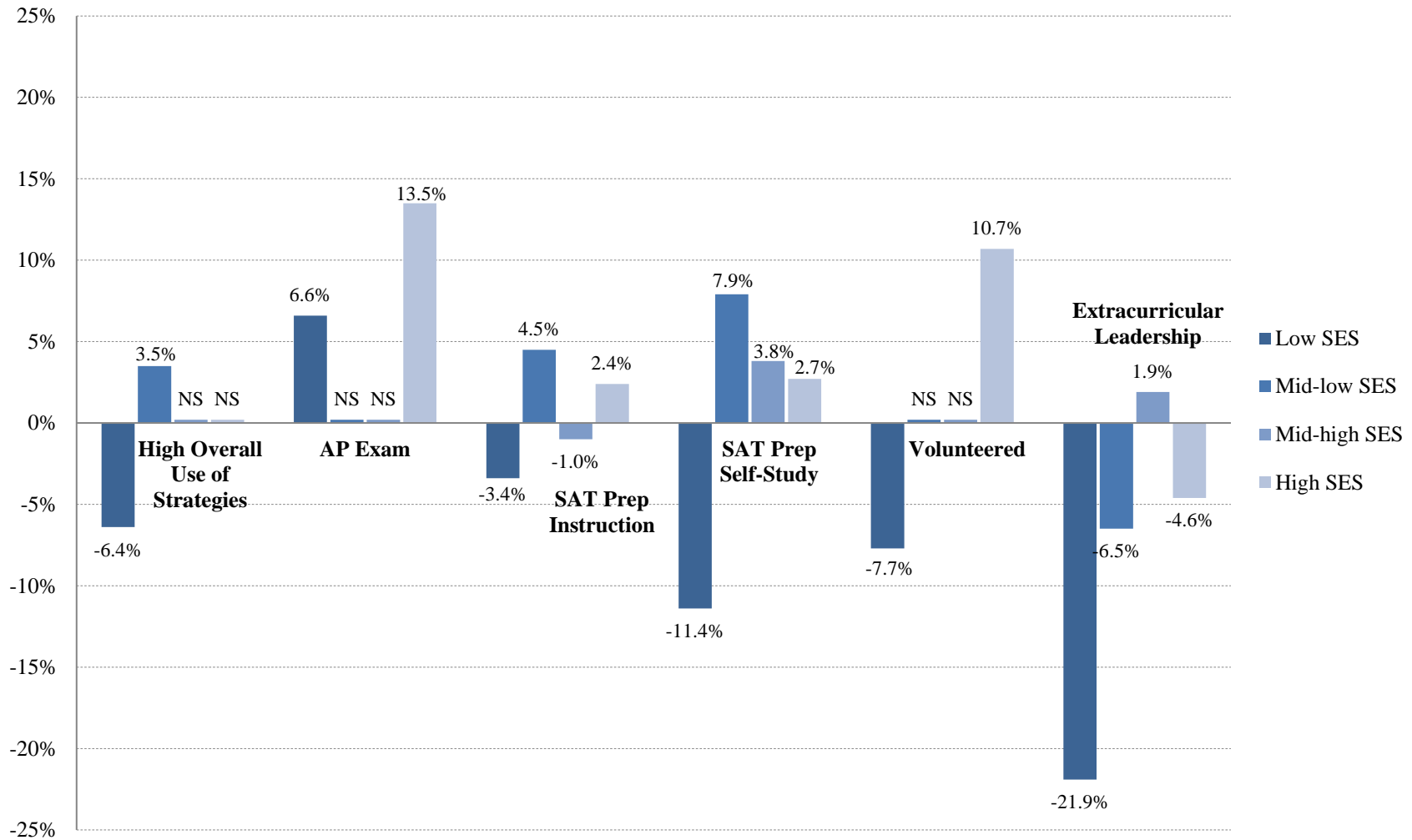SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study (ELS:2002/06).

FIGURE 2. Statistically Significant (*p*<0.01) Changes in Enhancement Strategy Use Between 1992 and 2004: Selective College Applicants

NOTES. "NS" denotes 1992–2004 mean differences that were not statistically significant at *p*<0.01 within the associated SES category. N_{1992} = 970, N_{2004} = 1380. Reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license agreement.

SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study (ELS:2002/06).

TABLE 3. Estimated Odds Ratios (Standard Errors) of Individual Enhancement Strategies on Four-year College Enrollment: All 4-year Applicants & Selective Applicants

	1992 cohort		2004 cohort	
	All 4-yr applicants	Selective applicants	All 4-yr applicants	Selective applicants
Admission Enhancement Strategies				
AP Exam	1.149	1.506	1.506**	1.379
	(0.175)	(0.400)	(0.141)	(0.330)
SAT prep instruction	1.388*	0.909	1.243	1.504
	(0.173)	(0.240)	(0.127)	(0.313)
SAT prep self-study	0.867	1.034	0.985	1.004
	(0.120)	(0.289)	(0.100)	(0.257)
Volunteered	1.277	1.310	1.247	1.738
	(0.160)	(0.368)	(0.119)	(0.464)
Extracurricular leadership	1.043	1.697	1.421**	1.276
	(0.137)	(0.463)	(0.128)	(0.250)
Socioeconomic and Academic Backgrounds				
SES	1.482*	1.664*	1.380**	1.254
	(0.152)	(0.291)	(0.090)	(0.179)
Test Score	2.104**	1.910*	1.919**	1.799**
	(0.222)	(0.455)	(0.108)	(0.268)
McFadden Adj. R^2	0.175	0.187	0.210	0.144
-2 log-likelihood	924,756	162,764	1,479,941	266,870
N	5670	970	7360	1380

NOTES. All models also include controls for gender, race/ethnicity, college expectations, parental expectations, peer plans, HS program, region, urbanicity, school type, and
% high school free lunch. Sample sizes are rounded to the nearest 10 in accordance with NCES restricted data use agreement. **$p<0.001$; *$p<0.01$.

SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study (ELS:2002/06).

TABLE 4. Estimated Odds Ratios (Standard Errors) of High Overall Use of
Enhancement Strategies on Four-year College Enrollment: All 4-year Applicants
& Selective Applicants

	1992 cohort		2004 cohort	
	All 4-yr applicants (*N*=5670)	Selective applicants (*N*=970)	All 4-yr applicants (*N*=7360)	Selective applicants (*N*=1380)
Admission Enhancement Strategies				
High Overall Use	1.504*	1.592	1.987**	1.984*
	(0.228)	(0.355)	(0.221)	(0.412)
Socioeconomic and Academic Backgrounds				
SES	1.507**	1.728*	1.403**	1.307
	(0.157)	(0.308)	(0.092)	(0.181)
Test Score	2.131**	2.167**	2.007	1.830**
	(0.225)	(0.459)	(0.110)	(0.247)
McFadden Adj. R^2	0.171	0.172	0.206	0.138
-2 log-likelihood	928,516	165,667	1,486,715	267,792
N	5670	970	7360	1380

NOTES. All models also include controls for gender, race/ethnicity, college expectations, parental
expectations, peer plans, HS program, region, urbanicity, school type, and
% high school free lunch. Sample sizes are rounded to the nearest 10 in accordance with NCES restricted
data use agreement. **$p<0.001$; *$p<0.01$.

SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study
(ELS:2002/06).

FIGURE 3. Differences in Predicted Probability of High Overall Use of Enhancement Strategies on Four-year College Enrollment by SES: All four-year applicants
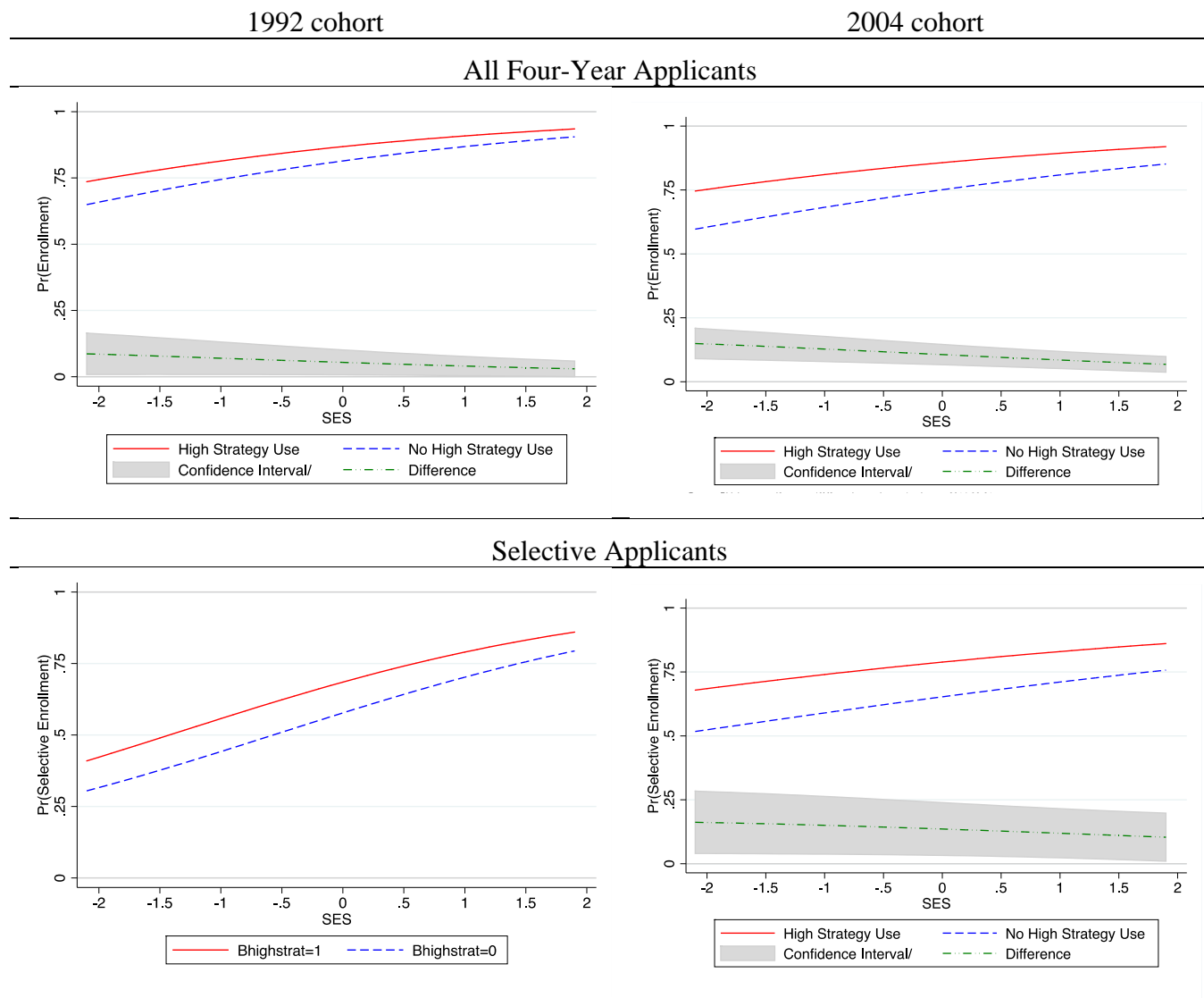
NOTES. Models include controls for students' gender, race/ethnicity, high school academic achievement (standardized composite test score from English and Math exams administered by NCES), the college expectations of the student and peers, and school factors including curricular program (general, college prep, or vocational-technical), control (public, private, or Catholic), school-SES (based on the percentage of students on free or reduced lunch), urbanicity, and geographic region. Reported sample sizes are rounded to the nearest 10 in accordance with NCES restricted data license agreement.

SOURCE. National Educational Longitudinal Study (NELS:88/94), Educational Longitudinal Study (ELS:2002/06).

Endnotes

[1] We originally controlled for parents' expectations for the student's attainment, but this variable caused colliearity problems in some analyses, and therefore was dropped from all models for consistency.

[2] Without addressing missing data, approximately 19% of NELS cases and 39% of ELS cases would have been dropped via listwise deletion in models for four-year enrollment. Instances of missing data for individual variables reached a high of 19% in NELS (test score variable) and 35% in ELS (school free lunch variable).

[3] All sample sizes are rounded to the nearest 10, in accordance with the restricted data license agreement with NCES.

[4] We created a wrapper program in Stata that calculated the predicted probabilities using the *margins* command separately for each imputation, and then we combined the results using *mi estimate*. Our approach was informed by the analysis described at
http://www.ats.ucla.edu/stat/stata/faq/ologit_mi_marginsplot.htm. Interested readers may contact the authors for more information.

[5] Simply putting a confidence interval band around each predicted probability line and observing where they overlap would not not an appropriate way to examine group differences and would likely result in incorrectly showing fewer group differences than actually exist (Long, 1997, 2009; Shenker & Gentleman, 2001).