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Participating in a high school debate program and college matriculation and completion: Evidence from the Chicago Debate League

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Prior work has demonstrated that debate is associated with academic achievement in high school. Whether debate in high school is predictive of better college outcomes beyond its established relationship with promoting college readiness as indicated by the ACT is unknown. This research examines and evaluates the impact of participating in a high school debate program on college matriculation and completion. Data come from a cohort of 6,411 high school graduates from the Chicago Public School system, 26% of whom participated in the Chicago Debate League, from 1997 to 2007. Logistic regression was used to estimate the relationship between debate participation and college matriculation, type of college attended, and college graduation, with college-readiness, as indicated by performance on the ACT, examined as a mediating variable. Debaters were more likely to matriculate to college, particularly to 4-year versus 2-year institutions, than comparison students and these relationships were largely explained by debaters' better performance on the ACT. However, debate was not associated with higher likelihood of graduating from college.

Key words: College attainment, debate, urban education, extracurricular activities, mediation.

INTRODUCTION

An evolving global economy has generated immense demand for highly skilled workers. Out of the 11.6 million jobs added to the US economy since 2010, 99% have gone to workers with at least some college education (Carnevale et al., 2016). By 2020, nearly one-third of all jobs will require at least a bachelor's degree (Carnevale et al., 2013); however, only 66% of US high school graduates matriculate to college (either 2 or 4-year programs) (DeNavas-Walt and Proctor, 2015). Among students at 4-year colleges, only 60% graduate with a bachelor's degree within 6 years (Kena et al., 2016); for those at 2-year colleges, only 40% graduate, or transfer to a bachelor's program, within 6 years (Shapiro et al., 2015). These proportions are even lower for urban school

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districts. For example, in Chicago only 19% of high school graduates earn a bachelors degree within 6 years (Nagaoka and Healy, 2016). A college education is increasingly critical for socioeconomic mobility (Hout, 2012), and thus practitioners and policymakers must find innovative means of supporting postsecondary education.

A large body of research indicates that student participation in extracurricular programs in high school increases the likelihood of college matriculation and, to a more modest degree, college completion (Eccles and Barber, 1999; Eccles et al., 2003; Gardner et al., 2008; Gibbs et al., 2015; Kaufman and Gabler, 2004; Mahoney et al., 2003; Marsh and Kleitman, 2002; Peck et al., 2008; Zaff et al., 2003). This research suggests that the structure of extracurricular activities in general (rather than the particular content of specific programs) drives the relationship. For example, the benefits of extracurricular activities are conjectured to stem from elements inherent to all extracurricular programs such as enhanced social networks of educational aspirations, shared cultural capital (Kaufman and Gabler, 2004), and adult supervision (Zaff et al., 2003). The literature thus gives the impression that when it comes to extracurricular activities and college matriculation, it is not necessarily what students do in an activity that matters, merely that that they participate in activities under adult supervision. That is, that chess club and the basketball team are interchangeable vis-a-vis promoting postsecondary education.

In contrast to this perspective of extracurricular activities as a broad tool for supporting school engagement, there is an emerging body of research that has focused on programs that are more academically-oriented, redirecting the conversation from generalities to the specifics of extracurricular activities. High school policy debate is one specific extracurricular activity that may promote college attainment due to the explicit practice and performance of reading and writing skills by participating students. Previous research has shown that students who participate in debate are more likely to meet college readiness benchmarks in the English, Science, and Reading sections of the ACT (Author, 2009, 2011), suggesting that debaters may gain academic benefits that prepare them for college above and beyond the general structural and environmental support that extracurricular activities provide.

While the literature on extracurricular activities does not provide a clear consensus on why these programs influence college attainment (Farb and Matjasko, 2012; Feldman and Matjasko, 2005), research on a specific extracurricular activity, such as debate, may be able to tease apart the various mechanisms that impact students' educational trajectories. The present study thus investigates the relationship between participating in a high school debate program and college matriculation and graduation in a large sample of students from the Chicago Public Schools (CPS) System over a 10-year period. The primary hypotheses are that among high school graduates, participating in debate is associated with a greater likelihood of (a) college matriculation, (b) matriculating to a four-year versus two-year institution, and (c) college completion. These relationships are hypothesized to be largely explained by the established relationship between debate participation and improved academic performance in high school with scores from the ACT used as a mediating variable.

Existing research on extracurricular activities and college attainment

While participating in extracurricular activities is positively associated with college attainment (Eccles et al., 2003; Gardner et al., 2008; Gibbs et al., 2015; Kaufman and Gabler, 2004; Mahoney et al., 2003; Marsh and Kleitman, 2002; Zaff et al., 2003), there is no consensus regarding the mediating mechanisms. Zaff et al., (2003) argue that extracurricular activities provide adolescents with a safe space during the high-risk after-school hours, and that the adult supervision (for example, team coaches, club directors) inherent in these activities provides needed support for positive youth development. Marsh and Kleitman (2002) show that extracurricular activities foster a sense of school engagement that promotes college attainment. Kaufman and Gabler (2004) propose a cultural capital theory whereby students informally share desirable attributes related to college (for example, knowledge about college admissions processes, social norms regarding education). Another hypothesized pathway stems from simply being exposed to academically-orientated and engaged peers for a prolonged period of time (Eccles et al., 2003; Gibs et al., 2015).

However, there are important limitations to this research. In most of these reports, extracurricular activities were examined as a general group, or as broad types (for example, sports, academic, etc.), with little information regarding the specific content of the programs (Eccles and Barber, 1999; Eccles et al., 2003; Gibbs et al., 2015; Kaufman and Gabler, 2004; Mahoney et al., 2003; Marsh and Kleitman, 2002; Zaff et al., 2003). Also, most prior work is based on cross-sectional surveys of self-reported student participation, or relies on a single dichotomous indicator of whether a student participated in an activity or not, with no information about duration or intensity of involvement (Eccles et al., 2003; Gibbs et al., 2015; Kaufman and Gabler, 2004; Zaff et al., 2003). Finally, few studies comprehensively account for student achievement selection bias, particularly achievement prior to participating in the activity. Longitudinal investigations with objective, detailed information about the level of student participation in a specific activity provide a better setting for evaluating the competing hypotheses outlined.

Debate as an extracurricular activity

Policy debate is a competitive extracurricular activity in which teams of students engage in structured argumentation about social policies (Breger, 2000). Students work in two-person teams to craft and defend arguments about a particular topic (called a resolution) which changes annually. Throughout the academic year, debate leagues host tournaments (usually three to six of 90 min debate rounds) where students participate in switch-side debating (that is, alternatively debating to affirm or negate the resolution) (Winkler, 2011). As a result, students must become adept at arguing both sides of an issue persuasively. These debates are judged by other coaches and community volunteers, and students receive individual and team awards based on their performance. In practical terms, the activity of policy debate is characterized by the training of academic skills such as reading and interpreting complex non-fiction text, developing and writing arguments based on these texts, verbally expressing and defending evidence-based claims, and listening to and interpreting opponents' arguments (Mitchell, 1998).

Previous studies show that participating in debate is robustly associated with academic achievement in high school (Author, 2009, 2011). In a 10-year longitudinal study of over 12,000 CPS high school students, including over 2,500 students who participated in the Chicago Debate League. Author (2011) show that even after accounting for self-selection into the activity using propensity score matching, students who debated were more likely to graduate high school, more likely to meet college readiness benchmarks in the English, Science, and Reading sections of the ACT, and had greater gains in cumulative grade point average (GPA) over the course of high school relative to comparable peers. In a follow-up analysis, Author (2015) found that school, social, and civic engagements were higher among debaters than non-debaters, but that these characteristics did not explain the relationship between debate and academic achievement.

These quantitative findings are in line with years of qualitative research that illustrates positive impacts for students. In one of the only comprehensive ethnographic studies on the subculture of high school policy debaters, Fine (2001) concludes that participating in debate instills high levels of self-confidence and shapes relationships in participants' personal, professional, and civic lives. Winkler (2011) qualitative evaluation of the Milwaukee and Atlanta urban debate leagues provides a further glimpse into the possible mechanisms by which debate promotes college access. When asked to explain why debate supports school engagement, one participant noted: Since joining debate, I am more interested in going to college… Debate makes me believe I could succeed in life.

Debate is unlike most extracurricular activities in that it develops skills that align well with many scholastic goals. The English language arts and reading objectives outlined in the common core explicitly focus literary education on the analysis of non-fiction texts and oral communication (that is, listening, speaking and presenting) (Porter et al., 2011). For example, the first writing standard for grades 9 and 10 states that students should be able to write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence (National Governors Association, 2010). Thus, unlike mentoring programs, sports teams, or other extracurricular activities, debate may potentially reinforce the same academic writing and language skills that are the focus of standardized reading and writing tests. Because the likelihood of college matriculation and degree completion is moderately predicted by performance on college entrance exams such as the ACT (Lotkowski et al., 2004), it is plausible that debate is an extracurricular activity where students gain both the academic *and* social skills necessary to succeed in college.

Present study

This study examines the relationship between debate participation and college matriculation and completion using a longitudinal cohort of high school students from CPS. This study uses objective debate tournament attendance records, which have been linked to official administrative data on high school performance and college outcomes, to quantify engagement in this activity during high school. The primary hypothesis is that among high school graduates, participating in debate will be positively associated with a) college matriculation, b) attending a four-year versus two-year institution, and c) college graduation.

For these analyses, college-readiness, as indicated by performance on the ACT, is examined as a mediating variable. A mediator is a variable that is in the causal pathway linking an exposure (that is, debate) and an outcome (college achievement) (Fairchild and Mackinnon, 2009), while all standardized college entrance exams are imperfect instruments for predicting overall college performance (Lotkowski et al., 2004), Radunzel and Noble (2012) found that students who met the individual ACT benchmarks were substantially more likely than those who did not; to enroll in college the fall immediately following high school graduation, to earn a college degree, and to earn a degree in a timely manner. This suggests that debate may improve college outcomes by setting participants on a more positive trajectory when they enter college, which then persists over time.

Prior work has demonstrated that debate is associated with better performance on the ACT, including greater likelihood of meeting established college readiness benchmarks on this exam (Author, 2011); in turn, the

ACT is among the strongest predictors of academic performance for college Freshman (Lotkowski et al., 2014; Radunzel and Noble, 2012; ACT, 2013). However, whether debate in high school is predictive of better college outcomes beyond its established relationship with promoting college readiness as indicated by the ACT, is unknown. If the academic skills (proxied by the ACT) learned in debate explain the debate-college relationship, then debate participation should no longer be associated with college outcomes after accounting for ACT performance. In contrast, if the structural or social benefits of extracurricular activities explain the debate-college relationship, then debate should still be associated with college outcomes even after accounting for ACT performance.

The secondary hypothesis is that among debaters, the amount of participation and degree of competitive success in this activity will be associated with college outcomes. This analysis provides a more detailed examination of the potential mechanisms driving the relationships tested by the first hypothesis. If the academic skills learned in debate explain the debate-college relationship, then measures of intensity of participation will be significantly associated with college outcomes. In contrast, if the structural and social benefits of debate explain the debate-college relationship, then measures of participation intensity of participation will not be significantly associated with college outcomes.

DATA AND METHODS

Sample

Data come from CPS and the Consortium on Chicago School Research (CCSR) at the University of Chicago. The CCSR has maintained enrollment, demographic, and academic data on CPS high school students since 1991. The CPS district includes 116 high schools with enrollment of approximately 112,000 students. Private and charter schools were not included. The racial/ethnic makeup of the CPS district is 47% Black, 39% Latino, 8% White, 3% Asian, and 3% multiracial (CPS, 2009). To construct the analytic cohort, the CCSR linked enrollment, demographic, and academic performance data from CPS administrative records with tournament participation records from the Chicago Debate League (CDL) from the 1997-98 through 2006-07 school years. These data were then linked to records from the National Student Clearinghouse (NSC) provided by CPS. The NSC includes data from over 3,600 colleges and covers approximately 98% of US college students (Shapiro et al., 2015).

A random sample of comparison students who did not debate was selected for each debater by the CCSR. In order to account for school-level factors, comparison students were selected from the pool that attended the same school and entered high school in the same year as each debate participant (Author, 2009). Additionally, to maximize statistical power, the selection targeted four comparison students for every one debate participant (actual sampling ratio was 3.978:1). Overall, 12,179 CPS students enrolled in high school at some point during the 1997-98 through 2006-07 school years were selected, of which 2,449 (20%) had participated in at least one CDL tournament. This analysis was limited to students who graduated high school between 1997 and 2007 and have information on college outcomes (N = 6,411).

The study was approved by the CPS Office of Research and the Institutional Review Board at [BLINDED].

Independent variables

For this analysis, students who participated in at least one debate tournament were considered debaters; comparison non-debater students were identified from CPS records as described. Next, among debaters, two metrics were created to indicate intensity of participation; quantity and competitive success. Quantity of participation was indexed by the cumulative number of preliminary debate rounds that each student completed over the course of high school. Each CDL tournament consisted of five preliminary rounds (students who did well in these rounds went on to elimination rounds, however CDL did not keep records of these elimination rounds and thus they are not included in our data). Each year the CDL held between five and seven tournaments, representing between 25 and 35 potential rounds that a student could have debated each year. Competitive success was indexed by cumulative win percentage (number of wins/number of total rounds completed) at CDL tournaments.

Dependent variables

Three indicators relating to college were abstracted from the NSC data; a) matriculation to any type of college (yes vs. no), b) type of college attended (4-year institution vs. 2-year institution), and, among those who matriculated, c) college completion (yes vs. no). Type of college was coded according to the first institution attended (for example, a student who transferred to a 4-year institution after initially attending a 2-year one would be coded as the latter).

Covariates

Analyses were adjusted for gender, race/ethnicity (White, Black, Hispanic, Asian/other), age at high school graduation, academic performance prior to debate participation (measured by 8^{th} grade standardized test scores), neighborhood poverty, and composite ACT score, all recorded in CPS data and provided by the CCSR. Neighborhood poverty was calculated by census block from the percent of adult males who were employed and the percent of families with incomes above the poverty line. Two standardized tests were used by CPS to assess 8^{th} grade student performance during this study period; the Iowa Test for Basic Skills and the Illinois Standards Achievement Test. These scores were mean-standardized individually to yield one estimate for 8^{th} grade reading and one estimate for 8^{th} grade math, as previously described (Author, 2011). The ACT consists of four sections (reading, English, mathematics, and science) of multiple-choice questions, each scored out of 36. The composite ACT score is the average across all four sections.

Analysis

Logistic regression was used to assess the relationship between debate participation and college matriculation, type of college attended, and college completion. For each outcome, three models were fit; a) a crude model regressing college outcomes on debate participation, unadjusted for covariates, b) a model adjusted for age at graduation, sex, race/ethnicity, 8^{th} grade standardized test scores, and neighborhood poverty, and c) a model additionally adjusting for composite ACT score. The degree to which ACT performance mediated the debate-college relationship was quantified using a

Table 1a. Student characteristics by college matriculation status: Chicago Public Schools 1997 – 2007.

Student characteristics		Total	Did not matriculate	Matriculated	X^2 or t, p-value
N		6416	1592	4824	
Debater (N, %)		1696 (26.43)	308 (19.35)	1388 (28.77)	54.7, <.0001
Demographics	Age at HS graduation (M, SD)	18.03 (0.61)	18.21 (0.68)	17.97 (0.57)	14.1, <.0001
	Female (N, %)	3705 (57.75)	822 (51.63)	2883 (59.76)	32.4, <.0001
					260.8, <.0001
Race/ethnicity (N, %)	Non-Hispanic White	993 (15.48)	169 (10.62)	824 (17.08)	
	Black	2926 (45.60)	625 (39.26)	2301 (47.70)	
	Hispanic	1985 (30.94)	738 (46.36)	1247 (25.85)	
	Asian/other	512 (7.98)	60 (3.77)	452 (9.37)	
	Neighborhood poverty (M, SD)	0.07 (0.64)	0.17 (0.62)	0.04 (0.64)	7.6, <.0001
Academic performance	Overall ACT (M, SD)	19.07 (4.88)	16.33 (4.13)	19.94 (4.77)	-23.2, <.0001
	English ACT (M, SD)	18.86 (5.97)	15.50 (5.34)	19.92 (5.76)	-23.2, <.0001
	Reading ACT (M, SD)	19.59 (6.07)	16.59 (5.21)	20.54 (6.01)	-20.1, <.0001
	Science ACT (M, SD)	19.03 (4.69)	16.76 (4.26)	19.75 (4.58)	-19.7, <.0001
	Math ACT (M, SD)	18.81 (4.77)	16.47 (3.66)	19.55 (4.84)	-19.9, <.0001
	8^{th} grade standardized test score (M, SD)	0.19 (0.95)	-0.32 (0.89)	0.36 (0.91)	-23.7, <.0001
College characteristics	Type of college attended (N, %)				
	Associates (2 year)	--	--	1497 (31.03)	--
	Bachelors (4 year)	--	--	3327 (68.97)	--
	Graduated college	--	--	859 (17.81)	--

modified version of the Sobel test, which provides estimates for the total, direct, and indirect effects of exposure-mediator-outcome relationship and a p-value for the statistical significance of the indirect/direct effect ratio (MacKinnon and Dwyer, 1993). Initial tests of model fit assumptions indicated that the relationship between 8^{th} grade standardized test and ACT scores with the college outcomes was curvilinear, and thus these models included a squared term on both variables. These models were also estimated within the restricted sample of debate participants to examine the influence of debate intensity (quantity and competitive success) on college attainment.

Absolute model fit, which reflects the predictive capability of the model, was evaluated using the C-statistic. The C-statistic represents the proportion of outcomes correctly classified by the model; it ranges from 0.5 to 1 and values greater than 0.7 indicate adequate classification ability (Hosmer and Lemeshow, 2000). All analyses were conducted using SAS (version 9.4) and all p-values refer to two-tailed tests.

RESULTS

Table 1a illustrates the characteristics of CPS high school graduates stratified by college matriculation status; while Table 1b shows these same characteristics stratified by debater status. Students who matriculated were younger when they graduated from high school, more likely to be female, less likely to be Hispanic, and lived in lower poverty neighborhoods than students who did not matriculate. As expected, both 8^{th} grade test scores and ACT scores were substantially higher among students who matriculated versus those that did not. Among those who matriculated, 18% of students graduated from college during the study period. Table 1b shows that debaters were younger when they graduated high school, were more likely to be female, and had higher 8^{th} grade and ACT test scores relative to non-debaters.

Figure 1 shows the distribution of college matriculation and graduation for debaters and comparison students from 1997 to 2007. Debaters were substantially more likely to matriculate to college, a difference that was largely driven by 4-year institutions (63.5 vs. 47.7%). Differences in graduation from college were less pronounced but still favored debaters (21.0 vs. 16.5%). Among college graduates, debaters and non-debaters took similar average lengths of time to earn their degrees [2-year institutions (debaters: 3.71 years, non-debaters: 3.65 years; 4-year institutions (debaters: 4.19 years, non-debaters: 4.20 years)].

College matriculation

Table 2 illustrates the relationship between participating in debate and college matriculation. Consistent with the

Table 1b. Student characteristics by debater status: Chicago Public Schools 1997 – 2007.

Student characteristics		Total	Non-debater	Debater	X^2 or t, p-value
N		6416	4720	1696	
Demographics	Age at HS graduation (M, SD)	18.03 (0.61)	18.06 (0.62)	17.93 (0.57)	7.64, <.0001
	Female (N, %)	3705 (57.75)	3669 (56.55)	1036 (61.08)	10.5, 0.0012
	Race/ethnicity (N, %)				11.7, 0.0085
	Non-Hispanic White	993 (15.48)	714 (15.13)	279 (16.45)	
	Black	2926 (45.60)	2112 (44.75)	814 (48.00)	
	Hispanic	1985 (30.94)	1513 (32.06)	472 (27.83)	
	Asian/other	512 (7.98)	381 (8.07)	131 (7.72)	
	Neighborhood poverty (M, SD)	0.07 (0.64)	0.07 (0.64)	0.07 (0.65)	-0.30, 0.7625
Academic performance	Overall ACT (M, SD)	19.07 (4.88)	18.61 (4.80)	20.28 (4.87)	-10.78, <.0001
	English ACT (M, SD)	18.86 (5.97)	18.28 (5.92)	20.38 (5.83)	-11.09, <.0001
	Reading ACT (M, SD)	19.59 (6.07)	19.01 (5.96)	21.13 (6.08)	-11.03, <.0001
	Science ACT (M, SD)	19.03 (4.69)	18.61 (4.65)	20.13 (4.61)	-10.13, <.0001
	Math ACT (M, SD)	18.81 (4.77)	18.55 (4.65)	19.49 (5.01)	-6.15, <.0001
	8^{th} grade standardized test score (M, SD)	0.19 (0.95)	0.12 (0.97)	0.38 (0.89)	-8.87, <.0001
College characteristics	Type of college attended (N, %)				126.1, <.0001
	None	1592 (24.81)	1284 (27.20)	308 (18.16)	
	Associates/2 year	1497 (23.33)	1186 (25.13)	311 (18.34)	
	Bachelors/4 year	3327 (51.85)	2250 (47.67)	1077 (63.50)	
	Graduated college	859 (17.81)	568 (16.53)	291 (20.97)	13.3, 0.0003

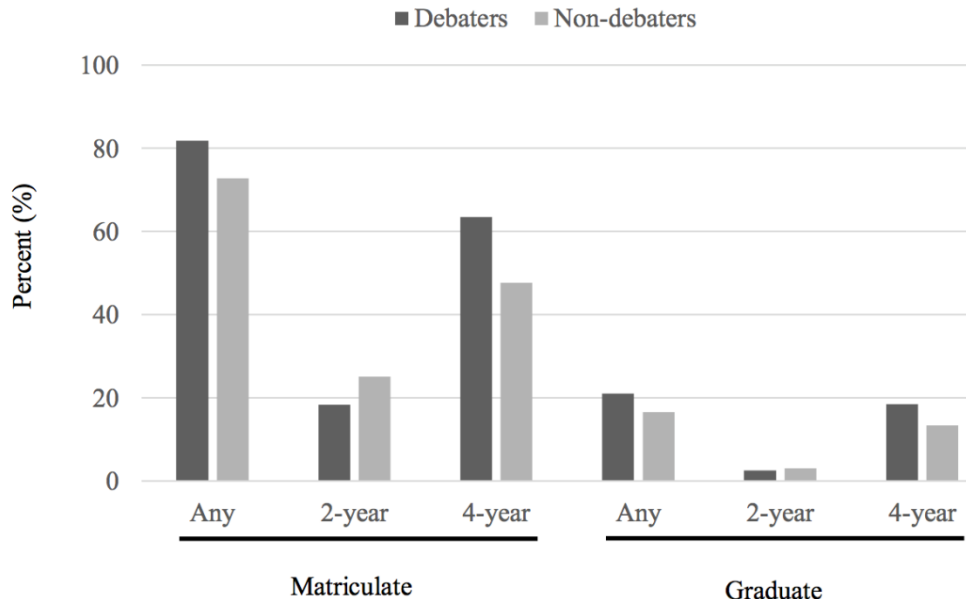

Figure 1. Unadjusted percentage of CPS graduates who matriculated to and graduated from any, 2-year and 4-year institutions from 1997 – 2007, stratified by debater status. N=6,416.

primary hypothesis, debaters were more likely to matriculate to college. After accounting for demographic characteristics, neighborhood poverty, and 8^{th} grade standardized test scores, debaters had 27% greater odds

Table 2. Relationship between debate participation and college matriculation.

High school graduate		Model 1	Model 2	Model 3
		OR (95% CI)	OR (95% CI)	OR (95% CI)
Outcome: Any type of institution	Debater (reference group = No)	1.60 (1.35, 1.89)	1.27 (1.06, 1.52)	1.17 (0.97, 1.41)
	Age at high school graduation	-	0.65 (0.55, 0.76)	0.71 (0.60, 0.83)
	Sex (reference group = Male)	-	1.36 (1.17, 1.59)	1.34 (1.14, 1.57)
	Race/ethnicity (reference group = White)	-	-	-
	Black	-	1.63 (1.19, 2.24)	1.73 (1.25, 2.39)
	Hispanic	-	0.62 (0.47, 0.82)	0.64 (0.48, 0.85)
	Asian/other	-	1.64 (1.06, 2.54)	1.51 (0.98, 2.35)
	Neighborhood poverty	-	0.69 (0.59, 0.81)	0.70 (0.60, 0.83)
	8^{th} grade standardized tests (at mean)	-	1.81 (1.57, 2.10)	1.04 (0.82, 1.32)
	Cumulative ACT score (at mean)	-	-	1.15 (1.11, 1.20)
	N	4129	4129	4129
	C-statistic	0.54	0.74	0.75
Outcome: 4-year vs 2 year institution	Debater (reference group = No)	1.84 (1.54, 2.20)	1.61 (1.32, 1.97)	1.43 (1.17, 1.76)
	Age at high school graduation	-	0.53 (0.43, 0.66)	0.62 (0.50, 0.76)
	Sex (reference group = Male)	-	1.62 (1.35, 1.94)	1.66 (1.38, 2.00)
	Race/ethnicity (reference group = White)			
	Black	-	1.95 (1.41, 2.69)	2.52 (1.79, 3.54)
	Hispanic	-	1.07 (0.79, 1.45)	1.28 (0.94, 1.76)
	Asian/other	-	1.94 (1.26, 2.97)	1.95 (1.25, 3.04)
	Neighborhood poverty	-	0.91 (0.76, 1.08)	0.95 (0.79, 1.13)
	8^{th} grade standardized tests (at mean)	-	3.53 (2.86, 4.35)	1.24 (0.92, 1.67)
	Cumulative ACT score (at mean)	-	-	1.29 (1.23, 1.35)
	N	3127	3127	3127
	C-statistic	0.56	0.79	0.82

Values are odds ratios (95% confidence intervals). Both the 8^{th} grade standardized test score and the ACT variables include square terms in Models 2 and 3. Parameter estimates for these variables are reported at their respective mean values (0.22 for 8^{th} grade test scores and 19.0 for the ACT).

(95% confidence interval (CI): 1.06 – 1.52) of matriculating to college relative to comparison students. To test the mediation hypothesis, we first confirmed the relationship between debating and ACT performance. Supplemental Table 1 shows the results for each of the four sections and the composite (overall) score. Consistent with prior work in this cohort (Author, 2011), debaters had significantly higher mean ACT composite scores (β=0.53, 95% CI: 0.37 – 0.69), and higher scores on the reading, English, and science sections, even after accounting for demographic characteristics and 8^{th} grade standardized test scores. This established that ACT is a potential mediator of the relationship between debate and college outcomes.

As shown by Table 2 (Model 3), debaters were no longer significantly more likely to matriculate after accounting for performance on the ACT (Odds ratio (OR): 1.17, 95% CI: 0.97 – 1.41). The formal Sobel test of this mediation relationship showed that 70% of the total effect between debate and college matriculation was mediated by ACT score (total effect (ignoring ACT) of debate: 0.11; direct effect: 0.03; indirect effect through ACT: 0.07; ratio of indirect/direct: 2.33, Sobel Z: 11.10, $p<0.0001$). This indicates that this metric of college readiness partially mediates the relationship between debate participation and college matriculation. Turning to type of college, debaters were significantly more likely to matriculate to a 4-year institution compared to non-debaters, even after accounting for ACT score (OR: 1.43, 95% CI: 1.17 – 1.76). Model fit was acceptable, with C-statistics >0.7 for all fully-adjusted models, indicating that these models have adequate discriminating power at predicting college matriculation.

College completion

Table 3 shows the relationship between debate participation and college graduation. Debaters were not significantly more likely to graduate from college overall even in the crude model (OR: 1.20; 95% CI: 0.96 – 1.51). Results were similar when looking at the type of college attended; debaters were not significantly more likely to graduate from college, regardless of whether they

Table 3. Relationship between debate participation and college graduation.

Outcome: Graduate from any type of institution	Model 1	Model 2	Model 3
	OR (95% CI)	OR (95% CI)	OR (95% CI)
Debater (reference group = No)	1.20 (0.96, 1.51)	1.09 (0.87, 1.38)	1.07 (0.84, 1.35)
Age at high school graduation	-	0.74 (0.57, 0.95)	0.76 (0.59, 0.98)
Sex (reference group = Male)	-	1.86 (1.47, 2.36)	1.88 (1.48, 2.39)
Race/ethnicity (reference group = White)	-	-	-
Black	-	0.92 (0.64, 1.39)	0.97 (0.67, 1.41)
Hispanic	-	0.86 (0.60, 1.24)	0.90 (0.63, 1.30)
Asian/other	-	1.13 (0.74, 1.71)	1.13 (0.74, 1.71)
Neighborhood poverty	-	0.88 (0.71, 1.09)	0.89 (0.72, 1.10)
8^{th} grade standardized tests (at mean)	-	1.38 (1.19, 1.60)	1.09 (0.85, 1.42)
Cumulative ACT (at mean)	-	-	1.06 (1.01, 1.11)
N	3127	3127	3127
C-statistic	0.52	0.65	0.65

Values are odds ratios (95% confidence intervals). Both the 8^{th} grade standardized test score and the ACT variables include square terms in Models 2 and 3. Parameter estimates for these variables are reported at their respective mean values (0.22 for 8^{th} grade test scores and 19.0 for the ACT).

attended a 2-year or 4-year institution. As shown by the lower C-statistics, the predictive power of these models was not as robust as the matriculation models, which is expected given the lag between the exposures (for example, activities in high school activities) and the outcome (college graduation approximately four years later). It is also worth noting that ACT performance, despite being strongly predictive of college matriculation, is itself only weakly, albeit significantly, associated with college graduation (OR: 1.06, 95% CI: 1.01 – 1.11); indeed, the magnitude of this association is almost identical to that of debate in the fully-adjusted model (OR: 1.07; 95% CI: 0.84 – 1.35). Because debate was not a significant predictor of college graduation, there was no justification for formally testing whether ACT mediated this (non-significant) relationship.

Supplemental Figure 1 summarizes the findings between debate participation and college matriculation and graduation; overall, for 2-year institutions, and for 4-year institutions. Taken together, these findings show that the relationship between debate participation and college matriculation is partially mediated by college readiness as indicated by the ACT. There is no evidence that debate participation in high school is associated with graduating from college, regardless of the type of institution attended.

Characteristics of debate participation and college outcomes

Figures 2a and 2b show the relationship between quantity of debate participation and competitive success at the activity with college matriculation and completion. There was a modest, but positive, relationship between quantity of participation and college matriculation even after accounting for demographic characteristics and standardized test scores (OR: 1.01, 95% CI: 1.00 – 1.02). Quantity of participation was not significantly associated with college graduation (OR: 1.01, 0.99 – 1.01). Competitive success was significantly associated with matriculation (OR: 1.01, 1.00 – 1.02), but not completion (OR: 1.01, 95% CI: 0.99 – 1.02), in crude models; these associations were no longer statistically significant after accounting for standardized test scores (matriculation OR: 1.00, 95% CI: 0.99 – 1.01; graduation OR: 1.01, 95% CI: 0.99 – 1.02).

DISCUSSION

The primary finding from this study is that, even after accounting for prior achievement, high school graduates who participated in the CDL were more likely to matriculate to college, specifically 4-year institutions, than those who did not participate. However, these relationships are largely explained by debaters' better performance on the ACT, which itself is a strong predictor of college matriculation (Coca et al., 2017; Lotkowski et al., 2004; Radunzel and Noble, 2012). There was no evidence that debate participation in high school predicted college completion, regardless of the type of institution attended. Prior work has demonstrated that debate is predictive of substantially better performance on the reading, science, and writing sections of the ACT (Author, 2011). Taken together, these findings are consistent with the hypothesis that debate improves college readiness, as indicated by the ACT, which in turn promotes college matriculation.

These findings call into question hypotheses that

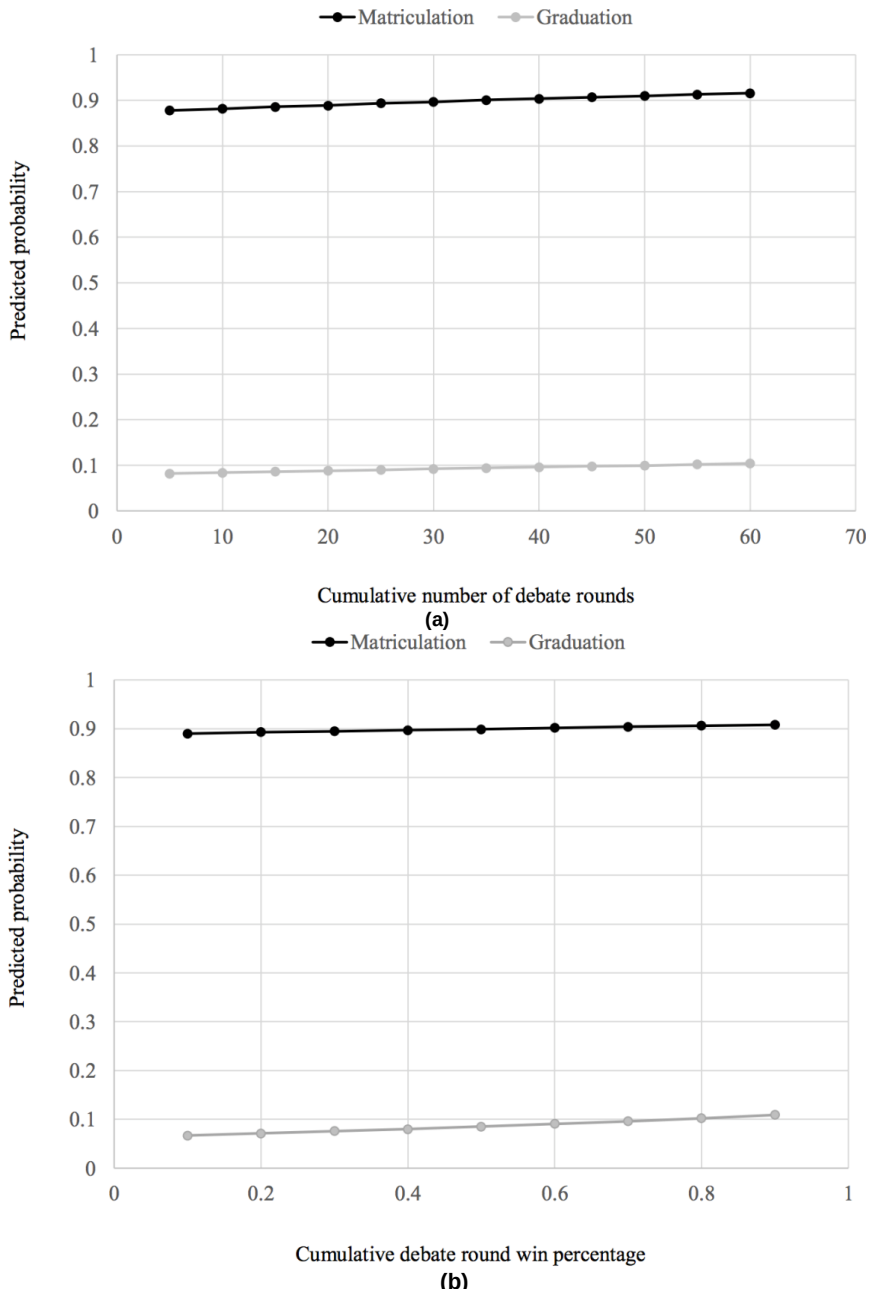

Figure 2a, b. Predicted probability of college matriculation and graduation by cumulative competitive success among debaters in the Chicago Debate League, 1997 – 2007. Values are predicted probabilities of matriculating to any college institution and of graduating from any institution as a function of (2a) number of rounds debated and (2b) cumulative win percentage among high school graduates who debated in the CDL from 1997 to 2007 (N=920). Values are adjusted for age at high school graduation, sex, race/ethnicity, neighborhood poverty, 8th grade standardized test scores, and cumulative ACT score.

emphasize factors related to socialization or norms about the value of education as the primary drivers of the relationship between debate and college outcomes. That is, there was little evidence of a benefit of debate on college outcomes after accounting for college readiness, which would have been expected if social or cultural factors were significant contributors. Instead, these findings indicate that the pathway linking debate participation to college outcomes is largely driven by academic factors rather than by social aspects of this

activity. This is critical, since there is not a strong positive relationship between participating in extracurricular activities and ACT performance in general; indeed, as the number of extracurricular activities participated in increases, ACT performance tends to decline (ACT, 2015). In sum, this study extends the growing body of evidence on the academic benefits associated with high school policy debate program participation and college attainment.

These findings contrast with prior work positing that elements of the general social structure of extracurricular activities drive the relationship between participation and college outcomes. Instead, if there are distinct benefits from the social and environmental structure of academically-oriented activities like debate, their influence is likely indirect and correlated with college readiness. While prior work has found that positive peer relationships, social norms, expectations about college, and overall school engagement are correlated with debate participation (Author, 2015), these factors are not strongly associated with ACT performance, nor do they substantially mediate the relationship between debate and high school achievement. It is perhaps better to consider debate a *co-curricular*, rather than extra-curricular, activity.

The hypothesis that extracurricular activities (at least those that explicitly involve the practice of reading and writing) promote college success through supporting academic performance is not prominent in the extant literature. For example, Eccles et al., (2003) report that all extracurricular programs (prosocial activities, team sports, performing arts, school-involvement activities, and academic clubs) were associated with college matriculation and college graduation. The lack of specificity to a specific type of activity was interpreted by the authors as evidence that the way extracurricular activities promote college success is through social pathways (that is, participants were interacting with more peers who planned to attend college and were engaged in school versus the peer groups of non-participants). More recently, Gibbs et al., (2015) report that participating in extracurricular activities whose participants have high GPA is predictive of enrolling in college regardless of the student's own GPA. They conclude that peers likely play a role in modeling achievement by creating norms of college-going and providing paths to information about how postsecondary education works. The authors provide the following example to illustrate their findings; debate fosters work ethic that increases a student's confidence for attending college or it signals to admissions that the student is prepared for college (Gibbs et al., 2015, p. 378). The results of this present study, however, demonstrate that debate is not simply a means to improve student confidence in pursing higher education; instead it provides a vehicle for directly improving academic readiness, which in turn is among the strongest predictors of college matriculation and completion.

Strengths and limitations

These results should be understood in the context of study limitations. Without a randomized controlled experiment in which students are assigned to participate in debate or not, it is impossible to fully account for self-selection into this activity. However, prior work in this cohort using quasi-experimental propensity score techniques has shown that debate is predictive of both ACT performance and GPA change over time (Author, 2011), indicating that these findings are robust to selection bias based on observable characteristics. Moreover, limiting this analysis to high school graduates, which are already selected for higher academic achievement, minimizes bias due to self-selection. While this study had detailed information on debate participation, it lacked data on other activities students may have also participated in (both for debaters and non-debater peers). However, the analysis examining debate quantity and competition suggests that the extent to which students participate in debate, as opposed to the structural benefits that all participants receive regardless of intensity, helps explain the positive relationship with college outcomes. Finally, this study examined debaters as a whole; further research as to whether the relationship between debate (and extracurricular activities in general) and college outcomes varies across social groups (for example, gender, and race/ethnicity) is warranted.

This study also has a number of strengths. All data were derived from objective records of tournament participation and academic records, which overcomes limits of student self-reported participation. The large, representative nature of this cohort allowed for a robust examination of the relationship between debate participation and multiple college outcomes. The detailed records on debate participation allowed for a more nuanced analysis of the roles of competitive success and duration of participation, which stands in contrast to much prior work on extracurricular activities which generally lacks information on intensity of involvement. Finally, to the authors' knowledge, this study constitutes the first quantitative test of the relationship between high school debate participation and college attainment.

Implications for policy and practice

These findings suggest that education practitioners and policymakers can support educational trajectories to higher education by promoting extracurricular activity programs like debate. In urban districts like Chicago, which serve a substantial percentage of low-income and minority students, debate may be a critical program for

broadening college access. There are persistent socioeconomic and racial gaps in postsecondary attainment across the U.S. (Kena et al., 2016). In Chicago, racial gaps in four-year college enrollment amongst high school graduates have increased (Coca et al., 2017), while Black and Latino college enrollees consistently have lower rates of bachelor's degree attainment than their White and Asian counterparts (Nagaoka et al., 2017). However, multiple studies (ACT, 2013; Radunzel and Noble, 2012) have demonstrated that gaps in college enrollment, retention, and degree completion rates narrow substantially among students who are academically-prepared for postsecondary education. Debate is an activity that promotes college readiness. However, these findings also show that there is a need for continued support while in college to promote graduation.

Furthermore, while there is warranted enthusiasm for the importance of supporting school success early in life on educational trajectories (Heckman, 2006), debate presents an opportunity to impact college matriculation among adolescents in the later stages of their academic trajectories. With the adoption of the Common Core Standards, in addition to recent efforts to promote innovation in education programming such as Race to the Top initiatives, practitioners and policymakers should consider promoting educational programs that align with explicit academic skills and learning objectives. As school boards across the United States contemplate the funding and development of extracurricular activities in a time of tightening budgets, our results demonstrate that programs like debate, which focus on academic content and improve college readiness, can play a significant role in promoting college access.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Supplemental table

Table S1. Relationship between debate and ACT performance among Chicago Public Schools high school graduates.

Variable	Model 1	Model 2
	B (95% CI)	B (95% CI)
Composite ACT score	-	-
Debate	1.59 (1.26, 1.91)	0.53 (0.37, 0.69)
English ACT section score	-	-
Debate	1.99 (1.60, 2.38)	0.72 (0.49, 0.96)
Reading ACT section score	-	-
Debate	2.06 (1.66, 2.47)	0.86 (0.60, 1.13)
Science ACT section score	-	-
Debate	1.42 (1.11, 1.73)	0.56 (0.36, 0.76)
Math ACT section score	-	-
Debate	0.87 (0.55, 1.19)	-0.01 (-0.20, 0.17)

Model 1 is unadjusted. Model 2 is adjusted for age at high school graduation, sex, race/ethnicity, 8th grade standardized test scores, and neighborhood poverty.

Supplemental figure

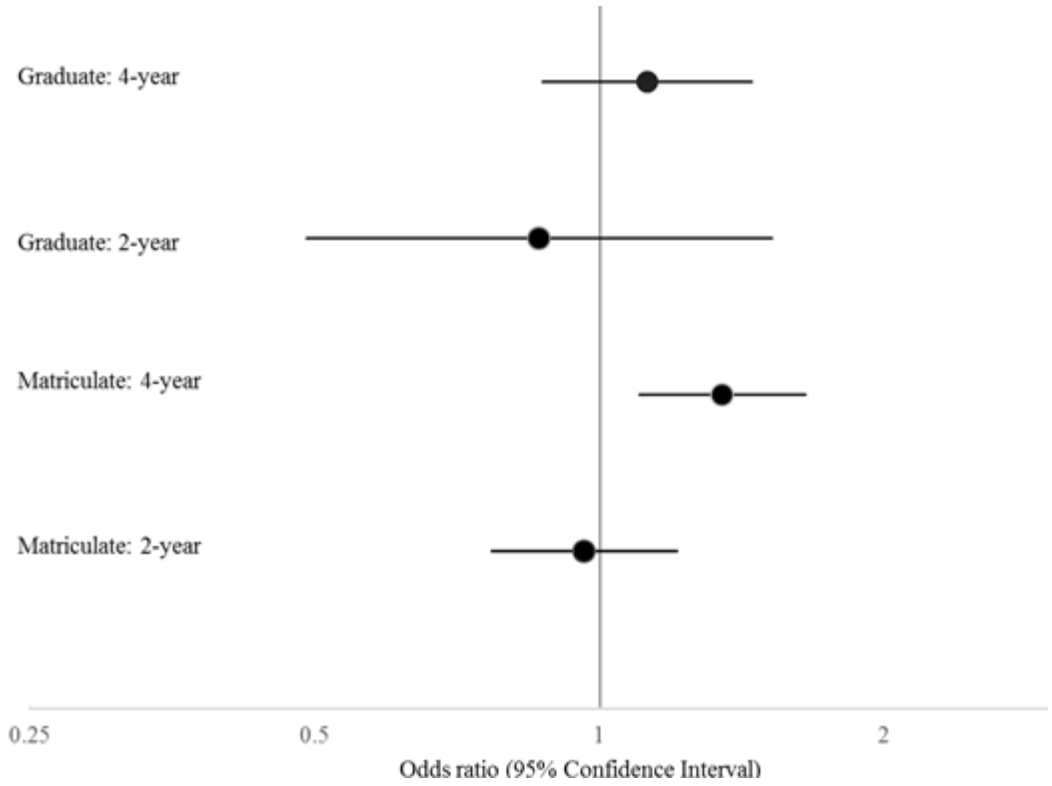

Figure S1. Relative odds of matriculating and graduating for debaters compared to non-debaters. Values are relative odds of (a) matriculating to a 2 or 4-year institution as compared to not matriculating to any college, and (b) graduating from a 2-year or 4-year institution as compared to attending but not graduating from any type of college. Values are adjusted for age at high school graduation, sex, race/ethnicity, neighborhood poverty, 8th grade standardized test scores, and cumulative ACT score.