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A SMART BREAK? COLLEGE TENURE INTERRUPTION AND GRADUATING STUDENT OUTCOMES

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Abstract

Using data from a longitudinal survey of college students from over 400 institutions, we examine the impacts of occupational internship programs and voluntary academic leave on returning academic achievement, post-college ambitions, and general facets of the college experience. Previous literature on college internships has focused on labor market effects and the literature on academic leave has emphasized its causes. Much less has been done to analyze effects of these occurrences on collegiate outcomes. College internships are found to have a positive effect on grades, increase desires to work full-time or attend graduate school immediately following graduation, and slightly increase ambitions to have administrative responsibilities and be financially well off. Voluntary academic leave is found to have only negative effects on collegiate outcomes, including study habits and academic achievement upon return. Implied policy implications are that colleges and universities should champion internship programs but discourage college tenure interruption for other reasons.

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1. INTRODUCTION

We estimate the impact on both academic and nonacademic collegiate outcomes of two different types of breaks in college tenure: occupational internship programs and voluntary academic leave. Voluntary academic leave refers to a student choosing not to take any collegiate courses for a semester or more, often referred to as a "gap" (as in "gap year" or "gap semester") and is not to be confused with withdrawal from school or involuntary academic leave (academic probation). Internship programs are methods of on-the-job training which often take place in white collar or professional job roles where an individual works for a short period of time in a field they are considering as a career. In our data, students who participate in occupational internships during college tenure graduate on average 0.53 years later than those who continuously attend college, implying they may take a leave of absence from coursework for a semester or at least are slowed in their progress toward graduation. In both cases, students have chosen to do something other than, or in addition to, taking college courses for at least a semester, and these experiences are likely to affect subsequent academic outcomes, perceptions of the college experience, and post-collegiate goals.

There are several channels through which breaks in college tenure could affect collegiate outcomes. First, students who take breaks in their studies likely do not retain as much knowledge over this period as students who continuously attend college, and may thus be less likely to make connections from previous to current courses. Second, there may be readjustment costs to returning to school, that is, it may take these students some time to readjust to college life. Third, taking a leave of absence may affect their planned course of study in that not all courses may be offered every semester to continue unabated through coursework.

Though our research questions, data, and methodology differ from most previous studies, we are not the first to study college internships or academic leave. There have been several studies examining the impact of working while in college, though they do not constrain the analysis to internships. Ehrenberg and Sherman (1987) find employment while attending college aids persistence, academic performance, and post-college labor market success. Stinebrickner and Stinebrickner (2003) use instrumental variable estimation and data from a mandatory work study program and find detrimental effects on grades from working during college. This might be more intuitive since all students are required to work, not only those who are more ambitious or have financial need. Fuller and Schoenberger (1991), in a study of the gender wage gap, find that women were able to lessen the difference in wages via different choices of major and participation in internships. Closer to our analysis, Knouse, Tanner, and Harris (1999) find students with internships generally had a higher GPA,

were younger at graduation, and more apt to be employed upon graduation. Although these papers lend themselves toward the favorable impacts of optional internship programs, compulsory programs do not produce the same results, as is shown in Klein and Weiss (2011).

The impact of academic leave behavior on outcome measures is a topic that has received little attention from researchers, due in large part to difficulty in finding reliable data sources capturing students leaving and reentering collegiate studies. Breaks in academic studies, however, are arguably more widespread than participation in internships. O'Toole, Stratton, and Wetzel (2003) find that approximately 30 percent of students actively pursuing an academic degree interrupt their education for at least a single term during the five years following first enrollment. These authors focus on what causes students to want to take academic leave and/or withdraw from school, whereas we are interested in the impact academic leave has on collegiate outcomes. Horn and Carroll (1998) find, of students who have a break in college tenure (excluding those who participate in an internship program), only 64 percent return to college within five years of the leave. DesJardins, Ahlburg, and McCall (2006) estimate the impact of academic leave on student behavior, such as taking additional breaks and dropout behavior. They simulate changes in different variables to determine differential impacts on the likelihood of certain student outcomes, finding notable differences across race, family income, and high school performance.

Our study differs from prior studies of college internships and voluntary academic leave in multiple ways. Previous studies of college internships have focused on the impact they have on future labor market outcomes. We are interested in the impacts these programs have on a wide range of collegiate outcomes not previously examined, including college choice satisfaction, coursework relevance satisfaction, study habits, graduate school and labor market ambitions, graduate school admission test scores (arguably better measures of academic achievement than GPA when comparing students across degree plans and schools), and the accumulation of relevant skills. With regard to voluntary academic leave, we are again interested in the effects on collegiate outcomes instead of the causes of these breaks in college tenure. There have been a number of studies estimating the causes of this behavior and causes of break versus dropout behavior, but little focus has fallen on the academic ramifications of taking academic leave. Lastly, we make use of propensity score matching to construct control groups for each of the sub-analyses. This allows us to implement a large degree of control and address the selection issue regarding the choice to take a break from college tenure.

The rest of the paper is organized as follows. Section 2 details our data. In section 3, we describe our empirical methodology. The results of both

sub-analyses are presented in section 4. In section 5, we offer conclusions and discuss policy implications.

2. DATA

HERI Surveys

Data utilized in this study were collected as part of the Cooperative Institutional Research Program conducted by the Higher Education Research Institute (HERI) housed at the University of California, Los Angeles. HERI conducts several different surveys and we make use of The Freshman Survey (TFS) and the College Senior Survey (CSS). TFS is administered on or very near a student's matriculation in college and the CSS is administered very near graduation, often at the same time as a student's exit exam. Our data entries are longitudinal in the sense we are able to match student TFS responses to their corresponding CSS responses. Although our sample size is large, the data are not necessarily nationally representative. A greater number of religious and private schools than are observed nationally participate in the surveys and this should be kept in mind when interpreting results.[1] Also, by its nature, the sample only includes students who both go on to finish their undergraduate program and do so at their original institution or another institution which participates in the Cooperative Institutional Research Program.[2] Thus, we can only estimate the effects of internships and breaks in college tenure on those students who both return to school and graduate.

We make use of all freely available data on students who took both surveys at the time of writing. This merged data set contains 103,542 respondents from 463 different institutions[3] in CSS survey years 1994 to 1999. To estimate the effects of breaks in college tenure, our control sample must include only students who continuously attended college until graduation. Thus, we drop those students who at one time withdrew (left with no intention of return) from school, those who were ever on academic probation, and part-time students (as the effects of breaks in college tenure are likely different for these students). In our initial analysis, we additionally exclude those students who both interned and at another time took a voluntary leave (as it would be difficult to untangle the effects of each) and those students who took longer than five years to finish their undergraduate studies.[4] Our resulting primary sample contains 94,345

1. The oversamples of private and religious schools could explain why on-time graduation in the HERI sample is relatively high.
2. Approximately 7 percent of our student sample transferred schools.
3. The names of the specific institutions included are not available to us, though a summary of the institutions is as follows. Of the schools included, 56.8 (43.2) percent are religious (secular) institutions, 80.7 (19.3) percent are private (public), 100 percent grant four-year degrees, and 66.7 percent additionally grant graduate degrees.
4. The impacts of breaks in college tenure undoubtedly vary by the length of the break. Unfortunately, the data do not contain information on the length of these breaks other than they are all at least

students, of which 24,657 (or 26.1 percent) report they have participated in an internship program and 1,957 (or 2.1 percent) report they voluntarily took a leave of studies for other reasons. Our control sample, those students who attended college continuously and full-time, is therefore made up of 67,731 students.

After use of this preferred sample, we reestimate the effects of college tenure interruption on several other cuts of the data: a sample not excluding those students who took longer than five years to graduate (hereafter, "extended-tenure students"), a sample not excluding those who received both treatments, and a sample excluding noncitizen students (as student visa rules likely affect the choice to interrupt college tenure).[5] Lastly, with regard to the analysis of internships, we estimate effects on a sample that excludes business students as they may be differently affected and are more likely to have been encouraged or mandated to participate.

Collegiate Outcomes

Table 1 contains means of our outcome variables for the full sample, our primary control sample, and each of our primary treatment samples. We investigate 19 collegiate outcomes. As measures of academic success, we examine senior year GPA difference (the student's senior year GPA minus the average senior year GPA at his institution)[6] and scores on the four major graduate school admission exams (GRE, LSAT, MCAT, and GMAT).[7] As measures of satisfaction, we investigate the students' satisfaction with the relevance of coursework (on a 1–4 increasing scale) and an indicator for students who report, upon graduating, that they would reenroll to their undergraduate institution if given the initial choice over again.

Additionally, we look at an indicator for students who would like to earn a graduate degree upon undergraduate completion, hours per week spent

a full regular (Fall or Spring) semester long. Thus, we initially restrict our sample to those who graduate in five years or less so that we can somewhat safely assume that the maximum length of the break was an academic year. We also note the difference between the mean length of college tenure for interns and our control sample (+0.53 years) is very close to the difference for voluntary academic leave takers (+0.56 years). Thus, differences in causal effect estimates across break types are not likely due to differences in lengths.

5. International students attending American schools on F1 visas are required by law to leave the country within fifteen days of withdrawal from courses. Thus, if these students take a semester or more break in college tenure, they must spend much of it outside the United States. International students who obtain internships through their college must additionally receive Curricular Practical Training eligibility.
6. Because our sample of students comes from many different schools, we use GPA difference (instead of GPA) as GPAs across schools are not truly comparable.
7. GRE is the Graduate Record Examination; LSAT is the Law School Admission Test; MCAT is the Medical College Admission Test; and GMAT is the Graduate Management Admission Test. At the time the students in our sample took these exams, the GRE was scored on a 400–1,600 scale, the LSAT on a 120–180 scale, the MCAT on a 3–45 scale, and the GMAT on a 200–800 scale.

Table 1. Means of Outcome Variables by Subsample

Variable	Full Sample	Retention Risk	Control	Internship Participants		Academic Leave Takers	
				Mean	Difference	Mean	Difference
Senior-year GPA difference[a]	0.000	0.000	0.005	0.062	0.057***	−0.154	−0.159***
GRE score	1,170.709	1,103.000	1,176.915	1,155.073	−21.842***	1,198.505	21.590
LSAT score	153.651	153.292	153.804	153.491	−0.313	N/A	—
MCAT score	26.393	24.941	26.314	26.821	0.507*	N/A	—
GMAT score	530.662	530.667	554.710	476.171	−78.539***	N/A	—
Satisfaction: relevance of coursework[b]	2.765	2.740	2.742	2.839	0.097***	2.652	−0.090***
Would reenroll to this institution	0.797	0.738	0.790	0.823	0.033***	0.719	−0.071***
Wants a graduate degree	0.634	0.610	0.613	0.696	0.083***	0.564	−0.049***
Hours/week studying (senior year)	7.826	6.631	7.813	7.923	0.110**	7.196	−0.617***
Felt overwhelmed (senior year)[c]	1.257	1.221	1.253	1.265	0.012***	1.282	0.029**
Immediate plans: full-time job	0.529	0.536	0.488	0.641	0.153***	0.515	0.027***
Immediate plans: part-time job	0.223	0.209	0.243	0.162	−0.081***	0.286	0.043***
Change: general knowledge[d]	1.456	1.423	1.432	1.525	0.093***	1.435	0.003***
Change: knowledge of your particular field[d]	1.619	1.484	1.587	1.711	0.124***	1.552	−0.035***
Change: interpersonal skills[d]	1.155	1.134	1.119	1.260	0.141***	1.056	−0.063***
Change: ability to think critically[d]	1.297	1.237	1.266	1.382	0.116***	1.269	0.003

Table 1. Continued.

Variable	Full Sample	Retention Risk	Control	Internship Participants		Academic Leave Takers	
				Mean	Difference	Mean	Difference
Change: desire to have admin. responsibilities[d]	0.000	0.154	−0.002	0.009	0.011	−0.030	−0.028
Change: desire to be well off financially[d]	−0.199	−0.067	−0.203	−0.190	0.013**	−0.164	0.039**
Change: entrepreneurial spirit[d]	−0.090	−0.011	−0.088	−0.103	−0.015*	−0.037	0.051**
N	94,345	745	67,731	24,657		1,957	

Notes: Asterisks refer to *p*-values from *t*-test statistics for differences between the means of the treatment groups and the control group. *N*s are different for the graduate school admission tests as not all students attempt these exams. See tables 6 and 7 for these *N*s. Retention Risk refers to those students who felt they had "no chance" of graduating upon college matriculation. Sample sizes were too small to examine LSAT, MCAT, or GMAT scores for those students who took voluntary academic leave.

[a]Student's senior-year GPA minus the average senior-year GPA at the institution attended.

[b]Variable is on a 1 to 4 increasing scale.

[c]Variable is on a 0 to 2 scale with 0 meaning "never," 1 "sometimes," and 2 "frequently."

[d]Variables are on −2 to +2 scale with −2 meaning "much weaker," −1 "weaker," 0 "no change," 1 "stronger," and 2 "much stronger."

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

studying during the senior year, and a variable describing how frequently the student felt overwhelmed during his senior year. As measures of employment plans, we examine two indicators: one for those planning to work full-time immediately following graduation and one for those planning to work part-time. Lastly, we use differences in seven self-reported measures of student traits from the CSS and TFS as outcomes. These include general knowledge, knowledge of the student's particular field, interpersonal skills, the ability to think critically, the desire to have administrative responsibilities, the desire to be "well off" financially, and entrepreneurial spirit. A college internship is often the first experience students have working alongside others and dealing with employers and business owners. Thus, with regard to the outcomes change: interpersonal skills, change: administrative responsibilities, and change: entrepreneurial spirit, we are particularly interested in how internship experience affects these traits.

Comparing the means across both of the treatment groups against the common control group, it appears there are many statistically significant differences in our captured collegiate outcomes. For example, senior-year GPA differences, the desire to enter graduate studies upon undergraduate degree completion, and hours per week studying during the senior year are all higher for former interns and all lower for former academic-leave takers. Interns are found to be more satisfied with their institution upon graduation whereas leave-takers are found to be less satisfied. Also, interns are more likely to have plans to immediately begin full-time work and less likely to begin part-time work than those who attended continuously, whereas leave-takers are more likely in both these cases. In all, there are several apparent differences across these three groups.

As previously mentioned, we are unable to observe students who do not return and complete their undergraduate education and thus cannot examine the effects of college tenure interruption on retention. Nevertheless, in TFS responses, students were asked about their likelihood of graduating. Seven hundred forty-five (or 0.8 percent) of students in our sample reported "no chance" of graduating (though they did graduate) and it may be interesting to compare our treatment samples, particularly leave-takers, to these students. The column labeled Retention Risk in tables 1 through 4 refer to these 745 students. Interestingly, in terms of the outcome variables in table 1, students who initially felt they had no chance of earning a degree generally had more positive collegiate outcomes than those who took voluntary academic leave. As examples, their GPAs are higher, they are more likely to want a graduate degree, they are more satisfied with their institution and the relevance of coursework, and more often have plans to immediately begin full-time employment upon graduation.

Matching Covariates

Tables 2, 3, and 4 contain summary statistics for all the variables from TFS data that are used in the matching procedure, fully described in section 3. Table 2 presents means for the variables describing the student's individual and family demographics. Table 3 displays means for the variables describing the student's academic and related characteristics as well as characteristics of the institution attended (what we call "student and college type" variables). Table 4 presents means for two degree-related variables: freshman year degree aspiration and aggregate freshman major. The Unweighted Control column in these tables refer to our primary control sample. The Treatment column refers to students who either participated in an internship program or took academic leave. The Weighted Control column in the tables show how well the propensity score matching procedure performed and will be fully described in section 3.

Individual and Family Demographics

In making the decision of which survey variables would make the most appropriate matching covariates, we consulted prior studies discussing success factors during college and those dealing with factors making students more or less likely to participate in internships or take academic leave. Regarding the individual and family demographic measures in table 2, Johnson and Rochkind (2009) find differences in collegiate success across gender and ethnicity. Johnson and Rochkind additionally note that the most common reason for taking academic leave (as reported by students) is financial difficulty. As such, we include variables that are directly related to a student's ability to pay (or perceived ability) such as: family status, parental education levels, family income, and hours per week spent working in the year prior to college. Shepherd (2010) stresses the need to account for U.S. citizenship and whether a student is a native English speaker. Lehrer (2004) and Lee (2002) note differences in college outcomes by religious identification. We, thus, additionally include these measures.

Table 2 seems to confirm there are inherent demographic differences, at both the individual and family levels, between students with discontinuous college tenure or internship participation and the rest of the student pool. Focusing on internship participants, there are statistically significant differences in gender breakdowns, race, citizenship status, religious fervor, marital status of parents, parents' educational attainment, family income, and precollege employment status. Women partook in internship programs at higher rates, as did whites and blacks, though to a smaller degree. There is no statistical difference for native English speakers, perhaps implying that foreign students of English-speaking nations are receiving more of these internships. It is possible

Table 2. Means and Balance Measures of Individual and Family Demographics

Variable	Retention Risk	Internship Participants			Academic Leave Takers		
		Treatment	Unweighted Control	Weighted Control	Treatment	Unweighted Control	Weighted Control
Male	0.403	0.368	0.391**	0.370	0.393	0.391	0.397
Race: White	0.779	0.805	0.799***	0.802	0.711	0.799***	0.712
Race: African American	0.068	0.053	0.043***	0.054	0.078	0.043***	0.077
Race: American Indian	0.012	0.012	0.012***	0.011	0.025	0.012***	0.025
Race: Asian	0.043	0.044	0.047***	0.045	0.051	0.047***	0.052
Race: Hispanic	0.038	0.042	0.042***	0.043	0.061	0.042***	0.061
Race: other	0.060	0.029	0.028***	0.030	0.042	0.028***	0.042
U.S. citizen	0.973	0.649	0.795***	0.651	0.735	0.795***	0.739
Native English speaker	0.942	0.943	0.940	0.941	0.923	0.940***	0.920
Identifies as a religious person	0.891	0.905	0.894***	0.903	0.821	0.894***	0.819
Parental status: living together	0.769	0.803	0.793***	0.799	0.725	0.793***	0.727
Parental status: divorced/separated	0.196	0.161	0.168***	0.165	0.229	0.168***	0.227
Parental status: one or both deceased	0.035	0.032	0.035***	0.032	0.041	0.035***	0.041
Father's years of schooling	14.957	15.518	15.410***	15.503	15.218	15.410***	15.228
Mother's years of schooling	14.423	14.921	14.765***	14.905	14.734	14.765	14.732
Family income ($0,000)	73.825	68.549	65.295***	68.414	63.455	65.295*	63.911
Hours/week working (year before college)	8.992	8.232	7.993***	8.224	8.266	7.993*	8.233
Plans to work while in college	0.275	0.430	0.410***	0.424	0.439	0.410**	0.435
N	745	24,657	67,731		1,957	67,731	

Notes: Race and parental status are categorical variables. The asterisks refer to *p*-values from *t*-test (χ^2) statistics for continuous/indicator (categorical) variables. Asterisks in the Unweighted Control columns refer to differences between the treatment group and the unweighted control group (pre-match differences). Asterisks in the Weighted Control columns refer to differences between the treatment group and the propensity score weighted control group (post-match differences). Retention Risk refers to those students who felt they had "no chance" of graduating upon college matriculation.
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 3. Means and Balance Measures of Student and College Type Variables

		Internship Participants			Academic Leave Takers		
Variable	**Retention Risk**	**Treatment**	**Unweighted Control**	**Weighted Control**	**Treatment**	**Unweighted Control**	**Weighted Control**
High school GPA	3.159	3.366	3.354***	3.365	3.230	3.354***	3.234
College entrance exam (SAT) score	1,027.047	1,117.410	1,122.381***	1,116.222	1,110.351	1,122.381***	1,110.680
Number of colleges applied to	2.682	4.017	3.869***	4.010	3.842	3.869	3.846
Percent of colleges accepted to	0.878	0.992	0.977***	0.991	0.975	0.977	0.976
First generation college student	0.249	0.166	0.183***	0.165	0.202	0.183**	0.205
Self-rating: academic ability[a]	3.709	4.022	4.020	4.021	3.918	4.020***	3.916
Self-rating: competitiveness[a]	3.660	3.727	3.699***	3.720	3.629	3.699***	3.628
Time between HS and college (years)	0.168	0.070	0.085***	0.068	0.165	0.085***	0.163
Public college	0.168	0.129	0.212***	0.130	0.237	0.212***	0.233
College region: East	0.450	0.414	0.386***	0.414	0.403	0.386***	0.401
College region: Midwest	0.259	0.288	0.298***	0.286	0.243	0.298***	0.243
College region: South	0.189	0.145	0.164***	0.148	0.146	0.164***	0.150
College region: West	0.102	0.152	0.152***	0.153	0.208	0.152***	0.206
Distance from home: 10 miles or less	0.125	0.073	0.084***	0.075	0.106	0.084***	0.104
Distance from home: 11–50 miles	0.227	0.166	0.168***	0.166	0.151	0.168***	0.149
Distance from home: 51–100 miles	0.164	0.147	0.151***	0.148	0.126	0.151***	0.130

Table 3. Continued.

Variable	Retention Risk	Internship Participants			Academic Leave Takers		
		Treatment	Unweighted Control	Weighted Control	Treatment	Unweighted Control	Weighted Control
Distance from home: 101–500 miles	0.309	0.400	0.372***	0.395	0.358	0.372***	0.358
Distance from home: 500+ miles	0.165	0.201	0.213***	0.203	0.241	0.213***	0.243
College quality: avg. student HS GPA	3.050	3.265	3.231***	3.263	3.175	3.231***	3.177
College quality: avg. student SAT score	997.561	1,065.56	1,071.95***	1,064.38	1,103.57	1,071.95***	1,102.96
Academic engagement index	5.898	6.505	6.315***	6.493	6.058	6.315***	6.073
N	745	24,657	67,731		1,957	67,731	

Notes: HS: high school. College choice, region, and distance are categorical variables. The asterisks refer to *p*-values from *t*-test (χ^2) statistics for continuous/indicator (categorical) variables. Asterisks in the Unweighted Control columns refer to differences between the treatment group and the unweighted control group (pre-match differences). Asterisks in the Weighted Control columns refer to differences between the treatment group and the propensity score weighted control group (post-match differences). Retention Risk refers to those students who felt they had "no chance" of graduating upon college matriculation.

[a]On a 1–5 scale.

$^{**}p < 0.05$; $^{***}p < 0.01$.

Table 4. Means and Balance Measures of Degree-Related Variables

		Internship Participants			Academic Leave Takers		
Variable	**Retention Risk**	**Treatment**	**Unweighted Control**	**Weighted Control**	**Treatment**	**Unweighted Control**	**Weighted Control**
Freshman Year Degree Aspiration							
None (not degree-seeking)	0.052	0.003	0.006***	0.003	0.010	0.006***	0.010
Associate (AA or equivalent)	0.052	0.002	0.003***	0.002	0.003	0.003***	0.004
Bachelor's degree (BA, BS, etc.)	0.121	0.146	0.162***	0.147	0.154	0.162***	0.154
Master's degree (MA, MS, etc.)	0.235	0.359	0.353***	0.355	0.341	0.353***	0.342
PhD or EdD	0.101	0.156	0.156***	0.156	0.191	0.156***	0.191
MD, DO, DDS, DVM	0.142	0.104	0.116***	0.107	0.101	0.116***	0.101
JD (Law)	0.054	0.070	0.062***	0.068	0.046	0.062***	0.046
BD or MDIV (Divinity)	0.004	0.004	0.003***	0.004	0.003	0.003***	0.003
Undecided/Other degree	0.239	0.156	0.139***	0.158	0.151	0.139***	0.149
Aggregate Freshman Major							
Agriculture	0.004	0.006	0.005***	0.006	0.004	0.005***	0.004
Biological Sciences	0.068	0.083	0.086***	0.084	0.087	0.086***	0.087
Business	0.146	0.169	0.147***	0.166	0.132	0.147***	0.132
Education	0.103	0.064	0.096***	0.065	0.084	0.096***	0.083
Engineering	0.032	0.070	0.068***	0.070	0.063	0.068***	0.063
English	0.023	0.025	0.031***	0.024	0.040	0.031***	0.040
Health Professional	0.216	0.116	0.133***	0.117	0.116	0.133***	0.116

Table 4. Continued.

		Internship Participants			Academic Leave Takers		
Variable	**Retention Risk**	**Treatment**	**Unweighted Control**	**Weighted Control**	**Treatment**	**Unweighted Control**	**Weighted Control**
History or Political Science	0.047	0.069	0.065***	0.068	0.063	0.065***	0.063
Humanities	0.023	0.023	0.023***	0.023	0.035	0.023***	0.036
Fine Arts	0.040	0.033	0.040***	0.034	0.043	0.040***	0.044
Mathematics or Statistics	0.003	0.010	0.014***	0.010	0.012	0.014***	0.011
Physical Sciences	0.012	0.024	0.026***	0.025	0.031	0.026***	0.031
Social Sciences	0.051	0.093	0.071***	0.092	0.089	0.071***	0.089
Other Technical	0.032	0.021	0.147***	0.022	0.017	0.147***	0.017
Other Non-technical	0.099	0.077	0.024***	0.076	0.062	0.024***	0.061
Undecided	0.099	0.076	0.080***	0.075	0.074	0.080***	0.073
N	745	24,657	67,731		1,957	67,731	

Notes: χ^2 tests were run both pre- and post-matching. The asterisks in the Unweighted Control columns (and lack thereof in the Weighted Control columns) show that these categorical variables are statistically different (all with p-values < 0.001) pre-match and not statistically different (all with p-values ≥ 0.883) post-match. Retention Risk refers to those students who felt they had "no chance" of graduating upon college matriculation.

***$p < 0.01$.

employers may also be less inclined to offer internships to those whose native language is not English. Future interns are also found to be more religious,[8] more likely to have intact families, have more educated parents, have higher family incomes, and have worked more the year before college enrollment.

Regarding the voluntary academic leave sample, table 2 shows these students are also characteristically different from students who attend college continuously, though in a different way. Students who take academic leave are more likely to be from a minority group, less likely to be a noncitizen or a native English speaker, are less religious, less likely to come from an intact family, have less-educated fathers (though not mothers), lower family incomes, and worked more in the year before college. We find no statistical difference between the gender compositions of the academic leave and control samples.

Student and College Type Variables

Table 3 contains means detailing measures of student and college type. Because controlling for student quality is of key importance in this and any other study that examines collegiate outcomes, we match individuals on several variables that serve as proxies for student quality. These include students' high school GPAs, SAT exam scores (for students taking the ACT and not the SAT, scores were converted into equivalent SAT scores), percent of colleges applied to that accepted their application, and students' self-rated academic ability (on a 1–5 scale). The remaining student type variables include the number of colleges to which the student applied, an indicator for first-generation college students, student's self-rated general competitiveness level[9] (again, on a 1–5 scale), and time (in years) between high school graduation and college matriculation (to control for "nontraditional" students).

As previously mentioned, because the students in our sample come from over 400 institutions and college experiences, of course they vary across the institutions attended. Unfortunately, the data do not contain the names of the institutions attended but do contain several institutional characteristics that allow us to control for these differences. We match students on a public college indicator,[10] the college's geographic region, the distance from the college to the student's high school home (an ordered variable with five categories), the average high school GPA of students who attend the college, and the average SAT score of the students who attend the college. We created and merged with our sample these last two variables from HERI survey data to help control for

8. The variable is an indicator for students who identify themselves as a religious person.
9. Competitive students may be more apt to participate in internship programs. Students who are academically competitive with their peers may also be less apt to take gap periods.
10. We note that the HERI sample contains many more private institutions than public.

differences in college quality as they are proxies for the quality of students who attend.

In considering the choice of student and college type variables, DesJardins, Ahlburg, and McCall (2006) find high school GPA and college entrance exam scores are significant determinants of academic leave. Smith (2011) relates statistical differences between the number of colleges applied/accepted to and later success. In the Advisory Committee on Student Financial Assistance's report (ACSFA 2012), differences are shown in outcomes based on the amount of time between high school and college. Johnson and Rochkind (2009) additionally find differences for the student and college type variables in table 3, such as first-generation college student, self-ratings of academic ability and competitiveness, public/private university attended, college region, and distance from home.

Across these variables, we again see there are many differences between future college interns, those who take academic leave, and our control group. On average, students who later participate in internship programs have slightly higher high school GPAs, slightly lower SAT scores, apply to more colleges, get accepted to more colleges, are less likely to be first-generation college students, are slightly more competitive, and attend college sooner following high school. Students who voluntarily take academic leave on average have lower high school GPAs, lower SAT scores, are more likely to be first-generation college students, rate themselves lower on academic ability and competitiveness, and wait longer to first attend college. Generally speaking, those who take leave appear to be more marginally attached to collegiate education. Table 3 also shows there are differences in institutional characteristics across the three subsamples. Notably, students who later take academic leave are more often attending a lower-quality college that was also not their first choice. The last variable in table 3 is an academic engagement index and is discussed fully later in this section.

Degree-Related Variables

Table 4 contains measures for two degree-related categorical variables: the highest level of degree aspired to upon college matriculation (ten categories) and aggregate freshman major (sixteen categories). Students who later participate in an internship program aspire to only a bachelor's degree at lower rates, master's degrees at higher rates, and a JD (law degree) at higher rates. Students who later take voluntary academic leave aspire at higher rates to PhDs and lower rates for bachelor's degrees. Not surprisingly, looking at freshman majors, students in business are most likely to have an internship as an undergraduate. Business students are also the most likely to take a voluntary academic leave. In all, table 4 demonstrates that students who later take breaks

in college tenure begin their higher education with different aspirations and degree plans than those who do not. Matching on these two variables allows us to construct control groups that are made up of students with the same majors and degree aspirations as the treatment groups—an important dimension of control.

Tables 2 through 4 contain columns of Retention Risk status student responses as described previously. Although we do not have information on the students who separated from college, we are hopeful students responding they had "no chance" of completing college (although they later did) may serve to give an idea of the characteristics of others who did not finish. Respondents who marked they had no chance of completing college were more often male, U.S. citizens, African American, and had less-educated parents. They also had spent a greater number of hours working the year before college. Unsurprisingly, on average, these students were less prepared for college (as measured by high school GPAs and SAT scores). These students were additionally more apt to attend a college closer to home and aspired to lower level degrees (e.g., an associate's degree instead of a bachelor's degree).

Academic Engagement Index

Students who interrupt college tenure, either to intern or take a break, may additionally be different from those who do not in ways other than what can be captured by the variables discussed earlier. Importantly, they may be differently "attached" to their higher education and academic success than those who attend continuously. This is likely more of an issue for an analysis of voluntary academic leave than college internships. To control for this difference, we use additional student information collected by HERI to construct an academic engagement index which is then used as an additional matching covariate.

Researchers commonly construct such composite indices (or scales) by simply summing the values of component variables. Other methods include principal component analysis or factor analysis. Thus, a composite index, in its most general form, is the weighted sum of the component variables as shown in

$$\theta_i = \sum_{r=1}^{p} \gamma_{ri}\mu_r, \forall i, \tag{1}$$

where the value of the index for individual i (θ_i) is the sum of the component variable values (γ_{ri}) for p components, each component value weighted by a weight (μ_i). As noted by Eff (2010), a wide variety of methods exist for specifying the weights and, in most cases, there is no a priori reason to choose one scheme over another, leaving the choice open for criticism as arbitrary.

Table 5. Component Variables of the Academic Engagement Index

Variable	Min.	Mean	Max.	Invert	Alpha
Perceived likelihood of failing one or more courses	1	1.714	4	1	0.568
Perceived likelihood of making at least a "B" average	1	3.531	4	0	0.535
Perceived likelihood of not graduating on time	1	2.266	4	1	0.516
College's academic reputation was important to your choice	1	2.689	3	0	0.604
Self-rating of "drive to achieve" at school	1	4.076	5	0	0.519
Academic engagement index	1	6.329	10		

Notes: "Invert" = 1 when the variable is negatively correlated with the meaning of the index. Cronbach's alpha = 0.616. "Alpha" is the Cronbach's alpha when the row variable is *excluded*.

The ideal method would be one that most diminishes the effect of weight choice in ranking individuals. Therefore, we follow Eff (2010) and others by using linear programming to help solve for these weights. More specifically, we solve for weights on the individual components (μ_i) in order to calculate the highest possible index for the kth individual in the constrained maximization problem:

$$\text{Maximize } \theta_k = \sum_{r=1}^{p} y_{rk}\mu_r \tag{2a}$$

$$\text{subject to } \sum_{r=1}^{p} y_{ri}\mu_r \leq 1, \forall i \tag{2b}$$

$$\text{and } \mu_r \geq 0, \forall r. \tag{2c}$$

This problem is solved once for every individual in the data. In practice, we replace the zero in constraint (2c) with a very small number (0.000001) so that all component variables are considered. The weights yielded by this procedure are then used to construct the academic engagement index. As examples of its use and for further reading on this technique, this method has been previously used for ranking universities (Bougnol and Dulá 2006), U.S. states (Eff and Eff 2007), and elementary schools (Eff 2004), among other things.

Table 5 presents summary statistics for the component variables of the academic engagement index as well as the index itself. All five component variables come from TFS data. Students were asked, on a 1 to 4 scale, about the likelihoods of failing one or more courses, earning a "B" or above average in college, and not graduating on time. They were also asked to rate, on a 1 to 3 scale, how important their college's academic reputation was in choosing it and, on a 1 to 5 scale, their personal "drive" to do well in school. The perceived likelihoods of failing courses and not graduating on time are negatively

correlated with the other component variables and the meaning of the index. They are therefore multiplied by −1 before creating the index to ensure that they vary directly with the others. The resulting composite index has a range of 1 to 10 (with higher values representing a more engaged student) and a mean of approximately 6.3. Means across the major subsamples for this index are shown in table 3. Students who later participated in internship programs are found to have a higher academic engagement on average, whereas, unsurprisingly, students who take voluntary academic leave have lower average academic engagement.

Academic engagement is a difficult trait to capture and there may be other unobserved student characteristics that influence the choice to interrupt college tenure and/or collegiate outcomes. Thus, our estimated results should perhaps be thought of as more suggestive than causal. Nevertheless, a sensitivity analysis (described in the next section) indicates it is unlikely there is an unobserved variable that, if observed, would remove the effects of college tenure interruption on our collegiate outcome variables. Our empirical methodology is described in full in the following section.

3. EMPIRICAL METHODOLOGY

As shown in the previous sections and tables 2–4, there are numerous differences in the backgrounds, perceived and true abilities, degree aspirations, majors of study, and many other characteristics between internship participants and students who take academic leave when compared with the rest of the student pool. In both cases, therefore, the use of a control group made up of the general population of college students would not be appropriate. Because there are so many relevant differences between these subsamples, several important controls are likely correlated, and nonlinearities may be present, we feel that typical regression techniques are inappropriate in this case. Additionally, varying specifications of ordinary least squares (OLS) regressions can result in marked differences of coefficient estimates. For instance, Imbens (2004, p. 12) states, "regression estimators may be very sensitive to differences in the covariate distributions for treated and control units." Thus, we implement propensity score matching to assign a more effective control group and better estimate the impacts of these breaks in college tenure on collegiate outcomes, though we also present OLS estimates (with our propensity score matching covariates used as controls) in the Appendix.

Rosenbaum and Rubin (1983) initially proposed propensity score matching (PSM) and it is now a widely implemented empirical identification strategy. Under laboratory conditions, researchers would compare treated and untreated individuals, assuming that treatment was randomly assigned. Given random

assignment, causality from the treatment can be easily inferred. The choices to either participate in an internship program or take a break from college, however, are made voluntarily. PSM corrects for observable pretreatment differences by matching treated and untreated individuals by propensity score, their likelihood of being treated.

As an empirical methodology, PSM is best suited for cases where: (1) few observations in the control group are truly comparable to the treatment group; and/or (2) it is difficult to select a subset of control observations similar to the treatment group because it is necessary to compare observations across a large set of pretreatment characteristics (Rosenbaum and Rubin 1983). From the discussion of the summary statistics in section 2, we can see these cases are evident. An argument could easily be made that only certain types of students would be willing and able to participate in an internship program, meaning that the general population of students who do not participate in such a program would make a poor comparison group. Also, because there are numerous factors affecting the probability of receiving treatment as well as collegiate outcomes, program participants and nonparticipants should be compared across a large number of individual-level characteristics. The same can be said of those who choose to take a break from college.

We follow McCaffrey, Ridgeway, and Morral (2004) and Ridgeway (2006) in our choice of propensity scoring method. For a detailed discussion of the method, we direct the reader to Ridgeway (2006), though we summarize it here. Let $b = 1$ denote the sample of students participating in college leave or internships, and $b = 0$ denote those attending college continuously (the control sample). Also, let $\boldsymbol{x}$ denote the set of matching covariates presented in section 2. Students should only be matched on pretreatment observables as any post-treatment variables could have been affected by treatment. The ultimate goal is to weight students in the control sample in such a way that, when the weights are assigned, there are no observable differences between this group and those participating in internships or academic leave (treatment). In statistical terms, we want to weight the joint distribution of those students who attended college continuously, $f(\boldsymbol{x}|b = 0)$, so it would be identical to the joint distribution of the features in the sample of students who did participate in internships or academic leave, $f(\boldsymbol{x}|b = 1)$, as shown in the equation

$$f(\boldsymbol{x}|b = 1) = w(\boldsymbol{x}) f(\boldsymbol{x}|b = 0). \tag{3}$$

Solving for $w(\boldsymbol{x})$ and applying Bayes theorem to the two conditional distributions of $\boldsymbol{x}$ results in

$$w(\boldsymbol{x}) = K \frac{f(b = 1|\boldsymbol{x})}{1 - f(b = 1|\boldsymbol{x})}, \tag{4}$$

where K is constant independent of $\boldsymbol{x}$ that will cancel in the outcomes analysis. Control students with similar traits as those who do take leave or participate in internships are thus "upweighted" and those with more largely differing traits are "downweighted." For a more detailed discussion of these weights, we direct the reader to Wooldridge (2002), Hirano and Imbens (2001), and McCaffrey, Ridgeway, and Morral (2004).

After construction and use of the weights, the only observed differences between those who interrupt college tenure and those who do not will be treatment and possibly the outcome variables. The difference between the average outcome in each group measures the "break effect" (or BE) as shown in

$$BE = \frac{\sum_{i=1}^{N} b_i y_i}{\sum_{i=1}^{N} b_i} - \frac{\sum_{i=1}^{N} (1 - b_i)\, w(\boldsymbol{x}_i)\, y_i}{\sum_{i=1}^{N} (1 - b_i)\, w(\boldsymbol{x}_i)}. \tag{5}$$

Students are matched on all the variables listed in tables 2–4. This extensive level of control allows us to capture more precise estimates of the effects of college breaks and internship participation.

The effects of internships and voluntary academic leave are separately studied. In each case, the control group is made up entirely of students who continuously attended college until graduation. For each cut of the data (each column in tables 6 and 7), a different set of propensity scores is calculated. Thus, there are nine sets of propensity scores used in this analysis. Tables 2, 3, and 4 additionally relate balance measures of these propensity scores. For brevity, only balance measures for the preferred samples are shown. The absence of significance stars in the Weighted Control column in all three tables show, when weighted by propensity score, there are no pretreatment differences remaining between the two treatment groups and their respective newly created control groups in all the variables incorporated—the balance condition is satisfied. This was the case for all nine sets of weights.

Using a method developed by Ridgeway (2006), we also assess how sensitive our results are to hidden bias. This method involves removing one of our matching covariates from the propensity score model, reestimating the propensity scores, treating the removed variable as the unobserved factor, and measuring the change in the observed treatment effect. This procedure is done for each of the twenty-seven variables we use to estimate propensity scores. For an in-depth discussion of this type of sensitivity analysis, see Ridgeway (2006). Here, the sensitivity analysis indicates that it is unlikely there is an unobserved variable that, if observed, would remove the effects of college tenure interruption on the collegiate outcomes. If such a variable existed, it would need to be as strongly correlated with treatment (either participating in an internship program or taking voluntary academic leave) as the matching covariate with the

Table 6. The Impact of College Internships on Collegiate Outcomes (PSM Results)

Outcome	Preferred Sample (1)	Extended-Tenure Students Included (2)	Leave Takers Included (3i)	Non-Citizens Excluded (4)	Business Majors Excluded (5)
Senior year GPA difference[a]	0.080***	0.080***	0.078***	0.076***	0.072***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
GRE score	−14.561***	−14.582***	−13.875***	−18.136***	−14.885***
	(4.973)	(4.965)	(4.925)	(6.034)	(4.975)
	[2,122/5,299]	[2,214/5,547]	[2,203/5,299]	[1,389/4,404]	[1,928/4,808]
LSAT score	0.686	0.681	0.625	1.254	0.360
	(0.774)	(0.772)	(0.777)	(0.790)	(0.740)
	[1,112/2,507]	[1,112/3,093]	[1,137/2,507]	[775/2,158]	[924/2,080]
MCAT score	0.654**	0.653**	0.691**	0.879*	0.640**
	(0.325)	(0.325)	(0.319)	(0.448)	(0.320)
	[477/1,830]	[477/2,048]	[494/1,830]	[250/1,509]	[464/1,759]
GMAT score	11.180	12.807	7.808	25.650	−23.840
	(15.680)	(15.719)	(15.626)	(16.460)	(17.260)
	[495/1,060]	[495/1,116]	[503/1,060]	[413/938]	[344/748]
Satisfaction: relevance of coursework[b]	0.055***	0.055***	0.052***	0.079***	0.058***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)
Would reenroll to this institution	0.022***	0.023***	0.020***	0.025***	0.025***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Wants a graduate degree	0.064***	0.064***	0.063***	0.062***	0.062***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Hours/week studying (senior year)	0.137***	0.136***	0.142***	0.074	−0.012
	(0.049)	(0.049)	(0.048)	(0.059)	(0.053)
Felt overwhelmed (senior year)[c]	0.009*	0.008*	0.011**	0.006	0.012**
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Immediate plans: full-time job	0.142***	0.141***	0.141***	0.144***	0.127***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)

Table 6. Continued.

Outcome	Preferred Sample (1)	Extended-Tenure Students Included (2)	Leave Takers Included (3i)	Non-Citizens Excluded (4)	Business Majors Excluded (5)
Immediate plans: part-time job	−0.076***	−0.076***	−0.074***	−0.076***	−0.067***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
Change: general knowledge[d]	0.090***	0.090***	0.090***	0.099***	0.079***
	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Change: knowledge of your particular field[d]	0.132***	0.131***	0.130***	0.138***	0.113***
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)
Change: interpersonal skills[d]	0.137***	0.137***	0.136***	0.137***	0.128***
	(0.005)	(0.005)	(0.005)	(0.007)	(0.006)
Change: ability to think critically[d]	0.114***	0.113***	0.113***	0.123***	0.103***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)
Change: desire to have administrative responsibilities[d]	0.016**	0.016*	0.015*	0.016	0.023***
	(0.008)	(0.008)	(0.008)	(0.010)	(0.009)
Change: desire to be well off financially[d]	0.021***	0.021***	0.021***	0.015*	0.015*
	(0.007)	(0.007)	(0.007)	(0.009)	(0.008)
Change: entrepreneurial spirit[d]	0.001	−0.001	0.004	−0.013	−0.013
	(0.009)	(0.009)	(0.009)	(0.011)	(0.010)
N (treatment)	24,657	24,961	25,692	16,150	19,549
N (control)	67,731	68,182	67,731	53,742	54,980
N (total)	92,388	93,143	93,432	69,892	74,529

Notes: *N*s are different for the graduate school admission tests as not all students attempt these exams. Thus, these *N*s (treated/control) are in brackets.

[a]Student's senior year GPA minus the average senior year GPA at the institution attended.

[b]Variable is on a 1 to 4 increasing scale.

[c]Variable is on a 0 to 2 scale with 0 meaning "never," 1 "sometimes," and 2 "frequently."

[d]Variables are on −2 to +2 scales with −2 meaning "much weaker," −1 "weaker," 0 "no change," 1 "stronger," and 2 "much stronger."

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table 7. The Impact of Voluntary Academic Leave on Collegiate Outcomes (PSM Results)

Outcome	Preferred Sample (1)	Extended-Tenure Students Included (2)	Internship Takers Included (3)	Non-Citizens Excluded (4)
Senior year GPA difference[a]	−0.085***	−0.085***	−0.052***	−0.074***
	(0.011)	(0.011)	(0.009)	(0.013)
GRE score	23.827	20.688	14.921	37.809*
	(19.643)	(19.120)	(14.399)	(21.560)
	[100/5,299]	[104/5,547]	[181/5,299]	[79/4,404]
Satisfaction: relevance of coursework[b]	−0.032	−0.034*	−0.025	−0.007
	(0.021)	(0.020)	(0.017)	(0.024)
Would reenroll to this institution	−0.060***	−0.057***	−0.056***	−0.065***
	(0.010)	(0.010)	(0.008)	(0.012)
Wants a graduate degree	−0.045***	−0.036***	−0.023**	−0.049***
	(0.011)	(0.011)	(0.009)	(0.013)
Hours/week studying (senior year)	−0.246*	−0.322**	−0.129	−0.447***
	(0.133)	(0.127)	(0.114)	(0.153)
Felt overwhelmed (senior year)[c]	0.022*	0.026**	0.037***	0.004
	(0.013)	(0.012)	(0.011)	(0.015)
Immediate plans: full-time job	0.010	0.016	0.036***	−0.003
	(0.011)	(0.011)	(0.009)	(0.013)
Immediate plans: part-time job	0.038***	0.032***	0.020**	0.052***
	(0.010)	(0.010)	(0.008)	(0.012)
Change: general knowledge[d]	−0.006	0.004	0.021*	−0.005
	(0.014)	(0.013)	(0.011)	(0.015)
Change: knowledge of your particular field[d]	−0.022*	−0.014	0.010	−0.025*
	(0.013)	(0.012)	(0.011)	(0.015)
Change: interpersonal skills[d]	−0.049***	−0.041***	−0.008	−0.064***
	(0.016)	(0.016)	(0.014)	(0.019)
Change: ability to think critically[d]	−0.011	0.001	0.018	−0.024
	(0.015)	(0.014)	(0.012)	(0.017)
Change: desire to have administrative responsibilities[d]	−0.028	−0.023	−0.030	−0.001
	(0.024)	(0.023)	(0.020)	(0.027)
Change: desire to be well off financially[d]	0.006	0.017	0.011	0.008
	(0.021)	(0.021)	(0.018)	(0.024)
Change: entrepreneurial spirit[d]	0.041	0.034	0.055**	0.032
	(0.026)	(0.025)	(0.022)	(0.030)
N (treatment)	1,957	2,328	2,992	1,592
N (control)	67,731	68,182	67,731	53,742
N (total)	69,688	70,510	70,723	55,334

*Notes: N*s are different for the GRE as not all students attempt this exam. Thus, these *N*s (treated/control) are in brackets.
[a]Student's senior year GPA minus the average senior year GPA at the institution attended.
[b]Variable is on a 1 to 4 increasing scale.
[c]Variable is on a 0 to 2 scale with 0 meaning "never," 1 "sometimes," and 2 "frequently."
[d]Variables are on −2 to +2 scales with −2 meaning "much weaker," −1 "weaker," 0 "no change," 1 "stronger," and 2 "much stronger."
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

highest relative influence[11] *after* controlling for all of our twenty-seven matching covariates *and* be more correlated with the outcome variable in question than any of the twenty-seven observed variables included in the propensity score model. Our results are presented in the following section.

4. RESULTS AND DISCUSSION

Table 6 presents our estimates for the impact of college internships on collegiate outcomes. Overall, we find that participating in an internship program has a positive impact on students. We begin by looking at column 1, our preferred sample. First, we find there is a small, positive effect on senior-year GPA difference of 0.08 points (on the typical 0.0–4.0 GPA scale). It is possible that occupational experience has increased students' desires to do well in school as a means to maximize their labor market outcomes. Graduate school admittance tests perhaps offer a more absolute measure of performance. Students who have participated in an internship program are found to do just as well as others on the LSAT and GMAT but underperform on the GRE and score higher on the MCAT. Former interns scored 14.6 points lower on the GRE and 0.7 points higher on the MCAT. While statistically significant, these effects are relatively small.

Upon graduation from an undergraduate program, former interns are found to be 6.4 percentage points more likely to desire a graduate degree. Again, this result may stem from the effect of occupational experience on the desire to maximize labor market outcomes or may result partially from internships making some students want a field change. Internship participants also report studying 0.137 more hours (about eight minutes) each week, being 2.2 percentage points more likely to report they would reenroll in the same institution given the initial choice again (a good proxy for how college students feel about their chosen institution upon graduation), and report slightly higher rates of satisfaction (0.055 points on a 1–4 scale) with the relevance of coursework. These small increases in coursework relevance and institutional satisfaction may come from former interns being arguably more knowledgeable on these subjects as they have "real world" experience where other students may not. The one negative outcome among this group of variables is internship recipients were more likely to report feeling overwhelmed by all they had to accomplish during their senior year. However, at a 0.009 point increase on a 0 to 2 scale, this effect is very small.

11. Relative influence refers to the contribution of the variable for predicting treatment, as measured by the percentage increase in the logistic log-likelihood attributable to the variable (Friedman 2001). For internships, SAT exam scores are found to have the highest relative influence. For voluntary academic leave, high school GPAs are found to have the highest relative influence.

Interns also report planning to work full-time after graduation at much higher rates (14.2 percentage points higher) and plan to work part-time at lower rates (7.6 percentage points lower). Perhaps internship experience increases students' confidence and desire to start their professional careers, or those intern positions turn into full-time employment offers at graduation. Across the trait change measures reported, former interns reported slightly greater increases in interpersonal skills, general knowledge, the ability to think critically, the desire to have administrative responsibilities, and the desire to be "well off"[12] financially. The effect on their change in entrepreneurial spirit is found to be statistically insignificant. As they have likely had additional opportunities to work alongside others and been given independent work, these gains are not surprising. The impact of student internships seems consistently positive across virtually all measures reported. Most of the effects are small in magnitude, though the positive effects on full-time job plans and graduate school desires are noticeably large. Columns 2 through 5 in table 6 show the results of the internship analysis on different cuts of the data. Generally speaking, the impacts of college internships change very little across the different samples. The most notable exception is that the effect on hours spent studying loses significance in the citizens-only sample and the non-business majors sample.

Table 7 presents the results of the analysis of students who took voluntary academic leave. There appear to be several educational disruption costs to these breaks. Senior year GPA difference is negatively impacted for those who take academic leave by 0.085 GPA points. Leave takers are found to study 0.246 hours (about fifteen minutes) less per week upon return. It may be the case that these students have already decided their education is less important to them and/or they are experiencing difficulty in returning to academic life. Breaks in attendance have negative and significant impacts on wanting a graduate degree (4.5 percentage points less likely) and wanting to reenroll at the same institution given the initial choice over again (6.0 percentage points less likely). These outcomes are indicative of students who receive less enjoyment from school—perhaps the reason they took leave initially and less indicative of a causal effect of the break.

We additionally find that academic leave students are 0.022 points (on a 0–2 scale) more likely to report feeling overwhelmed during their senior year upon return. They also plan to work part-time by 3.8 percentage points more than those who did not. We find no statistically significant effects of voluntary academic leave on plans to work full-time, coursework relevance satisfaction,

12. This is the terminology used in the HERI surveys. We acknowledge that "well off" is a relative state across individuals. However, because the variable is capturing the change in this desire over college tenure, its relativity is less of a concern.

changes in general knowledge, the ability to think critically, the desires to have administrative responsibilities or be well off financially, entrepreneurial spirit, or GRE scores. Overall, the results here appear to be consistently negative. Much of the literature in the causes of breaks associates financial difficulties with their occurrence. Just because students are reenrolled doesn't necessarily mean these problems have been abated. Continued financial problems could account for portions of the results we see for these students. Regarding the other cuts of the data, impact estimates vary little in the samples that include extended-tenure students or exclude noncitizens. When those students who both intern and take a voluntary leave of absence are considered, however, the impacts are somewhat lessened. When possible, it seems that students should remain consistently enrolled in coursework to maximize their chances of collegiate success.

5. CONCLUSIONS AND POLICY IMPLICATIONS

College internships are regular occurrences among undergraduate college students and offer a view into the working world many students may not be able to obtain otherwise. Our results show there are also many notable improvements across collegiate outcomes for students who participate in these programs. The central educational policy implication of our findings regarding internships is that colleges and universities could benefit (in the form of improved student outcomes) from further promoting and increasing the number of these programs or, in the case of unfilled internship positions, encouraging more students to participate in them while not mandating their participation. Students who intern may have to withdraw from coursework for a semester, or are otherwise slowed in their progression toward a degree. Nevertheless, the academic and nonacademic benefits of internship participation may outweigh the cost of extended college tenure. Given our results, greater utilization of student internships could increase subsequent academic performance, graduate school enrollment rates, student satisfaction rates, and coursework retention. With recent trends toward skill-based and applied-college courses and curricula, our study confirms the importance of relevant work experience.

Regarding voluntary academic leave, the reverse is true. Our results show these types of breaks in college tenure have several negative effects on student outcomes. Students who choose to take a semester or year break in coursework are found to study less upon return to school and therefore receive lower grades and retain less. The implied policy implication here is that colleges and universities should discourage students from taking these breaks in college tenure. Perhaps an easy solution is having students meet with academic advisors more often who could encourage students to stay enrolled, or pairing

student-mentors with those at greater risk to withdraw. We find evidence of differences in specific pretreatment summary statistics that could potentially serve as (somewhat of) a guide for marginally attached students, who are at the most risk of taking academic leave. Notably, we find that students whose parents are separated or deceased, minorities, those from lower-income families, and nontraditional students (those who begin their college careers later in life) are more likely to take voluntary academic leave. Programs to address issues with financial hardship could be implemented—Johnson and Rochkind (2009) associated money issues with separation. Work study opportunities on campus, combined with having more of a campus attachment, may be viable. (See Stratton, O'Toole, and Wetzel 2008 for additional discussion of causes of college leave and dropout behavior and, more universally, Braxton, Shaw Sullivan, and Johnson 1997.)

Our analysis is not without shortcomings and further study on the effects of college internships and voluntary academic leave is needed. Although large, our sample is not necessarily nationally representative. Also, our sample of students who took voluntary academic leave is relatively small given national statistics. As previously mentioned, a shortage of quality data is likely the primary reason for the deficit of studies of academic leave; these students are difficult to identify and track. We advise our readers to take these data shortcomings into account when interpreting our results. However, our findings are largely intuitive lending credence to external validity.

There appear to be both good and bad types of breaks in college tenure. Occupational internship programs perhaps challenge students in new ways, strengthen their human capital, and increase focus on the ultimate goal of higher education—a good career. Though some students who voluntarily take a break from studies for reasons other than an internship program may also be engaging in activities that are worthwhile and/or career-related, these breaks, on average, are found to be harmful. We encourage students to consider the academic effects of these breaks before opting into them.

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APPENDIX: OLS RESULTS

Table A.1. The Impact of College Internships on Collegiate Outcomes (OLS Results)

Outcome	Preferred Sample (1)	Extended-Tenure Students Included (2i)	Leave Takers Included (3)	Non-Citizens Excluded (4)	Business Majors Excluded (5)
Senior year GPA difference[a]	0.068***	0.068***	0.067***	0.069***	0.060***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
GRE score	2.983	2.697	4.542	3.184	6.228
	(4.934)	(4.923)	(4.871)	(4.979)	(5.028)
	[2,122/5,299]	[2,214/5,547]	[2,203/5,299]	[1,389/4,404]	[1,928/4,808]
LSAT score	0.320	0.307	0.413	0.215	0.513
	(0.728)	(0.726)	(0.725)	(0.719)	(0.733)
	[1,112/2,507]	[1,112/3,093]	[1,137/2,507]	[775/2,158]	[924/2,080]
MCAT score	2.067***	2.140***	2.067***	1.990***	2.090***
	(0.628)	(0.625)	(0.609)	(0.630)	(0.632)
	[477/1,830]	[477/2,048]	[494/1,830]	[250/1,509]	[464/1,759]
GMAT score	−169.100***	−167.623***	−170.401***	−166.604***	−139.611***
	(20.811)	(20.790)	(20.710)	(21.460)	(22.820)
	[495/1,060]	[495/1,116]	[503/1,060]	[413/938]	[344/748]
Satisfaction: relevance of coursework[b]	0.224***	0.223***	0.220***	0.229***	0.224***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.012)
Would reenroll to this institution	0.020***	0.020***	0.017***	0.020***	0.019***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Wants a graduate degree	0.064***	0.064***	0.063***	0.065***	0.056***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Hours/week studying (senior year)	−0.244***	−0.241***	−0.231***	−0.263***	−0.227***
	(0.073)	(0.072)	(0.072)	(0.073)	(0.081)
Felt overwhelmed (senior year)[c]	0.015**	0.015**	0.017**	0.014*	0.013
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Immediate plans: full-time job	0.112***	0.110***	0.111***	0.110***	0.111***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.007)

Table A.1. Continued.

Outcome	Preferred Sample (1)	Extended-Tenure Students Included (2i)	Leave Takers Included (3)	Non-Citizens Excluded (4)	Business Majors Excluded (5)
Immediate plans: part-time job	−0.053***	−0.052***	−0.052***	−0.051***	−0.052***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Change: general knowledge[d]	0.070***	0.070***	0.071***	0.073***	0.065***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Change: knowledge of your particular field[d]	0.105***	0.105***	0.105***	0.107***	0.101***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Change: interpersonal skills[d]	0.127***	0.128***	0.126***	0.127***	0.121***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Change: ability to think critically[d]	0.090***	0.090***	0.089***	0.092***	0.081***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
Change: desire to have administrative responsibilities[d]	0.022*	0.023*	0.022*	0.020	0.033**
	(0.012)	(0.013)	(0.013)	(0.013)	(0.014)
Change: desire to be well off financially[d]	0.016	0.016	0.014	0.017	0.014
	(0.011)	(0.011)	(0.011)	(0.012)	(0.013)
Change: entrepreneurial spirit[d]	0.014	0.013	0.018	0.012	0.006
	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
N (treatment)	24,657	24,961	25,692	16,150	19,549
N (control)	67,731	68,182	67,731	53,742	54,980
N (total)	92,388	93,143	93,432	69,892	74,529

Notes: *N*s are different for the graduate school admission tests as not all students attempt these exams. Thus, these *N*s (treated/control) are in brackets.

[a]Student's senior year GPA minus the average senior year GPA at the institution attended.

[b]Variable is on a 1 to 4 increasing scale.

[c]Variable is on a 0 to 2 scale with 0 meaning "never," 1 "sometimes," and 2 "frequently."

[d]Variables are on −2 to +2 scales with −2 meaning "much weaker," −1 "weaker," 0 "no change," 1 "stronger," and 2 "much stronger."

*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

Table A.2. The Impact of Voluntary Academic Leave on Collegiate Outcomes (OLS Results)

Outcome	Preferred Sample (1)	Extended-Tenure Students Included (2)	Internship Takers Included (3)	Non-Citizens Excluded (4)
Senior year GPA difference[a]	−0.073***	−0.074***	−0.046***	−0.072***
	(0.013)	(0.013)	(0.011)	(0.013)
GRE score	26.470*	22.820	34.901***	24.292
	(15.932)	(15.670)	(13.253)	(39.384)
	[100/5,299]	[104/5,547]	[181/5,299]	[79/4,404]
Satisfaction: relevance of coursework[b]	−0.032	−0.039	−0.006	−0.035
	(0.030)	(0.029)	(0.026)	(0.030)
Would reenroll to this institution	−0.075***	−0.076***	−0.071***	−0.076***
	(0.013)	(0.013)	(0.012)	(0.013)
Wants a graduate degree	−0.041***	−0.036**	−0.019	−0.037**
	(0.016)	(0.015)	(0.014)	(0.016)
Hours/week studying (senior year)	−0.396**	−0.463**	−0.283*	−0.445**
	(0.188)	(0.182)	(0.167)	(0.191)
Felt overwhelmed (senior year)[c]	0.026	0.031*	0.042**	0.024
	(0.019)	(0.018)	(0.017)	(0.019)
Immediate plans: full-time job	0.017	0.022	0.037***	0.019
	(0.016)	(0.015)	(0.014)	(0.016)
Immediate plans: part-time job	0.030**	0.021	0.020*	0.029**
	(0.013)	(0.013)	(0.012)	(0.014)
Change: general knowledge[d]	0.009	0.011	0.027	0.008
	(0.019)	(0.018)	(0.017)	(0.019)
Change: knowledge of your particular field[d]	−0.023	−0.018	0.004	−0.021
	(0.018)	(0.017)	(0.016)	(0.018)
Change: interpersonal skills[d]	−0.072***	−0.070***	−0.031	0.066***
	(0.023)	(0.022)	(0.020)	(0.023)
Change: ability to think critically[d]	−0.016	−0.013	0.004	−0.011
	(0.020)	(0.020)	(0.018)	(0.021)
Change: desire to have administrative responsibilities[d]	−0.026	−0.021	−0.014	−0.024
	(0.033)	(0.032)	(0.029)	(0.034)
Change: desire to be well off financially[d]	0.021	0.020	0.005	0.029
	(0.030)	(0.029)	(0.026)	(0.030)
Change: entrepreneurial spirit[d]	0.043	0.047	0.062*	0.043
	(0.036)	(0.035)	(0.032)	(0.037)
N (treatment)	1,957	2,328	2,992	1,592
N (control)	67,731	68,182	67,731	53,742
N (total)	69,688	70,510	70,723	55,334

Notes: *N*s are different for the GRE as not all students attempt this exam. Thus, these *N*s (treated/control) are in brackets.
[a]Student's senior year GPA minus the average senior year GPA at the institution attended.
[b]Variable is on a 1 to 4 increasing scale.
[c]Variable is on a 0 to 2 scale with 0 meaning "never," 1 "sometimes," and 2 "frequently."
[d]Variables are on −2 to +2 scales with −2 meaning "much weaker," −1 "weaker," 0 "no change," 1 "stronger," and 2 "much stronger."
*$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.