A Trickle or a Torrent? Understanding the Extent of Summer "Melt" Among College-Intending High School Graduates*

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Objectives. The object of this study was to examine whether college-intending, low-income high school graduates are particularly susceptible to having their post-secondary education plans change, or even fall apart, during the summer after high school graduation. College access research has largely overlooked this time period. Yet, previous research indicates that a sizeable share of low-income students who had paid college deposits reconsidered where, and even whether, to enroll in the months following graduation. We assess the extent to which this phenomenon—commonly referred to as "summer melt"—is broadly generalizable. *Methods.* We employ two data sources, a national survey and administrative data from a large metropolitan area, and regression analysis to estimate the prevalence of summer melt. *Results.* Our analyses reveal summer melt rates of sizeable magnitude: ranging from 8 to 40 percent. *Conclusions.* Our results indicate that low-income, college-intending students experience high rates of summer attrition from the college pipeline. Given the goal of improving the flow of low-income students to and through college, it is imperative to investigate how to effectively intervene and mitigate summer melt.

The share of students enrolling in higher education in the United States has increased steadily in recent decades. Nevertheless, enrollment rates of low-income youth continue to lag behind those of their wealthier peers. Research seeking to explain these persistent—and widening—gaps has focused predominantly on student characteristics, academic preparation, and access to

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financial resources. College-choice research has examined students' decision making up to the point when they decide whether and where to enroll, while college-retention research has focused on students' college experiences upon matriculation at a particular institution. Yet, neither literature has considered thoroughly the importance of the summer between high school graduation and college matriculation in the transition to college.

For many reasons, however, low-income students' plans may be particularly vulnerable in the summer following high school graduation. During this period, many important tasks need to be completed to finalize college plans. For example, students may need to secure additional funds to cover gaps between the cost of attendance and the financial aid package they received. They also typically need to complete a range of paperwork for their intended institution: course registration, housing forms, and academic placement tests, among other requirements. Nevertheless, students often lack access to quality support and guidance; they are no longer part of their high school community and have yet to become active members of their intended college. This isolation from professional support may be particularly problematic for first-generation college-bound students, whose families and extended social networks may lack direct experience with the college process. Thus, when faced with a multitude of pressing requirements but without sufficient support or know-how to meet them, low-income students who have overcome many hurdles on the path to college may still falter in their collegiate ambitions.

Research to date indicates that the summer after high school graduation can pose considerable obstacles to the transition to college. However, the existing literature lacks broad generalizability, leaving open questions about the vulnerability of students' postsecondary plans. First, to what extent do college-intending students fail to matriculate in college in the fall after high school graduation? Second, to what extent do specific college plans change over the summer, even among those who enroll on time? Third, how do the answers to these questions vary by socioeconomic status (SES)? These questions—the focus of this article—are relevant to practitioners and policymakers seeking to improve college access, particularly for low-income students. If motivated, academically accomplished students are on track for college, only to have their plans fall apart in the summer after high school—a phenomenon to which we refer as *summer melt*—policymakers should consider additional interventions during this time period.

To address these gaps in the literature we capitalize on two complementary and nonoverlapping data sets to obtain more generalizable estimates of the extent of summer melt. The first is from uAspire, a nonprofit organization that delivers college financial aid and scholarship advising to Boston's public school students. From uAspire, we have records on where students intended to enroll as of high school graduation and where, if anywhere, they subsequently matriculated. While these data allow for the direct examination of summer melt, our inference is limited along two dimensions. First, the data pertain to a particular geographic region of the country. In addition, as we detail

below, students in the uAspire sample may not be representative even of college-intending students in the Boston public schools, as a whole.

To obtain national generalizability, we use the Educational Longitudinal Study of 2002 (ELS:2002). A limitation, however, is that ELS:2002 lacks information on where students intend to enroll. Therefore, we first isolate students whom we consider to be college intending and then construct for each student a final set of potential colleges, based on the institutions to which each student applied, was accepted, and submitted a financial aid application. While the ELS:2002 data do not allow us to observe students' specific college intentions at the time of high school graduation, we are still able to assess the degree to which college-considering students are able to realize their postsecondary plans and the extent to which failure to do so relates to student SES.

With both data sources, we focus on whether college-intending students enroll in the fall immediately after high school graduation. With the uAspire sample, in particular, students were clearly intent on immediate enrollment, as discussed below. From the student perspective, having to delay matriculation because of financial or informational barriers encountered during the summer months could be viewed as an inferior alternative even if students had the option to enroll at a later date. Descriptive research suggests that delayed enrollment is a significant risk factor for students dropping out of college before receiving a degree (Bradburn and Carroll, 2002; Horn, Cataldi, and Sikora, 2005). Therefore, it is relevant to investigate summer roadblocks that can prevent students from realizing their intentions to begin college immediately following high school.

Here, we preview our findings. We estimate that 22 percent of the lowest income, college-intending students in our uAspire sample failed to matriculate in college in the fall after high school graduation, compared to a somewhat lower melt rate of approximately 18 percent among all other students in our sample.[1] With the ELS:2002 data, we are able to incorporate additional student-level information and capitalize on a composite measure of SES. We find that the probability of summer melt is negatively associated with students' scores on a 10th grade cognitive test. Holding constant performance on the cognitive test, low-SES students remain more likely to melt than their higher SES peers. We estimate a summer melt rate of 15 percent for low-SES students of mean cognitive performance, compared with a melt rate of 10 percent for high-SES students of similar cognitive performance. Across data sources, our analyses point to a prevalence of summer melt that is surprisingly high, especially given that students in both samples have already overcome major hurdles to successful college enrollment.

[1]We define a student as low income if his expected family contribution (EFC) for the cost of college puts him within the range of eligibility for a Pell Grant. A Pell Grant is a federal need-based grant awarded to low-income students with the goal of promoting broad access to postsecondary education. We define the lowest income students as those with an EFC of zero, meaning their families were not expected to contribute to the cost of college.

We structure the remainder of the article as follows. In the second section, we review the existing college access theory and literature pertinent to an examination of summer melt. In the third section, we discuss our analytic samples, the measures we incorporate in our analyses, and the specific statistical models that we fit to the data. In the fourth section, we present our results. We conclude with a discussion of these results and implications for policy and research in final section.

Background and Context

The returns to a college degree are substantial (Adelman, 2004; Baum, Ma, and Payea, 2010; Mumper, 1996). Yet, higher income students have realized these benefits disproportionately. Even controlling for academic achievement, low-income students enroll in and complete college at significantly lower rates. By their mid-20s, differences in educational attainment are pronounced: only 7 percent of low-income youth attain a four-year degree by age 26, compared with 51 percent of the wealthiest quartile of students (Haveman and Smeeding, 2006). These differences have grown over time (Bailey and Dynarski, 2011)

Policymakers and educators have explored a variety of remedies for these gaps. A major focus has been on college affordability. For several decades, federal and state governments and higher education institutions have offered need-based grants and subsidized loans. The evidence on the effectiveness of such aid is mixed: while several studies failed to find a significant effect of the Pell Grant on college going (Kane, 1996; Manski and Wise, 1983; Turner, 1998), scholars found other means-tested aid to positively impact enrollment (Dynarski, 2003; Kane, 2003). A second approach has involved college preparatory programs—some starting as early as middle school—for disadvantaged youth. Yet, there is little evidence to show that these programs have had a positive impact on students' postsecondary outcomes (Gullatt and Jan, 2003). Policymakers have also sought to better align high school and college curricula. In California and Texas, for example, education officials have worked toward seamless transition between secondary and higher education (Hodgkinson, 1999; Venezia, Kirst, and Antonio, 2003). To date, however, there has been limited research to evaluate the impact of such alignment efforts on college outcomes.

Despite these efforts, educational policy and the college access literature have not emphasized the summer. Even the writing on college access programs (Swail and Perna, 2002; Tierney, 2002) does not explicitly consider the summer before students attend college. Rather, while there is frequently a push among college preparatory initiatives to "start early" by reaching out to elementary and middle school students, there is not a concurrent emphasis on "staying late," by continuing to support students after high school graduation (Arnold et al., 2009). This is surprising, given the literature linking socioeconomic achievement gaps and learning "fadeouts" over the summer

among younger children (Cooper et al., 1996; Entwisle, Alexander, and Olson, 1997).

Research has begun to highlight summer-specific barriers to timely college enrollment. Roderick et al. (2008) tracked students' progress through the stages of successful college enrollment. Of students who aspire to at least a four-year degree, 51 percent were accepted into a four-year college, but only 41 percent successfully enrolled the next fall. Given that students typically receive college acceptances toward the end of senior year, a 20 percent college attrition rate over the summer is quite striking. Additionally, low-income students often encounter unique obstacles that can alter or derail their college plans. Arnold et al. (2009) describe the summer as a "turbulent period" (2009:25) during which up to one-third of those who had been accepted into and paid deposits to attend college reconsidered where, and even whether, to enroll. During this period, students face a host of financial and informational barriers to enrollment, yet lack formal connections to institutions equipped to offer guidance and support through the final hurdles to matriculation. Thus, the summer after high school graduation may represent a critical but underexplored leak in the education pipeline.

While summer attrition has been largely overlooked by policymakers and the secondary education sector, it is not a new phenomenon to higher education practitioners. Rather, colleges and universities anticipate that some share of admitted and deposited students will delay enrollment or enroll elsewhere.[2] College-sponsored summer "bridge" programs have emerged to address this trend and to help underrepresented students transition to college (Kezar, 2000). While bridge programs have improved students' subsequent academic performance and persistence at individual colleges and universities (Ackermann, 1991; Buck, 1985; Garcia, 1991; Gold, 1992), in aggregate, they serve only a limited number of college-bound, low-income students. Therefore, policymakers may need to explore more broadly scalable solutions.

For example, through a pilot experimental study, Castleman, Arnold, and Wartman (2012) found that proactive college counseling in the months after high school graduation significantly improved the rate of immediate enrollment. Nevertheless, this study has limitations: it drew on a small sample and was conducted at a network of schools not representative of the typical public high school in the United States. In sum, before calling for broad-based responses to address summer melt, researchers and policymakers concerned with increasing college access among underrepresented populations must first understand its prevalence and magnitude.

Data, Measures, and Analytic Samples

We explore the phenomenon of summer melt using two distinct sources of information on high school graduates in the United States. The first allows

[2]In fact, while different from our use of the term, admissions officers refer to this phenomenon as "summer melt" (*How to Talk Like an Admissions Dean*, 2001).

us to investigate summer melt directly within a subset of graduates from the Boston public schools. With the second, we build on Roderick et al.'s (2008) analysis of the "potholes" that occur on the road to college at the end of senior year by generalizing to college-intending students nationwide. As with their analysis, we lack information on each student's intended institution as of the end of high school. In this section, we detail these data sources and our analytic samples.

Boston uAspire

Our first sample is a subset of applicants to the Last Dollar Scholarship (LDS) offered by uAspire, a Boston-based, nonprofit organization providing financial aid advising and scholarships to Boston public school students.[3] The goal of the LDS program is to partially defray financial need remaining after students have received complete financial aid packages, including federal, state, institutional, and other support. Eligible students are those who have met with a uAspire advisor during the academic year and submitted an LDS application, including a copy of their Student Aid Report, by mid-June. Applicants are highly college intending: they have completed high school, applied for financial aid, and applied for an additional scholarship. In the application, students declare the college at which they intended to matriculate in the fall.

uAspire facilitated linking LDS application records to college attendance information from the National Student Clearinghouse (NSC),[4] which provides semester-level information on whether and where students enrolled in college between high school completion and the end of the spring 2010 semester. Our sample includes students from the high school graduating classes of 2007, 2008, and 2009. The original data set included 2,840 student records. We considered a student as college intending if he declared a college of intent in his LDS application and, therefore, dropped 402 records missing college-of-intent information. We additionally dropped 63 records corresponding to students intending to enroll at institutions not represented in the NSC database. The majority of these were career and technical institutions. Finally, we dropped 514 cases that lacked information sufficient for assessing student socioeconomic status, a key predictor of interest. Our final analytic sample contains 1,861 students.[5]

[3]See <http://www.uaspire.org/> for more information about uAspire.

[4]The National Student Clearinghouse is a nonprofit organization that houses student degree and enrollment information for colleges and universities in the United States. At the time of our writing, approximately 3,500 colleges and universities participated in the NSC <www.studentclearinghouse.org>.

[5]Of those students who reported a college of intent but for whom financial information was incomplete, fewer than 50 percent enrolled in college in the fall after high school graduation. Because this enrollment rate is lower than in our remaining sample, this analytic decision leads to a more conservative estimate of the extent of summer melt.

In our uAspire analysis, we focused on two outcome variables. The first, *ENROLL*, is an indicator for whether a student enrolled in college in the fall after high school graduation. Our second outcome, *ENROLL_INT*, is an indicator for whether, conditional on on-time enrollment, a student enrolled in his intended institution. As noted above, this outcome is of interest as an additional means of assessing the vulnerability of students' plans. *ENROLL_INT* equals "1" for students who enrolled in their intended institution, "0" for students who enrolled in a different institution, and is undefined for those who did not enroll.

In addition to assessing summer melt overall, we investigate variability in melt by SES. Here, we use each student's expected family contribution (EFC) to the cost of college as a measure of SES.[6] Because EFC is highly skewed in our data, we created three categories: (1) EFC of zero, (2) EFC within the Pell-awardable range, and (3) EFC above the Pell-awardable range. We represent these categories with two dichotomous indicators, *EFC_pell* and *EFC_nonpell*, with EFC of zero as the reference category.[7] In the uAspire sample, 51 percent of students have an EFC of zero, and 29 percent are within the Pell-awardable range (Table 1).

A limitation of the uAspire data is that they do not include student demographic information. Therefore, the covariates that we examine are characteristics of students' intended postsecondary institutions. We consider whether an intended school was (1) a public or private institution, (2) a two-year or a four-year institution, and (3) was in-state versus out-of-state.[8] In our sample, 13 percent of students intended on a community college, 55 percent intended on a private, four-year institution, and 32 percent intended on a public, four-year institution (Table 1).

Education Longitudinal Study of 2002

The Education Longitudinal Study of 2002 (ELS:2002), conducted by the National Center for Education Statistics, tracks a nationally representative sample of students as they transition from high school into college and/or the labor market. Tenth grade students were interviewed in the spring of

[6]The formula utilized for calculating a student's EFC includes the family's income (taxed and untaxed), assets, benefits (included unemployment and Social Security), and the family's size and number of members engaged in postsecondary education in a given year <http://www.fafsa.ed.gov/help/fftoc01g.htm>. The complexity of the formula makes EFC less than an ideal measure of socioeconomic status. For example, two households that are similar in terms of income but different in terms of size or number of college students may differ in terms of EFC. Nevertheless, EFC is the best summary measure in the data available.

[7]We set the maximum EFC level according to the maximum EFC at which students can still be eligible for a Pell award, published in the Federal Pell Grant Payment and Disbursement Schedules released annually by the U.S. Department of Education. See, for example, <http://www.nasfaa.org/publications/2009/p0901.html>.

[8]Because in-state status of intended institution did not predict on-time matriculation, we do not discuss it further.

TABLE 1

Descriptive Statistics for the uAspire Analytic Sample, the ELS:2002 Analytic Sample, and the ELS:2002 Overall Sample

	uAspire Analytic Sample	
EFC of zero	0.51	
	(0.50)	
EFC within Pell-awardable range	0.29	
	(0.45)	
EFC above Pell-awardable range	0.20	
	(0.40)	
Intend on community college	0.13	
	(0.34)	
Intend on private, four-year institution	0.55	
	(0.50)	
Intend on public, four-year institution	0.32	
	(0.47)	
	ELS:2002 Analytic Sample	ELS:2002 Overall Sample
ELS composite SES measure	0.39	0.04
	(0.77)	(0.75)
ELS cognitive score	55.40	50.70
	(8.70)	(9.90)
Black	0.11	0.13
	(0.31)	(0.34)
White	0.64	0.56
	(0.48)	(0.50)
Hispanic	0.09	0.15
	(0.29)	(0.36)
Other race	0.16	0.16
	(0.37)	(0.36)
Female	0.56	0.50
	(0.50)	(0.50)

NOTES: Cell entries are mean and standard deviation, in parentheses. The uAspire analytic sample includes 1,861 observations. The ELS:2002 analytic sample includes 6,410 observations with the exception of the cognitive score variable, for which we have 6,380 observations. The ELS:2002 overall sample variables includes 16,200 observations with the exception of the cognitive score variable, for which we have 15,890 observations. All ELS:2002 sample sizes are rounded to the nearest 10, in compliance with ELS:2002 procedures regarding restricted-use data.
SOURCE: uAspire student data base; ELS:2002 restricted use data file.

2002, 2004, and most recently in the spring of 2006. In addition, ELS:2002 interviewed school staff and parents, collected high school transcripts, and compiled student records (e.g., financial aid records) from other federal data sources for each student. ELS:2002 includes rich demographic data and a wealth of information pertaining to college access. It documents students' college application process and postsecondary attainment. In particular, ELS:2002 reports the colleges to which students applied and were accepted

and which, if any, they attended through June 2006. From these data, we constructed a sample of students whom we define as "college intending" in the spring of their high school senior year. College-intending students were those who in the second wave of data collection were on-time high school graduates and applied and were accepted to at least one college or university. We consider FAFSA (Free Application for Federal Student Aid) completion to be an additional signal of college intent and therefore further restricted our sample to students who completed the FAFSA prior to June 30, 2004.[9] Given that the wealthiest of students may be college intending but may not need financial aid, we also included students in the highest income quartile who answered affirmatively to a survey question regarding plans to attend college immediately after high school.[10] These decision rules resulted in an analytic sample of 6,460 students, which was reduced to 6,410 during data cleaning.[11,12]

The primary outcome in the ELS data is *ENROLL*, an indicator for whether the student enrolled in college immediately following high school graduation. *ENROLL* equals "1" if, in the third wave of the ELS:2002 survey, the student indicated being enrolled in college in September 2004 (i.e., the beginning of the fall semester immediately following high school) and equals "0" otherwise. We are unable to isolate each student's intended postsecondary institution in the ELS:2002 data. Instead, we examine whether those who enroll on-time attend a "choice" school. Our definition of choice depended on FAFSA completion. If a student completed the FAFSA, a choice school is one to which he applied, sent a FAFSA, and was accepted. If a high-income student did not complete the FAFSA but signaled college intent, a choice school is one to which he applied and was accepted. Therefore, our second outcome variable *CHOICE_INST* indicates whether, of those who enrolled immediately, students attended one of their final choice set institutions. *CHOICE_INST* equals "1" for those who attended a choice set institution, "0" for those who did not attend a choice set institution, and is undefined for those who did not enroll.[13]

[9]We selected these dates to correspond to what would be the end of senior year of high school for most graduating students. Our logic is that the forward planning required to complete the FAFSA while still in high school signals a qualitatively stronger level of intent compared to students who complete the FAFSA after they graduate.

[10]Only 52 percent of students in the top SES quartile submitted a FAFSA. However, 97 percent respond positively to the question of whether they plan to attend college immediately following high school.

[11]To comply with ELS:2002 restricted-use data procedures, we round all sample sizes to the nearest 10.

[12]We dropped 30 cases that had missing or incorrect IPEDS school information and 20 cases for students who were enrolled in multiple institutions in the fall after high school graduation. For these 20 students, we were not able to disentangle which school was their institution of primary enrollment. Because multiply- enrolled students were such a small fraction of the sample as a whole, we deleted these cases in order to simplify our analyses.

[13]Because available FAFSA records capture information on up to six schools, this approach risks understating students' choice sets. However, we find that 95.2 percent of students in our sample are associated with (i.e., applied, were accepted to, attended) six or fewer postsecondary institutions.

To assess the relationship between summer melt and SES, we utilize a detailed composite of information about family income, parental educational attainment, and parental occupational prestige available in the restricted-use ELS:2002 data. We refer to this variable as *ELS_SES*.[14] We also consider basic features of students' demographic background, including race and gender. As a control for academic ability, we utilize *COG_SCORE,* a standardized composite score on a math and reading cognitive test administered in the 10th grade. In Table 1, we present descriptive statistics comparing our analytic sample to the overall ELS:2002 sample.[15] Not surprisingly, our analytic sample embodies characteristics of the traditional college-going population in the United States. Students in our sample tend to be wealthier and to have higher cognitive ability. In addition, they are more likely to be non-Hispanic white and female.

Data Analyses and Results

uAspire

With the uAspire data, we first explored whether low-SES, college-intending students were less likely to enroll in college in the fall after high school graduation. Second, among those who did enroll on time, we examined whether low-SES students were less likely to continue with their intended plans. To do so, we utilized linear probability models.[16] While the data did not consistently include information on high school of attendance, they did include information on graduation year. Therefore, we include fixed effects for cohort membership to account for yearly fluctuations in on-time matriculation rates, but we are unable to account for high school membership.[17] Our models take the following general form, for the *i*th student in the *j*th cohort:

$$Y_{ij} = \theta_j + \beta_1 EFC\_pell_{ij} + \beta_2 EFC\_nonpell_{ij} + \alpha X'_{ij} + \varepsilon_{ij},$$

where Y_{ij} generically represents the outcome of interest, θ_j is a fixed effect for cohort membership, and X'_{ij} is a vector of characteristics of the intended

[14]In the ELS:2002 data set, this variable is named F1SES2. Parental college attainment and parent occupational prestige are recorded in the senior year survey. Family income is recorded in the 10th grade survey.

[15]The ELS:2002 cognitive test assessed both content areas (e.g., algebra, geometry) and broader cognitive processes of comprehension and problem solving. The test questions were chosen from prior national surveys (e.g., NELS:88) and were primarily multiple choice. For additional information, see the ELS:2002 Base Year to Second Follow-Up data file documentation <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2008347>.

[16]We prefer linear probability models for ease of interpretation. Neither substantive conclusions nor conclusions regarding the statistical significance of parameter estimates differed when we fit models using logistic regression.

[17]Only the 2009 data include high school of attendance. In a separate analysis conducted only on these data (not presented here), we examined the impact on substantive conclusions of including fixed effects for high school membership. While parameter estimates were reduced somewhat, substantive conclusions and conclusions regarding the statistical significance of parameter estimates did not differ markedly.

postsecondary institution of student i in cohort j. Our interest focuses on β_1 and β_2. With respect to the first outcome, *ENROLL*, β_1 is the difference in the probability of on-time enrollment between students with an EFC within the Pell-awardable range and those with an EFC of zero. β_2 is the analogous difference comparing students with an EFC above the Pell-awardable range and those with an EFC of zero. With respect to *ENROLL_INT*, β_1 and β_2 are interpreted similarly, although they pertain to continuation to one's intended institution, conditional on on-time enrollment.

In Table 2, we present our primary results. We estimate that of students with an EFC of zero, 78 percent matriculate in the fall after high school graduation (Model 1). The on-time matriculation rate does not differ appreciably for those with EFCs in the Pell-awardable range but is 4.3 percentage points higher for students with EFCs above the Pell-awardable range ($p = 0.087$). Based on these results, we estimate a melt rate among the lowest SES students in our sample of approximately 22 percent. Differences by SES disappear, however, once we include characteristics of students' intended schools. These, not surprisingly, are correlated with student SES. For example, 17 percent of students with an EFC of zero compared to 8 percent of students with an EFC outside of the Pell-eligible range reported intentions to enroll in a two-year community college. In contrast, 63 percent of those in the highest EFC category compared to 50 percent of those in the lowest EFC category reported intentions to enroll in a four-year private institution. Models 2 and 3 illustrate the relationship between on-time enrollment and the characteristics of students' intended schools. For example, approximately 63 percent of students intending on a community college matriculate in the fall after high school graduation, compared to 81 percent of those intending on a four-year institution (Model 2). There is no appreciable difference by whether students intend on a public or private four-year institution (Models 3). In sum, nearly 40 percent of students intending on a community college and nearly 20 percent of students intending on a four-year institution fail to matriculate in the fall after high school graduation. These high rates of summer melt among applicants to the uAspire LDS program are surprising, given that we identify these students as highly college intending.

Among those who did enroll on time, approximately 94 percent of the lowest SES students continued with their originally reported plans, and we found no differences among students by level of EFC (Model 4). Results associated with Models 5 and 6 mirror those for Models 2 and 3. Among those who enroll on time, approximately 89 percent of those with community college intentions continue to their originally intended schools, while those intending on a four-year school were approximately 7 percentage points more likely to do so (Model 5). There was no difference by whether students intended on a public, four-year institution versus a private, four-year institution (Model 6). Thus, the postsecondary plans of students intending on two-year colleges are more vulnerable both in terms of realizing timely enrollment and in terms of realizing specific plans, even among those who do enroll.

TABLE 2

Linear Probability Models Predicting Postsecondary Enrollment Outcomes Among College-Intending Applicants to the uAspire Last Dollar Scholarship Program

	On-Time Enrollment			Enrollment in Intended Institution (Conditional on Enrollment)		
Outcome	M1	M2	M3	M4	M5	M6
EFC within Pell-awardable range	0.01	−0.002	−0.002	0.001	−0.002	−0.002
	(0.02)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)
EFC above Pell-awardable range	0.043∼	0.025	0.026	−0.007	−0.011	−0.011
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Intend on public institution		0.014			−0.003	
		(0.02)			(0.01)	
Intend on four-year institution		0.174***			0.069**	
		(0.03)			(0.02)	
Intend on four-year, public institution			0.175***			0.069**
			(0.03)			(0.02)
Intend on four-year, private institution			0.187***			0.072***
			(0.03)			−0.02
Intercept	0.780***	0.642***	0.628***	0.944***	0.886***	0.882***
	(0.01)	(0.03)	(0.03)	(0.01)	(0.02)	(0.02)
R^2	0.0015	0.024	0.024	0.0001	.0093	0.0092
N	1861	1861	1861	1473	1473	1473

∼$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.
NOTES: Standard errors in parentheses. All models include fixed effects for high school graduation cohort.
SOURCE: uAspire student database; National Student Clearinghouse.

ELS:2002

Using ELS:2002 data, we similarly explored whether low-SES, college-intending students had a higher probability of not actually enrolling in college in the fall after high school graduation, and/or not enrolling at one of their choice-set institutions. We again utilized linear probability models, here clustering standard errors to account for the grouping of students within high schools. Our models take the following general form, for the *i*th student:

$$Y_i = \beta_0 + \beta_1 \text{ELS\_SES}_i + \delta X_i' + \varepsilon_i,$$

where Y_i generically represents the outcome of interest, and X_i' is a vector of student-level covariates. With respect to both outcomes, *ENROLL* and *CHOICE_INST*, our focus is on β_1.

In Table 3, we present results exploring the relationship between SES and timely college enrollment. The relationship is positive and statistically significant; students from higher SES backgrounds have a higher probability of enrolling immediately in college (Model 1). This relationship persists upon controlling for gender and race/ethnicity (Model 2) and is diminished somewhat upon controlling additionally for students' cognitive scores (Model 3). While we tested for a possible interaction between SES and cognitive score, it was not statistically significant. The main effect of cognitive score is moderate: a 10-point difference in cognitive score is positively associated with a 6 percentage point difference in the probability of enrolling immediately in college, controlling for SES, race/ethnicity, and gender (Model 3). As a point of reference, the sample standard deviation for cognitive score is 8.70. In sum, even after controlling for cognitive scores and other demographic factors, low-income students are more susceptible to summer melt than their higher income peers.

In Models 4–6, we examine the relationship between SES and attending a choice-set institution, among students who enrolled immediately. As with *ENROLL,* the relationship between attending a choice-set institution and SES is positive and statistically significant; higher SES students have a higher probability of attending a choice-set institution, among all students who enrolled immediately (Model 6). The relationship is modestly smaller after controlling for gender and race/ethnicity (Model 7) and smaller still after controlling for cognitive score (Model 8). Among those who enroll immediately, the probability of attending a choice-set institution is high, even for low-SES, low-cognitive- score students. Across the distribution of cognitive scores, however, high-SES students remain more likely to attend a choice-set institution than low-SES students. Taken together, these results again indicate the greater vulnerability of the college plans of lower income students, even after accounting for cognitive performance.

TABLE 3

Linear Probability Model Predicting College Enrollment Outcomes Among College-Intending High School Seniors in the ELS:2002

	On-Time Enrollment			Enrollment in a Choice-Set Institution (Conditional on Enrollment)		
Outcome	M1	M2	M3	M4	M5	M6
ELS composite SES measure	0.052***	0.044***	0.022**	0.031***	0.028***	0.016*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Female		0.030**	0.033**		0.015	0.017∼
		(0.01)	(0.01)		(0.01)	(0.01)
Black		−0.53**	−0.007		−0.035∼	−0.011
		(0.02)	(0.02)		(0.02)	(0.02)
Hispanic		−0.063**	−0.036∼		−0.020	0.006
		(0.02)	(0.02)		(0.02)	(0.02)
Other race		−0.014	−0.002		−0.030∼	−0.025
		(0.02)	(0.02)		(0.02)	(0.02)
ELS cognitive score			0.061***			0.031***
			(0.01)			(0.01)
Intercept	0.873**	0.872***	0.531***	0.897***	0.898***	0.722***
	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)	(0.04)
R^2	0.016	0.023	0.046	0.006	0.009	0.016
N	6310	6310	6280	5680	5680	5650

∼$p < 0.10$;*$p < 0.05$;**$p < 0.01$;***$p < 0.001$.
NOTES: Standard errors in parentheses.
SOURCE: ELS:2002 restricted use data file.

Discussion

To date, college access literature has focused little attention on the months between high school graduation and college matriculation. We address this gap by exploring the extent to which college-intending high school graduates are susceptible to having their postsecondary plans change, or even fall apart, in the months after high school completion. Our results indicate a high prevalence of summer melt, despite focusing on students identified as highly college intending. With the uAspire sample, we estimate a summer melt rate of 22 percent among lower SES students and of 18 percent among comparatively wealthier students. With the ELS data, we estimate a summer melt rate of approximately 15 percent among lower SES students of mean cognitive performance and 10 percent among high-SES students of mean cognitive performance.

We consider two possible explanations for the higher rate of summer melt in the uAspire sample. First, the ELS students are wealthier, on average, than those in the uAspire sample, all of whom are graduates of an urban public school system and applicants to a scholarship program designed to defray financial need remaining after receiving financial aid. Approximately 80 percent of the uAspire sample has an EFC of zero or within the Pell-awardable range. Of those in the ELS who completed the FAFSA, approximately 42 percent had EFCs within these ranges. To the extent that lower SES students' college plans are particularly vulnerable, we would expect a higher rate of melt in the uAspire sample. Second, an inclusion criterion in the ELS analysis was applying and being accepted to at least one college or university. Given this, we may have excluded students who intended to matriculate in a community college to which they did not need to apply during high school. Our uAspire results suggest that the plans of community-college-intending students are particularly vulnerable. Specifically, we estimate a melt rate of nearly 40 percent among community-college-intending students. If this result is generalizable to high school seniors with community college intentions, exclusion of these students from the ELS analysis would also result in lower estimates of the extent of summer melt.

Despite these modest differences, the overall finding remains: a substantial share of college-intending high school graduates fail to matriculate immediately in college. Moreover, the immediate college plans of lower income students are more vulnerable. While some of those who do not matriculate on time do enroll eventually, this is not nearly the case for all students we examine.[18] Further, although community-college-intending students make up only 13 percent of our uAspire sample, the melt rate of 40 percent among them is itself noteworthy. In 2008, over one-quarter of traditional-aged

[18]In the ELS:2002 sample, 48 percent of students in the first SES quartile who did not enroll immediately eventually enrolled. This compares with a figure of 71 percent for students in the top SES quartile.

college students and over one-third of the college-going population attended a community college.[19] Given this significant share and the Obama administration's focus on community colleges for domestic workforce development, it is critical to attend to those students with community-college aspirations.

Together, our results indicate that low-income, college-intending students are particularly vulnerable to summer attrition from the college pipeline. Therefore, it is imperative to investigate how to effectively mitigate summer melt. A previous experimental study suggests that summer intervention can have large and positive effects on immediate enrollment, but this research is limited in its generalizability (Castleman, Arnold, and Wartman, 2012). Further research is needed to understand effective means of increasing college enrollment among low-income, college-intending students. From a policy perspective and in the context of strained federal and state budgets, such targeted focus may prove particularly fruitful. In the 2009–2010 academic year alone, the federal government spent almost $30 billion and state governments approximately $6 billion on need-based grant aid. Yet, in the wake of the financial crisis, these grant programs are being discussed for budget cuts at both the federal and state level. Therefore, it is increasingly important to identify high-impact, low-cost approaches to increasing college access for low-income students. For several reasons, post-high-school summer intervention may be one such policy: the target population is well defined; the time period is finite and distinctly bounded; students are intent on pursuing higher education and have already met key benchmarks in the college-going process. By providing assistance with obstacles that arise over the summer, policymakers can prevent 11th-hour attrition from a population already primed for college.

A question that remains unanswered relates to the types of support that would be most beneficial. In Castleman Arnold, and Wartman's (2012) experimental study, 47 percent of recorded interactions between students and counselors dealt with financial issues, and 31 percent dealt with students needing help communicating with a college or university. These areas of need were echoed anecdotally by uAspire staff who noted several summer-specific hurdles to timely matriculation: difficulty in registering for classes and completing other requisite paperwork (such as loan paperwork or a master promissory note); trouble paying the first college bill; and inability to pay additional fees such as those associated with health insurance. A second question relates to potential options for delivering such support. Having high school counselors provide support and guidance during the summer months is one approach. During this time period, students are confronted with pressing decisions and tasks that have a direct impact on timely enrollment.

[19]Authors' calculation using data from the Current Population Survey (U.S. Census Bureau). Table A-7. College Enrollment of Students 14 Years Old and Over, by Type of College, Attendance Status, Age, and Gender: October 1970 to 2008 <http://www.census.gov/population/www/socdemo/school.html>. Retrieved on January 21, 2011.

A logical response would be to extend the contracts of college/transition counselors to include the summer. Counselors can provide assistance with summer financial aid issues and can help facilitate necessary communications with colleges and universities. Another promising avenue is online social networking. Emerging research suggests that students begin participating in their intended college's Facebook community well before high school graduation and that Facebook interactions are an increasingly central component of students' college social experience (Martinez-Aleman and Wartman, 2009). Therefore, colleges could reach out, via Facebook, to students who paid deposits. By engaging with and helping students to meet deadlines and resolve issues that arise over the summer, students would be more likely to matriculate in the fall.

In sum, while the summer after high school graduation represents a largely unexamined stage of college access, summer melt is surprisingly prevalent. We document a high summer melt rate overall and persistent differences in on-time enrollment of college-intending students by socioeconomic status, even after controlling for demographic and academic factors. Our findings point to the potential importance of providing college-focused supports particularly to low-income students during the summer. The goal of improving the flow of low-income students to and through college necessitates further examination of this crucial time period.

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