

## Summer Enrollment and Student Success

### Introduction

College students enroll in summer courses for a number of reasons, to include an anticipated shorter time to graduation, to graduate on time by repeating failed courses, boost grade point average (GPA), smaller class sizes with more personal attention, lightening course load for future semesters, and a more focused learning environment. The purpose of this investigation is to determine if summer enrollment at CSU impacts student success, as defined by graduation and persistence to students' second fall term, while accounting for APP index, Pell eligibility, minority status, participation in Key, gender, and first generation status.

### Analysis Plan

Cohorts starting in 2008 through 2012 were utilized for the following analyses to maximize the potential for graduation (up to 6 years), given students' starting term. Descriptive statistics can be found in Table 1 of the Appendix.

Logistic regression was used to determine if timing of summer enrollment impacts graduation and retention by the following APP index ranges: <101 (Very Low), 101-110 (Low), 111-116 (Average), 117-124 (Above Average), and  $\geq 125$  (High Achieving). Logistic regression is useful in estimating the relationship between a binary outcome and other indicators of interest; relationships are expressed in an odds ratio, i.e., a one-unit increase in summer enrollment results in an x-amount increase (or decrease) in the odds of the binary outcome occurring. In this analysis, the primary relationship of interest is between graduation (binary outcome) and summer enrollment, while also estimating the impact of other important indicators: minority status, first-generation status, APP Index, gender, Key participation, previous spring end of term GPA, and Pell eligibility. In each analysis, the sample was limited to those students who persisted to the spring term prior to the summer term of interest.

### Results

Summer enrollment had an overall positive influence on 6-year graduation rates, despite these students taking an additional term to graduate as compared to their non-summer enrolling peers. The impact of timing of summer enrollment on graduation did differ across APP index categories. For complete logistic regression results by APP group, see Tables 2-6 in the Appendix.

**Odds Ratios for 6 Year Graduation by APP Index and Timing of Summer Enrollment**

Summer Session	APP Index Category				
	Very Low (<101)	Low (101-110)	Average (111-116)	Above Average (117-124)	High Achieving (125+)
First Summer	1.19	<b>1.27*</b>	<b>1.47*</b>	<b>1.34*</b>	1.15
Second Summer	<b>2.16*</b>	<b>1.46*</b>	<b>1.56*</b>	<b>2.16*</b>	<b>1.56*</b>
Third Summer	<b>1.61*</b>	<b>1.52*</b>	<b>1.73*</b>	<b>1.80*</b>	1.16

\* $p < .05$

## Key Findings

- First summer enrollment significantly increased the odds of graduation for students in the Low, Average, and Above Average groups.
- Second summer enrollment was beneficial for all students across APP categories.
- Third summer was beneficial for all groups except for High Achievers.
- If students in the Very Low group were able to persist to their second spring, subsequent summer enrollment significantly increased the odds of graduation.
- First generation status, minority status, and Pell eligibility significantly decreased graduation odds; however, the degree to which these indicators influenced graduation by APP category varied over time (see Tables 2-5 in the Appendix).
- Previous spring term GPA is by far the largest predictor of graduation across all APP indexes.

## Appendix

**Table 1.** Descriptive statistics for all students in Cohorts 2008-2012 who persisted to their second fall.

Indicator	<i>M</i>	<i>SD</i>	N
Total enrolled summer terms	0.66	0.93	21748
Key participation*	0.08	0.27	21748
Graduation status*	0.68	0.47	21748
Terms to graduation	12.15	2.00	14807
Any summer enrollment*	0.41	0.49	21748
Pell eligible*	0.20	0.40	21748
Male*	0.44	0.50	21748
APP Index	114.41	11.36	21535
Minority Status*	0.17	0.37	21748
First generation status*	0.25	0.43	21748
First summer enrolled*	0.10	0.30	21743
Second summer enrolled*	0.24	0.43	21736
Third summer enrolled*	0.28	0.45	21730
First fall GPA	2.83	0.84	21093
First spring GPA	2.84	0.83	20428
Second fall GPA	2.87	0.83	18084
Second spring GPA	2.94	0.79	17186
Third fall GPA	2.98	0.80	15959
Third spring GPA	3.05	0.78	15325
Fourth fall GPA	3.09	0.77	15203
Fourth spring GPA	3.17	0.75	14334

*M*=Mean; *SD*=Standard Deviation; N=sample size.

\*Indicates binary variable; mean is interpreted as the proportion of students who meet the specified criteria.

**Table 2.** Logistic regression results for Very Low APP group with graduation as the outcome.

Persistence							
Point	Predictor	<i>M</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	Odds Ratio
Spring 1	First summer enrolled	0.13	.175	.144	.028	.222	1.19
	Pell eligible	0.24	-.141	.115	-.029	.219	0.87
	Male	0.49	-.020	.090	-.005	.833	0.98
	Minority	0.23	-.220	.118	-.045	.063	0.80
	First generation	0.30	-.372	.105	-.082	.000*	0.69
	Key	0.10	.220	.167	.031	.188	1.25
	Spring 1 GPA	2.44	1.19	.067	.463	.000*	3.30
Spring 2	Second summer enrolled	0.31	.770	.139	.169	.000*	2.16
	Pell eligible	0.23	-.159	.147	-.032	.279	0.85
	Male	0.49	-.105	.120	-.025	.379	0.90
	Minority	0.23	-.277	.152	-.055	.068	0.70
	First generation	0.28	-.176	.136	-.038	.193	0.84
	Key	0.10	.108	.198	.016	.584	1.11
	Spring 2 GPA	2.60	1.27	.085	.455	.000*	3.55
Spring 3	Third summer enrolled	0.46	.478	.167	.108	.004*	1.61
	Pell eligible	0.23	-.247	.195	-.047	.085	0.78
	Male	0.50	-.244	.164	-.060	.019*	0.78
	Minority	0.23	-.377	.201	-.071	.004*	0.69
	First generation	0.28	-.129	.185	-.026	.413	0.88
	Key	0.10	-.064	.255	.009	.824	0.94
	Spring 3 GPA	2.70	1.55	0.113	0.53	.000*	4.71

\**p*<.05*M*=Mean; *B*=unstandardized beta coefficient; *SE*=standard error;  $\beta$ =standardized beta coefficient

**Table 3.** Logistic regression results for the Low APP group with graduation as the outcome.

Persistence							
Point	Predictor	<i>M</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	Odds Ratio
Spring 1	First summer enrolled	0.10	.239	.102	.035	.020*	1.27
	Pell eligible	0.23	-.034	.077	-.007	.654	0.97
	Male	0.49	-.002	.079	-.001	.973	1.00
	Minority	0.20	-.264	.079	-.052	.001*	0.77
	First generation	0.28	-.421	.069	-.094	.000*	0.66
	Key	0.10	.288	.110	.042	.009*	1.33
	Spring 1 GPA	2.58	1.073	.042	.419	.000*	2.92
Spring 2	Second summer enrolled	0.28	.380	.095	.082	.000*	1.46
	Pell eligible	0.22	.044	.093	.009	.670	1.05
	Male	0.49	-.118	.082	-.028	.150	0.89
	Minority	0.20	-.324	.103	-.062	.002*	0.72
	First generation	0.27	-.379	.084	-.070	.000*	0.72
	Key	0.10	.376	.144	.055	.009*	1.46
	Spring 2 GPA	2.72	1.25	0.055	0.459	.000*	3.49
Spring 3	Third summer enrolled	0.42	.408	.114	.091	.000*	1.52
	Pell eligible	0.22	.098	.138	.018	.480	1.10
	Male	0.50	-.111	.111	-.025	.314	0.90
	Minority	0.20	-.363	.136	-.065	.007*	0.70
	First generation	0.27	-.452	.193	-.090	.000*	0.64
	Key	0.10	.418	.193	.057	.026*	1.52
	Spring 3 GPA	2.83	1.57	.071	.545	.000*	4.81

\**p*<.05*M*=Mean; *B*=unstandardized beta coefficient; *SE*=standard error;  $\beta$ =standardized beta coefficient

**Table 4.** Logistic regression results for the Average APP group with graduation as the outcome.

Persistence Point	Predictor	<i>M</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	Odds Ratio
Spring 1	First summer enrolled	0.09	.383	.151	.054	.011*	1.47
	Pell eligible	0.20	-.326	.106	-.064	.002*	0.72
	Male	0.48	-.021	.086	-.005	.806	0.98
	Minority	0.15	-.303	.118	-.087	.010*	0.74
	First generation	0.25	-.009	.101	-.002	.926	0.99
	Key	0.08	-.101	.156	-.013	.517	0.90
	Spring 1 GPA	2.78	1.19	.059	.457	.000*	3.28
Spring 2	Second summer enrolled	0.29	1.44	.076	.092	.000*	1.56
	Pell eligible	0.20	-.372	.413	-.069	.009*	0.69
	Male	0.47	-.176	.117	.040	.134	0.84
	Minority	0.14	-.199	.161	-.032	.215	0.82
	First generation	0.24	.041	.139	.008	.769	1.04
	Key	0.08	-.010	.206	-.001	.962	0.99
	Spring 2 GPA	2.86	1.44	.076	.518	.000*	4.22
Spring 3	Third summer enrolled	0.40	.549	.164	.121	.001*	1.73
	Pell eligible	0.20	-.373	.185	-.067	.045*	0.69
	Male	0.47	-.143	.155	-.032	.358	0.87
	Minority	0.14	-.320	.178	-.050	.753	0.73
	First generation	0.24	.056	.178	.011	.753	1.06
	Key	0.08	.058	.278	.007	.833	1.06
	Spring 3 GPA	2.97	1.59	.094	.549	.000*	4.92

\**p*<.05*M*=Mean; *B*=unstandardized beta coefficient; *SE*=standard error;  $\beta$ =standardized beta coefficient

**Table 5.** Logistic regression results for the Above Average APP group with graduation as the outcome.

Persistence Point	Predictor	<i>M</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	Odds Ratio
Spring 1	First summer enrolled	0.10	.289	.138	.028	.000*	1.34
	Pell eligible	0.20	-.187	.138	-.065	.036*	0.83
	Male	0.42	.072	.082	.018	.383	1.08
	Minority	0.16	-.017	.110	-.018	.876	0.98
	First generation	0.24	-.308	.093	-.065	.001*	0.74
	Key	0.09	-.140	.141	-.019	.322	0.87
	Spring 1 GPA	2.95	1.11	.053	.433	.000*	3.04
Spring 2	Second summer enrolled	0.30	.749	.131	.164	.000*	2.16
	Pell eligible	0.19	-.213	.135	-.040	.113	0.81
	Male	0.42	-.191	.109	-.045	.079	0.83
	Minority	0.15	-.006	.148	-.001	.968	0.99
	First generation	0.23	-.288	.125	-.058	.021*	0.75
	Key	0.09	.203	.201	.027	.313	1.23
	Spring 2 GPA	3.03	1.26	.067	.457	.000*	3.54
Spring 3	Third summer enrolled	0.36	.589	.165	.130	.000*	1.80
	Pell eligible	0.19	-.303	.185	-.054	.102	0.74
	Male	0.41	-.318	.150	-.072	.034*	0.73
	Minority	0.15	-.166	.205	-.027	.417	0.85
	First generation	0.22	.003	.179	.001	.985	1.00
	Key	0.08	.111	.287	.014	.699	1.12
	Spring 3 GPA	3.15	1.54	.085	.515	.000*	4.68

\**p*<.05*M*=Mean; *B*=unstandardized beta coefficient; *SE*=standard error;  $\beta$ =standardized beta coefficient

**Table 6.** Logistic regression results for the High Achieving APP group with graduation as the outcome.

Persistence Point	Predictor	<i>M</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>p</i>	Odds Ratio
Spring 1	First summer enrolled	0.10	.141	.141	.021	.328	1.15
	Pell eligible	0.15	-.217	.112	-.039	.053	0.81
	Male	0.37	.122	.087	.030	.161	1.13
	Minority	0.11	-.129	.126	-.020	.308	0.88
	First generation	0.16	-.318	.107	-.059	.003*	0.73
	Key	0.04	.031	.206	.003	.881	1.03
	Spring 1 GPA	3.32	1.18	.058	.400	.000*	3.24
Spring 2	Second summer enrolled	0.30	.444	.134	.100	.001*	1.56
	Pell eligible	0.15	-.200	.155	-.035	.196	0.82
	Male	0.37	-.037	.118	-.009	.755	0.96
	Minority	0.11	-.241	.172	-.037	.162	0.79
	First generation	0.15	-.259	.150	-.046	.085	0.77
	Key	0.04	.688	.342	.069	.044*	1.99
	Spring 2 GPA	3.34	1.31	.072	.427	.000*	3.70
Spring 3	Third summer enrolled	0.30	.146	.174	.032	.402	1.16
	Pell eligible	0.14	-.348	.208	-.058	.094	0.71
	Male	0.37	-.199	.161	-.152	.215	0.82
	Minority	0.11	-.339	.233	-.051	.146	0.71
	First generation	0.15	-.123	.205	-.021	.547	0.88
	Key	0.04	.837	.495	.081	.091	2.31
	Spring 3 GPA	3.41	1.50	.088	.474	.000*	4.50

\**p*<.05*M*=Mean; *B*=unstandardized beta coefficient; *SE*=standard error;  $\beta$ =standardized beta coefficient