

Assessment of Effectiveness of Student Support Programs

1. Introduction

1.1 Purpose of the study

Student Support Programs (SSP) consists of five supporting programs: the Educational Opportunity Program (EOP), College Assistance Migrant Program (CAMP), University Migrant Services (UMS), Summer Bridge, and Student Support Services Program. The purpose of this study is to determine if the SSP programs have a positive impact on students' performance in terms of retention and graduation rates.

1.2 Dataset and methods

The Total of 7042 First-time full-time freshmen (FTFTF) who entered in fall 2003, 2004 and 2005 are included in the analysis. These students' SSP experience is measured through two variables: SSP participation status and SSP participation amount.

SSP participation status classifies all students into two groups. The group of SSP students includes students who participated in at least one of five support programs at their entering terms. The group of Others includes students who never participated in any of the five support programs.

SSP participation amount is the number of SSP programs in which a student participated. The group of "0" includes students who never participated in any of the five support programs. The group of "1" includes students who participated in only one of the five support programs at their entering terms. And the group of "2+" includes students who participated in two or more of the five support programs at their entering terms.

The data on students' demographics (gender, ethnicity, URM status, First generation status (FGS) and Pell Grant eligibility status) and academic preparation (HS GPA, SAT scores and English and Math remediation status) are also included in the analysis.

Descriptive statistics are used to identify SSP students' characteristics and performance and logistic regression models are used to determine the effects of SSP when statistically controlling for demographics and academic preparation.

2. Major findings

The following is the major findings based on three-cohort combined data.

2.1 Characteristics of SSP students (Table 1, Appendix I)

Demographic characteristics: Compared to students who did not participate in SSP, SSP students are more likely to be Female (69.4% VS 58.1%), First generation students (96.0% VS 58.0%), and to be eligible to apply for Pell Grant (90.0% VS 37.1%). Also, SSP students are more likely to be under-

represented minority students (62.2% VS 33.2%). Particularly, the majority of SSP students are Hispanic (54.8% VS 25.2%).

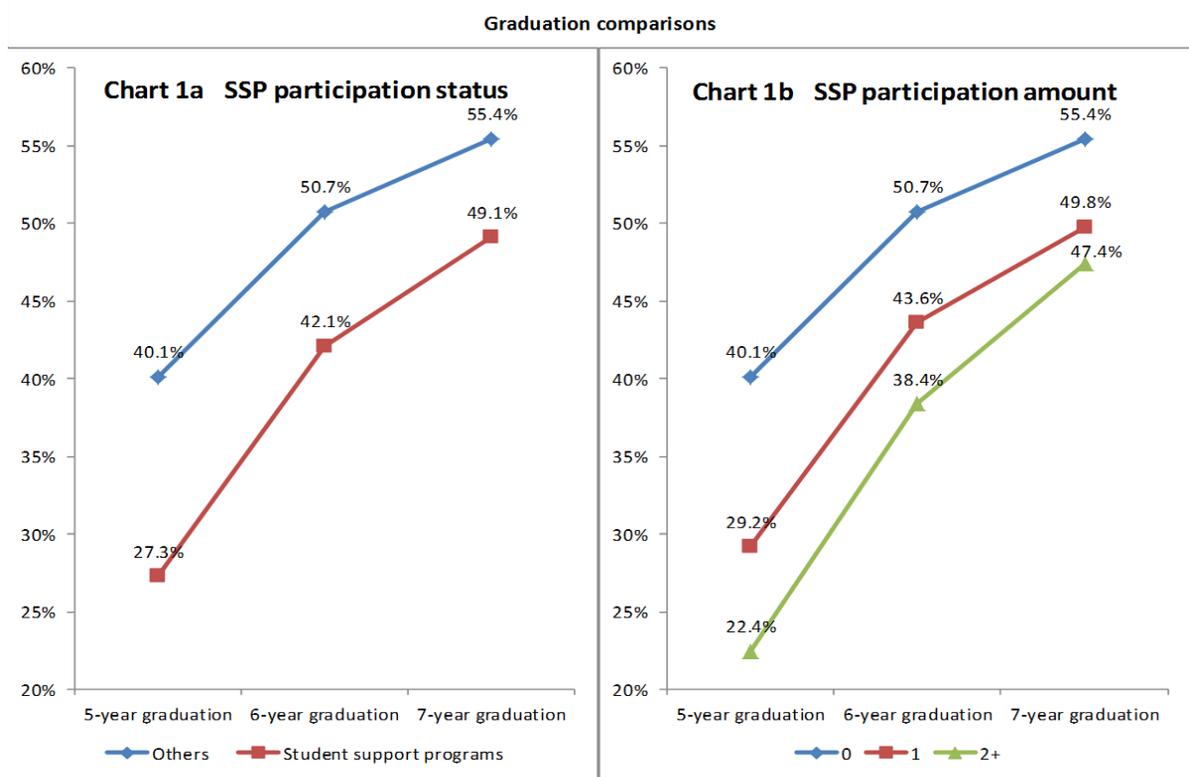
Academic preparation: Compared to students who did not participate in SSP, SSP students have lower HS GPA and SAT score, and are more likely to need English or Math remediation.

Students who participated in multiple SSP programs: Among three groups of SSP participation amount, Students who participated in multiple SSP programs are more likely to be URM and to be eligible to apply for Pell Grant. Also they have the lowest HS GPA, SAT score and are more likely to need English or Math remediation.

2.2 Performance of SSP students (Table 2, Appendix I)

Retention: Compared to students who did not participate in SSP, SSP students are more likely to retain after the 1st year (86.4% VS 83.3%), the 2nd year (74.8% VS 72.9%), the 3rd year (68.4% VS 66.0%), and the 4th year (55.8% VS 46.4%).

Graduation: Compared to students who did not participate in SSP, SSP students are less likely to graduate with a bachelor’s degree within 5 years (27.3% VS 40.1%), 6 years (42.1% VS 50.7%), and 7 years (49.1% VS 55.4%). However, the gap between both groups from the 5-year rate to the 7-year is decreasing (See Chart 1a below). The gap narrowed from 12.8% for the 5 year graduation rate to 6.3% for the 7 year graduation rate.



We further conducted controlled comparisons on the graduation rate by only including students who meet all five criteria: Underrepresented Minority (URM), First-Generation Students (FGS), Eligibility for Pell Grant, and Needing both English and Math Remediation. Of these students, SSP students have higher graduation rates than students who did not participate in any SSP programs even through SSP students have lower HS GPA and SAT scores (See the table below).

Table 1 Controlled comparison on graduation*

		HC	Academic preparation		Graduation rates				
			Avg. HS GPA	Avg. SAT_COMP	5 years	6 years	7 years	8 years	9 years
Three cohorts combined	Others	423	3.17	800	21.7%	34.3%	40.9%		
	SSP students	439	2.98	745	23.7%	38.0%	45.6%		
Fall 2003	Others	116	3.12	797	25.0%	32.8%	41.4%	43.1%	46.6%
	SSP students	117	2.97	720	21.4%	34.2%	43.6%	48.7%	48.7%
Fall 2004	Others	144	3.19	796	21.5%	31.9%	39.6%	41.0%	
	SSP students	145	3.06	753	26.2%	38.6%	42.1%	46.2%	
Fall 2005	Others	163	3.19	805	19.6%	37.4%	41.7%		
	SSP students	177	2.94	755	23.2%	40.1%	49.7%		

* Only includes FTFTF who have the following characteristics: 1) Being URM, FGS, Pell Grant eligible. 2) Requiring English and Math remediation.

Students who participated in multiple SSP programs: As demonstrated in Chart 1b above, students who participated in multiple SSP programs have the lowest graduation rates among the three types of SSP participation. However, the difference in graduation rates between them appears to be narrowing over time.

2.3 Effects of SSP participation

To determine the effects of SSP participation, the binary logistic regression models are applied when statistically controlling other factors' influences in the models as covariates. The dependent variable (DV) is retention or graduation status (0 = Not retained/not graduate, and 1 = Retained/Graduated). The independent variable (IV) of interest is SSP participation status/amount. The models also included the following controlling variables: Gender, URM status, FGS status, Pell Grant eligibility status, HS GPA, English and Math remediation status. The estimated odds ratio, EXP(B), is used to determine the effect of SSP participation. That the estimated EXP(B) is larger than one means that SSP participation status has a positive effect on retention and graduation. Appendix II includes the detailed results of fitting logistic regression models on retention and graduation rates for the three cohorts combined (The detailed results for three cohorts separately are available upon request).

SSP participation status (See Table 2 below)

Retention: The estimated odds ratio is 1.927 for the 1st year retention, 1.652 for the 2nd year retention, 1.677 for the 3rd year retention and 1.448 for the 4th year retention. In other words, compared to students who did not participate in any SSP programs, SSP participants are

significantly more likely to retain after the 1st-year/ 2nd year/3rd year/ 4th year when statistically controlling the influences of other factors (demographics and academic preparation) in the models.

Table 2 Estimated odds ratio of EXP(B) for SSP participation status

	Retention				Graduation				
	1st year	2nd year	3rd year	4th year	5 years	6 years	7 years	8 years	9 years
SSP participation status (SSP students compared to students who didn't participate in SSP, which is the reference group)									
Three cohorts combined	1.927***	1.652***	1.677***	1.448***	1.109	1.331***	1.382***		
Fall 2003	2.037***	1.621**	1.688***	1.324**	1.121	1.185	1.214	1.241	1.224
Fall 2004	2.187***	1.897***	1.829***	1.599***	1.041	1.307*	1.292*	1.373**	
Fall 2005	1.793***	1.544**	1.586**	1.487**	1.168	1.506**	1.681***		

Note: *** P-value <0.001, ** P-value <0.05 and * P-value <0.1.

Graduation: The estimated odds ratio is 1.109 for the 5-year graduation (which is not statistically significant), 1.331 for the 6-year graduation, 1.382 for the 7-year graduation. In other words, compared to students who did not participate in any SSP programs, SSP participants are significantly more likely to graduate within 6 years and 7 years when statistically controlling the influences of other factors (demographics and academic preparation) in the models.

SSP participation amount (See Table 3 below)

Retention: Compared to students who did not participate in any SSP programs, SSP students who participated both in only one SSP program and in two or more SSP programs are significantly more likely to retain after the 1st-year/ 2nd year/3rd year/ 4th year when statistically controlling the influences of other factors (demographics and academic preparation) in the models.

Furthermore, the estimated odd ratios for SSP students who participated in two or more SSP programs are larger than for SSP students who participated in only one SSP program (1.740 VS 1.618 for the 2nd year retention 1.776 VS 1.640 for the 3rd year retention, 1.468 VS 1.441 for the 4th year retention), which may imply that participating in more SSP programs will increase the likelihood of retention after the 2nd, 3rd and 4th year.

Table 3 Estimated odds ratio of EXP(B) for SSP participation amount

		Retention				Graduation				
		1st year	2nd year	3rd year	4th year	5 years	6 years	7 years	8 years	9 years
SSP participation amount (SSP students compared to students who didn't participate in SSP, which is the reference group)										
Three cohorts combined	Participated in one SSP program	1.958***	1.618***	1.640***	1.441***	1.137	1.325**	1.333**		
	Participated in two or more SSP programs	1.855***	1.740***	1.776***	1.468**	1.026	1.348**	1.523**		
Fall 2003	Participated in one SSP program	2.482***	1.494**	1.608**	1.320*	1.142	1.079	1.084	1.149	1.139
	Participated in two or more SSP programs	1.532*	1.894**	1.856**	1.330	1.072	1.438*	1.527**	1.449*	1.416*
Fall 2004	Participated in one SSP program	2.370***	2.007***	2.022***	1.727***	1.070	1.387**	1.390**	1.468**	
	Participated in two or more SSP programs	1.812*	1.644*	1.416	1.283	0.952	1.092	1.043	1.133	
Fall 2005	Participated in one SSP program	1.637**	1.494**	1.441**	1.380**	1.187	1.486**	1.533**		
	Participated in two or more SSP programs	2.447**	1.711**	2.179**	1.923**	1.098	1.577**	2.284***		

Note: *** P-value <0.001, ** P-value <0.05 and * P-value <0.1.

Graduation: Compared to students who did not participate in any SSP programs, SSP students who participated both in only one SSP program and in two or more SSP programs are significantly more likely to graduate within 6 years and 7 years when statistically controlling the influences of other factors (demographics and academic preparation) in the models.

Furthermore, the estimated odd ratios for SSP students who participated in two or more SSP programs are larger than for SSP students who participated in only one SSP program (1.348 VS 1.325 for 6-year graduation, 1.523 VS 1.333 for 7-year graduation). This may imply that participating in more SSP programs will increase the likelihood of graduation within 6 years, particularly in 7 year.

It is worth noting that the same procedures are also run for three cohorts separately. The pattern is clear that in all cases, the estimated odd ratios are larger than 1.0 even through many of them are not statistically significant.

3. Conclusion

The results show SSP programs significantly improve students' retention and graduation rates. Students who participate in SSP programs are more likely to retain after their 1st year, 2nd year, 3rd year and 4th year. Furthermore, SSP programs students are more likely than students who are not in SSP programs to graduate with a bachelor's degree within 6 years and 7 years. (The effect size of participating in SSP programs on 7 year graduation rate is slightly larger than the effect size on 6 year graduation rate.)

Like students who participate in only one SSP program, students who participate in two or more SSP programs are more likely to retain and graduate than students who did not participate in any SSP programs. The effect size of participating in multiple SSP programs is slightly larger than that of participating in one SSP program except for 1st year retention and 5 year graduation, which may imply that for students who are at-risk the most (or for the most disadvantageous students), participating in more SSP programs tends to keep them more engaged which would increase the chance for academic success in the long term.

Appendix

Appendix I: Descriptive statistics

Appendix II: Results of fitting logistic regression models on retention and graduation

Appendix III: Summer Bridge report

Table 1 Students' characteristics* (FTTF cohorts)

* Under-represented minorities (URM) include African American, American Indian, Hispanic, Native Hawaiians or Pacific Islanders. First generation students (FGS) are students whose parent(s) doesn't have a 4-year degree or higher. Pell grant eligible students include students who are eligible to apply for Pell grants.

Table 1a SSP participation status

The classification of two student groups is based on students' participation status. The group of student support programs includes students who participated in at least one of five support programs (CAMP, EOP, SSSP, UMS or Summer Bridge) at their entering terms. The group of Others includes students who never participated in any of five support programs.

Demographics-I								Demographics-II (Ethnicity)								Academic preparation									
		HC	Female %	URM %	FGS %	Pell eligibility %	Special admission %			African American	American Indian	Asian	Pacific Islander	Hispa..	White	Other/Unknwn	Non-Resident Alien	Grand Total			Avg. HS GPA	SAT_COMP	Avg. remediation %	Eng remediation %	Math remediation %
Fall 2003	Others	2,064	59.0%	31.4%	58.7%	38.2%	4.5%	Fall 2003	Others	6.5%	0.8%	13.1%	0.5%	23.6%	43.7%	10.4%	1.4%	100.0%	Fall 2003	Others	3.34	980	35.6%	45.0%	
	Student support progr..	404	68.8%	60.9%	96.2%	92.3%	38.9%		Student support p..	8.7%		26.0%	0.5%	51.7%	3.5%	5.0%	4.7%	100.0%		Student support programs	3.13	781	65.8%	70.0%	
Fall 2004	Others	1,853	57.6%	32.0%	56.9%	35.7%	2.9%	Fall 2004	Others	5.9%	0.5%	14.7%	0.6%	24.9%	44.7%	7.9%	0.7%	100.0%	Fall 2004	Others	3.37	989	54.7%	48.4%	
	Student support progr..	378	72.5%	61.4%	97.0%	89.9%	36.2%		Student support p..	5.8%		28.6%	0.8%	54.8%	2.6%	2.1%	5.3%	100.0%		Student support programs	3.17	793	87.8%	79.1%	
Fall 2005	Others	1,885	57.7%	36.2%	58.4%	37.2%	3.4%	Fall 2005	Others	7.7%	0.8%	15.3%	0.3%	27.3%	40.9%	6.4%	1.2%	100.0%	Fall 2005	Others	3.31	974	54.5%	48.1%	
	Student support progr..	458	67.2%	64.0%	95.1%	88.0%	37.8%		Student support p..	6.3%		24.7%	0.2%	57.4%	3.1%	1.3%	7.0%	100.0%		Student support programs	3.09	812	88.2%	73.6%	
Overall	Others	5,802	58.1%	33.2%	58.0%	37.1%	3.6%	Overall	Others	6.7%	0.7%	14.3%	0.5%	25.2%	43.1%	8.3%	1.1%	100.0%	Overall	Others	3.34	981	47.9%	47.1%	
	Student support programs	1,240	69.4%	62.2%	96.0%	90.0%	37.7%		Student sup..	6.9%		26.3%	0.5%	54.8%	3.1%	2.7%	5.7%	100.0%		Student support programs	3.13	796	80.8%	74.1%	

Table 1b SSP participation amount

The classification of three student groups is based on the number of Student Support Programs in which a student participated. The group of "0" includes students who never participated in any of five support programs (CAMP, EOP, SSSP, UMS or Summer Bridge). The group of "1" includes students who participated in only one of five support programs at their entering terms. And the group of "2+" includes students who participated in two or more of five support programs at their entering terms.

Demographics-I								Demographics-II (Ethnicity)								Academic preparation									
		HC	Female %	URM %	FGS %	Pell eligibility %	Special admission %			African American	American Indian	Asian	Pacific Islander	Hispa..	White	Other/Unknwn	Non-Resident Alien	Grand Total			Avg. HS GPA	SAT_COMP	Avg. remediation %	Eng remediation %	Math remediation %
Fall 2003	0	2,064	59.0%	31.4%	58.7%	38.2%	4.5%	Fall 2003	0	6.5%	0.8%	13.1%	0.5%	23.6%	43.7%	10.4%	1.4%	100.0%	Fall 2003	0	3.34	980	35.6%	45.0%	
	1	262	71.8%	56.5%	96.3%	89.7%	32.4%		1	5.0%		29.0%	0.4%	51.1%	3.8%	3.8%	6.9%	100.0%		1	3.20	797	62.2%	67.6%	
	2+	142	63.4%	69.0%	96.1%	97.2%	50.7%		2+	15.5%		20.4%	0.7%	52.8%	2.8%	7.0%	0.7%	100.0%		2+	3.01	752	72.5%	74.6%	
Fall 2004	0	1,853	57.6%	32.0%	56.9%	35.7%	2.9%	Fall 2004	0	5.9%	0.5%	14.7%	0.6%	24.9%	44.7%	7.9%	0.7%	100.0%	Fall 2004	0	3.37	989	54.7%	48.4%	
	1	279	73.8%	59.1%	96.6%	87.1%	31.9%		1	3.6%		29.0%	0.4%	55.2%	2.5%	2.2%	7.2%	100.0%		1	3.20	807	86.4%	75.6%	
	2+	99	68.7%	67.7%	98.0%	98.0%	48.5%		2+	12.1%		27.3%	2.0%	53.5%	3.0%	2.0%		100.0%		2+	3.09	753	91.9%	88.9%	
Fall 2005	0	1,885	57.7%	36.2%	58.4%	37.2%	3.4%	Fall 2005	0	7.7%	0.8%	15.3%	0.3%	27.3%	40.9%	6.4%	1.2%	100.0%	Fall 2005	0	3.31	974	54.5%	48.1%	
	1	347	68.3%	63.1%	94.8%	84.7%	32.6%		1	4.0%		22.5%		59.1%	3.7%	1.7%	8.9%	100.0%		1	3.13	830	86.7%	67.1%	
	2+	111	64.0%	66.7%	96.2%	98.2%	54.1%		2+	13.5%		31.5%	0.9%	52.3%	0.9%		0.9%	100.0%		2+	2.96	756	92.8%	93.7%	
Overall	0	5,802	58.1%	33.2%	58.0%	37.1%	3.6%	Overall	0	6.7%	0.7%	14.3%	0.5%	25.2%	43.1%	8.3%	1.1%	100.0%	Overall	0	3.34	981	47.9%	47.1%	
	1	888	71.1%	59.9%	95.8%	86.9%	32.3%		1	4.2%		26.5%	0.2%	55.5%	3.4%	2.5%	7.8%	100.0%		1	3.17	813	79.4%	69.9%	
	2+	352	65.1%	67.9%	96.7%	97.7%	51.1%		2+	13.9%		25.9%	1.1%	52.8%	2.3%	3.4%	0.6%	100.0%		2+	3.01	754	84.4%	84.7%	

Table 2 Retention and graduation (FTFTF cohorts)

Table 2a SSP participation status

The classification of two student groups is based on students' participation status. The group of students support programs includes students who participated in at least one of five support programs (CAMP, EOP, SSSP, UMS or Summer Bridge) at their entering terms. The group of Others includes students who never participated in any of five support programs.

		HC	1st-year retention	2nd-year retention	3rd-year retention	4th-year retention	4-year graduation	5-year graduation	6-year graduation	Continuing rates aft..	7-year graduation	8-year graduation	9-year graduation
Fall 2003	Others	2,064	82.9%	72.5%	64.9%	46.2%	15.6%	38.9%	49.6%	9.0%	54.3%	56.4%	57.8%
	Student support programs	404	88.1%	75.2%	68.3%	54.7%	7.4%	26.7%	38.9%	13.6%	46.5%	49.3%	51.0%
Fall 2004	Others	1,853	84.9%	72.9%	66.7%	46.0%	18.7%	41.7%	51.9%	9.0%	56.7%	59.0%	
	Student support programs	378	89.4%	78.3%	72.2%	58.2%	8.2%	28.8%	43.9%	15.3%	49.7%	53.4%	
Fall 2005	Others	1,885	82.1%	73.3%	66.6%	47.2%	15.3%	39.9%	50.9%	9.1%	55.5%		
	Student support programs	458	82.3%	71.4%	65.3%	54.8%	7.4%	26.4%	43.4%	13.8%	50.9%		
Overall	Others	5,802	83.3%	72.9%	66.0%	46.4%	16.5%	40.1%	50.7%	9.0%	55.4%	57.6%	57.8%
	Student support programs	1,240	86.4%	74.8%	68.4%	55.8%	7.7%	27.3%	42.1%	14.2%	49.1%	51.3%	51.0%

Note: The overall 9-year graduation rate is for Fall 2003 cohort only. The overall 8-year graduation rate is for Fall 2003 and 2004 cohorts.

Table 2b SSP participation amount

The classification of three student groups is based on the number of Student Support Programs in which a student participated. The group of "0" includes students who never participated in any of five support programs (CAMP, EOP, SSSP, UMS or Summer Bridge). The group of "1" includes students who participated in only one of five support programs at their entering terms. And the group of "2+" includes students who participated in two or more of five support programs at their entering terms.

		HC	1st-year retention	2nd-year retention	3rd-year retention	4th-year retention	4-year graduation	5-year graduation	6-year graduation	Continuing rates after 6th yr	7-year graduation	8-year graduation	9-year graduation
Fall 2003	0	2,064	82.9%	72.5%	64.9%	46.2%	15.6%	38.9%	49.6%	9.0%	54.3%	56.4%	57.8%
	1	262	90.5%	74.8%	69.1%	54.6%	8.0%	29.4%	39.3%	13.7%	46.6%	50.0%	51.9%
	2+	142	83.8%	76.1%	66.9%	54.9%	6.3%	21.8%	38.0%	13.4%	46.5%	47.9%	49.3%
Fall 2004	0	1,853	84.9%	72.9%	66.7%	46.0%	18.7%	41.7%	51.9%	9.0%	56.7%	59.0%	
	1	279	90.3%	79.9%	74.6%	59.9%	9.0%	30.1%	46.2%	16.5%	52.3%	55.9%	
	2+	99	86.9%	73.7%	65.7%	53.5%	6.1%	25.3%	37.4%	12.1%	42.4%	46.5%	
Fall 2005	0	1,885	82.1%	73.3%	66.6%	47.2%	15.3%	39.9%	50.9%	9.1%	55.5%		
	1	347	81.6%	71.8%	64.0%	53.0%	8.1%	28.2%	44.7%	11.5%	50.1%		
	2+	111	84.7%	70.3%	69.4%	60.4%	5.4%	20.7%	39.6%	20.7%	53.2%		
Overall	0	5,802	83.3%	72.9%	66.0%	46.4%	16.5%	40.1%	50.7%	9.0%	55.4%	57.6%	57.8%
	1	888	86.9%	75.2%	68.8%	55.6%	8.3%	29.2%	43.6%	13.7%	49.8%	53.0%	51.9%
	2+	352	84.9%	73.6%	67.3%	56.3%	6.0%	22.4%	38.4%	15.3%	47.4%	47.3%	49.3%

Note: The overall 9-year graduation rate is for Fall 2003 cohort only. The overall 8-year graduation rate is for Fall 2003 and 2004 cohorts.

Table 1 Results of fitting logistic regression models on retention and graduation for SSP participation status

	Retention																Graduation												
	1st-year Retention				2nd-year Retention				3rd-year Retention				4th-year Retention				Graduated in 5 years				Graduated in 6 years				Graduated in 7 years				
	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	
SSP participation status (Students who didn't participate in any SSP programs as reference group)																													
SSP students	.656	.105	.000	1.927	.502	.086	.000	1.652	.517	.080	.000	1.677	.370	.074	.000	1.448	.103	.084	.220	1.109	.286	.078	.000	1.331	.324	.077	.000	1.382	
Controlling variables																													
Gender (Male as the reference group)	.083	.072	.245	1.087	.076	.060	.205	1.079	.040	.057	.484	1.040	-.169	.053	.001	.844	.291	.058	.000	1.338	.222	.056	.000	1.248	.168	.055	.002	1.183	
URM (Non-URM as the reference group)	-.061	.073	.405	.941	.075	.062	.226	1.078	.162	.059	.006	1.176	.177	.055	.001	1.193	-.090	.060	.135	.914	-.034	.057	.549	0.966	-.044	.057	.443	0.957	
FGS (Non-FGS as the reference group)	-.372	.084	.000	.689	-.245	.070	.000	.782	-.245	.065	.000	.783	-.098	.060	.105	.907	-.371	.064	.000	.690	-.373	.063	.000	.689	-.333	.063	.000	.716	
PELL (Not eligible students as the reference group)	-.103	.080	.198	.902	-.168	.068	.013	.845	-.195	.064	.002	.823	.030	.060	.620	1.030	-.373	.065	.000	.689	-.305	.062	.000	.737	-.268	.062	.000	.765	
HS GPA	.935	.083	.000	2.546	1.002	.070	.000	2.725	.979	.066	.000	2.663	.380	.060	.000	1.462	1.198	.067	.000	3.312	1.317	.066	.000	3.730	1.291	.065	.000	3.636	
English remediation (Non-Rem students as the reference group)	.028	.077	.717	1.028	.020	.065	.752	1.021	.005	.061	.929	1.005	.226	.057	.000	1.254	-.229	.061	.000	0.796	-.063	.059	.283	0.939	-.032	.059	.588	0.969	
Math remediation (Non-Rem students as the reference group)	-.117	.078	.134	.890	-.195	.065	.003	.823	-.169	.061	.006	.845	.037	.058	.521	1.038	-.250	.062	.000	.779	-.225	.060	.000	.798	-.185	.060	.002	.831	
Constant	-1.175	.281	.000	.309	-2.086	.239	.000	.124	-2.364	.226	.000	.094	-1.463	.210	.000	.232	-4.010	.236	.000	.018	-4.025	.227	.000	.018	-3.763	.225	.000	.023	
Omnibus Tests of Model	Chi-square	211.779				315.334				337.341				101.382				826.667				781.350				690.911			
Coefficients	df	8				8				8				8				8				8				8			
	Sig.	.000				.000				.000				.000				.000				.000				.000			
Model Summary	-2 Log likelihood	5696.663				7419.912				8157.519				9098.487				7989.782				8428.072				8474.607			
	Cox & Snell R Square	.031				.046				.049				.015				.117				.111				.099			
	Nagelkerke R Square	.053				.067				.069				.020				.159				.148				.132			
Hosmer and Lemeshow	Chi-square	8.149				4.934				5.362				9.704				4.536				7.349				4.790			
Test	df	8				8				8				8				8				8				8			
	Sig.	.419				.765				.718				.286				.806				.500				.780			

Technical note:

Binary logistic regression models are applied to test the effect of SSP participation on retention and graduation. The dependent variable (DV) is retention or graduation status (0 = Not retained/not graduate, and 1 = Retained/Graduated). The independent variable (IV) of interest is SSP participation status (0=Not participate and 1= Participated). To isolate the effect of SSP participation status from other factors' influences, the following variables are also included in the models as control variables: Gender, URM status, FGS status, Pell grant eligibility status, HS GPA, English and Math remediation status. The estimated odds ratio, EXP(B) highlighted in the table above, is used to determine the effect of SSP participation status. That the estimated EXP(B) is larger than one means that SSP participation status has a positive effect on retention and graduation.

Table 2 Results of fitting logistic regression models on retention and graduation for SSP participation amount

	Retention																Graduation															
	1st-year Retention				2nd-year Retention				3rd-year Retention				4th-year Retention				Graduated in 5 years				Graduated in 6 years				Graduated in 7 years							
	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)	B	S.E.	Sig.	Exp(B)				
SSP participation amount (Students who didn't participate in any SSP programs as the reference group)																																
Students who participated only one SSP program	.672	.119	.000	1.958	.481	.096	.000	1.618	.495	.090	.000	1.640	.365	.082	.000	1.441	.128	.093	.166	1.137	.281	.087	.001	1.325	.288	.086	.001	1.333				
Students who participated two or more SSP programs	.618	.166	.000	1.855	.554	.138	.000	1.740	.574	.131	.000	1.776	.384	.122	.002	1.468	.026	.148	.862	1.026	.299	.130	.022	1.348	.421	.127	.001	1.523				
Controlling variables																																
Gender (Male as the reference group)	.083	.072	.248	1.086	.077	.060	.201	1.080	.040	.057	.476	1.041	-.169	.053	.001	.845	.290	.058	.000	1.337	.222	-.056	.000	1.248	-.170	.055	.002	1.185				
URM (Non-URM as the reference group)	-.061	.073	.408	.941	.075	.062	.229	1.078	.162	.059	.006	1.175	.177	.055	.001	1.193	-.090	.060	.136	.914	-.034	.057	.548	0.966	-.044	.057	.438	0.957				
FGS (Non-FGS as the reference group)	-.373	.084	.000	.689	-.245	.070	.000	.783	-.244	.065	.000	.783	-.097	.060	.106	.907	-.371	.064	.000	.690	-.373	.063	.000	.689	-.332	.063	.000	.717				
PELL (Not eligible students as the reference group)	-.102	.080	.202	.903	-.170	.068	.013	.844	-.196	.064	.002	.822	.029	.060	.624	1.030	-.371	.065	.000	.690	-.305	.063	.000	.737	-.271	.062	.000	.763				
HS GPA	.934	.083	.000	2.544	1.004	.070	.000	2.729	.981	.066	.000	2.667	.380	.060	.000	1.462	1.196	.067	.000	3.306	1.317	.066	.000	3.732	1.294	.065	.000	3.647				
English remediation (Non-Rem students as the reference group)	.028	.077	.720	1.028	.021	.065	.747	1.021	.006	.061	.923	1.006	.227	.057	.000	1.254	-.229	.061	.000	0.795	-.063	.059	.283	0.939	-.031	.059	.597	0.969				
Math remediation (Non-Rem students as the reference group)	-.116	.078	.137	.891	-.196	.065	.003	.822	-.170	.061	.006	.843	.037	.058	.525	1.037	-.248	.062	.000	.780	-.226	.060	.000	.798	-.188	.060	.002	.829				
Constant	-1.172	.281	.000	.310	-2.091	.239	.000	.124	-2.368	.226	.000	.094	-1.464	.210	.000	.231	-4.004	.236	.000	.018	-4.026	.228	.000	.018	-3.772	.225	.000	.023				
Omnibus Tests of Model Coefficients	Chi-square 211.863				315.564				337.651				101.406				827.367				781.365				691.850							
	df 9				9				9				9				9				9				9							
	Sig. .000				.000				.000				.000				.000				.000				.000							
Model Summary	-2 Log likelihood 5696.579				7419.683				8157.209				9098.467				7989.367				8428.057				8473.668							
	Cox & Snell R Square .031				.046				.050				.015				.117				.111				.099							
	Nagelkerke R Square .053				.067				.069				.020				.159				.148				.132							
Hosmer and Lemeshow Test	Chi-square 11.243				4.660				6.456				10.552				7.740				5.904				3.758							
	df 8				8				8				8				8				8											
	Sig. .189				.793				.596				.228				.459				.658				.878							

Technical note: Binary logistic regression models are applied to test the effect of SSP participation on retention and graduation. The dependent variable (DV) is retention or graduation status (0 = Not retained/not graduate, and 1 = Retained/Graduated). The independent variable (IV) of interest is SSP participation amount which is the total number of SSP programs in which a student participated (0=Not participate any, 1= Participated in only one, and 2=Participated in two or more). To isolate the effect of SSP participation amount from other factors' influences, the following variables are also included in the models as control variables: Gender, URM status, FGS status, Pell grant eligibility status, HS GPA, English and Math remediation status. The estimated odds ratio, EXP(B) highlighted in the table above, is used to determine the effect of SSP participation amount. That the estimated EXP(B) is larger than one means that SSP participation amount has a positive effect on retention and graduation.

Table 1 Students' characteristics* (FTFTF cohorts)

* Under-represented minorities (URM) include African American, American Indian, Hispanic, Native Hawaiians or Pacific Islanders. First generation students (FGS) are students whose parent(s) doesn't have a 4-year degree or higher. Pell grant eligible students include students who are eligible to apply for Pell grants.

Note: The classification of two student groups is based on students' participation status. The group of Summer Bridge includes students who participated in Summer Bridge program at their entering terms. The group of Others includes students who never participated in any of five support programs.

Demographics-I								Demographics-II (Ethnicity)								Academic preparation									
		HC	Female %	URM %	FGS %	Pell eligibility %	Special admission %			African American	American Indian	Asian	Pacific Islander	Hispa..	White	Other/Unkwn	Non-Resident Alien	Grand Total			Avg. HS GPA	SAT_COM P	Avg. remediation %	Eng remediation %	Math remediation %
Fall 2003	Others	2,064	59.0%	31.4%	58.7%	38.2%	4.5%	Fall 2003	Others	6.5%	0.8%	13.1%	0.5%	23.6%	43.7%	10.4%	1.4%	100.0%	Fall 2003	Others	3.34	980	35.6%	45.0%	
	Summer Bridge	136	61.8%	69.9%	95.9%	97.1%	52.9%		Summer Bri..	16.2%		19.1%	0.7%	52.9%	2.9%	7.4%	0.7%	100.0%		Summer Bridge	2.98	751	73.5%	76.5%	
Fall 2004	Others	1,853	57.6%	32.0%	56.9%	35.7%	2.9%	Fall 2004	Others	5.9%	0.5%	14.7%	0.6%	24.9%	44.7%	7.9%	0.7%	100.0%	Fall 2004	Others	3.37	989	54.7%	48.4%	
	Summer Bridge	92	67.4%	68.5%	97.8%	97.8%	51.1%		Summer Bri..	13.0%		26.1%	2.2%	53.3%	3.3%	2.2%		100.0%		Summer Bridge	3.07	756	91.3%	90.2%	
Fall 2005	Others	1,885	57.7%	36.2%	58.4%	37.2%	3.4%	Fall 2005	Others	7.7%	0.8%	15.3%	0.3%	27.3%	40.9%	6.4%	1.2%	100.0%	Fall 2005	Others	3.31	974	54.5%	48.1%	
	Summer Bridge	92	60.9%	66.3%	97.7%	98.9%	60.9%		Summer Bri..	16.3%		33.7%	1.1%	48.9%				100.0%		Summer Bridge	2.92	752	92.4%	98.9%	
Overall	Others	5,802	58.1%	33.2%	58.0%	37.1%	3.6%	Overall	Others	6.7%	0.7%	14.3%	0.5%	25.2%	43.1%	8.3%	1.1%	100.0%	Overall	Others	3.34	981	47.9%	47.1%	
	Summer Bridge	320	63.1%	68.4%	97.0%	97.8%	54.7%		Summer Bri..	15.3%		25.3%	1.3%	51.9%	2.2%	3.8%	0.3%	100.0%		Summer Bridge	2.99	753	84.1%	86.9%	

Table 2 Retention and graduation (FTFTF cohorts)

		HC	1st-year retention	2nd-year retention	3rd-year retention	4th-year retention	4-year graduation	5-year graduation	6-year graduation	Continuing rates after 6th yr	7-year graduation	8-year graduation	9-year graduation
Fall 2003	Summer Bridge	136	83.1%	75.0%	66.9%	55.9%	5.9%	19.9%	36.8%	13.2%	45.6%	47.1%	48.5%
	Others	2,064	82.9%	72.5%	64.9%	46.2%	15.6%	38.9%	49.6%	9.0%	54.3%	56.4%	57.8%
Fall 2004	Summer Bridge	92	87.0%	73.9%	65.2%	52.2%	6.5%	26.1%	38.0%	10.9%	42.4%	45.7%	
	Others	1,853	84.9%	72.9%	66.7%	46.0%	18.7%	41.7%	51.9%	9.0%	56.7%	59.0%	
Fall 2005	Summer Bridge	92	83.7%	68.5%	68.5%	57.6%	6.5%	19.6%	35.9%	21.7%	51.1%		
	Others	1,885	82.1%	73.3%	66.6%	47.2%	15.3%	39.9%	50.9%	9.1%	55.5%		
Overall	Others	5,802	83.3%	72.9%	66.0%	46.4%	16.5%	40.1%	50.7%	9.0%	55.4%	57.6%	57.8%
	Summer Bridge	320	84.4%	72.8%	66.9%	55.3%	6.3%	21.6%	36.9%	15.0%	46.3%	46.5%	48.5%

Note: The overall 9-year graduation rate is for Fall 2003 cohort only. The overall 8-year graduation rate is for Fall 2003 and 2004 cohorts.

**Table 2 Academic performance across terms
(FTTF cohorts)**

		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	
Fall 2003	HC enrolled by the end of terms	Others	2,031	1,906	1,685	1,591	1,459	1,416	1,319	1,262	936	747	404	300
		Summer Bridge	135	127	110	106	99	93	89	85	73	63	42	34
	Avg. Term GPA	Others	2.81	2.71	2.75	2.71	2.76	2.79	2.88	2.91	2.85	2.79	2.63	2.66
		Summer Bridge	2.72	2.30	2.38	2.30	2.40	2.56	2.51	2.60	2.56	2.30	2.63	2.70
	Avg. Cumulative GPA	Others	2.81	2.79	2.86	2.87	2.89	2.90	2.93	2.94	2.86	2.81	2.67	2.66
		Summer Bridge	2.75	2.59	2.66	2.59	2.59	2.63	2.64	2.65	2.63	2.59	2.62	2.62
	Avg. Cumulative Units Earned	Others	15	27	41	55	69	82	97	110	117	125	123	129
		Summer Bridge	16	27	38	49	62	73	85	97	108	118	128	136
	Avg. Term Units Enrolled	Others	13	14	14	14	14	14	14	14	13	13	12	12
		Summer Bridge	19	12	11	12	12	12	12	13	13	12	13	13
	Avg. Term Units Earned	Others	12	12	13	13	14	14	14	13	13	13	12	12
		Summer Bridge	13	11	11	12	12	13	12	12	12	12	12	12
	Probation/Disqualification (%)	Others	15.9%	17.3%	14.5%	13.7%	11.5%	10.4%	9.0%	8.6%	6.6%	5.7%	8.6%	8.0%
		Summer Bridge	19.3%	29.1%	27.3%	29.2%	22.2%	16.1%	18.0%	14.1%	6.8%	7.9%	4.7%	2.9%
Fall 2004	HC enrolled by the end of terms	Others	1,819	1,740	1,546	1,462	1,324	1,286	1,220	1,177	845	665	372	277
		Summer Bridge	90	85	77	74	65	59	58	56	47	43	24	17
	Avg. Term GPA	Others	2.85	2.70	2.70	2.77	2.83	2.92	2.93	2.92	2.86	2.78	2.69	2.67
		Summer Bridge	2.85	2.56	2.43	2.43	2.44	2.52	2.72	2.45	2.51	2.52	2.45	2.07
	Avg. Cumulative GPA	Others	2.85	2.80	2.85	2.88	2.92	2.95	2.97	2.97	2.87	2.83	2.72	2.69
		Summer Bridge	2.85	2.77	2.74	2.71	2.74	2.75	2.78	2.75	2.73	2.71	2.58	2.46
	Avg. Cumulative Units Earned	Others	15	28	42	56	71	85	100	113	119	127	128	135
		Summer Bridge	17	29	41	53	66	79	93	106	115	127	129	133
	Avg. Term Units Enrolled	Others	14	14	14	14	14	14	14	14	13	13	12	12
		Summer Bridge	19	13	12	12	13	13	14	13	12	12	10	10
	Avg. Term Units Earned	Others	12	13	14	14	14	14	14	14	13	13	12	12
		Summer Bridge	14	12	11	12	13	13	13	13	13	12	11	11
	Probation/Disqualification (%)	Others	15.9%	16.7%	14.7%	12.2%	9.7%	7.2%	6.3%	4.9%	5.7%	4.7%	5.1%	4.0%
		Summer Bridge	13.3%	18.8%	20.8%	20.3%	15.4%	13.6%	3.4%	7.1%	8.5%	4.7%	4.2%	11.8%
Fall 2005	HC enrolled by the end of terms	Others	1,841	1,767	1,527	1,455	1,359	1,308	1,248	1,200	884	695	378	291
		Summer Bridge	92	89	76	71	62	68	61	60	53	48	38	37
	Avg. Term GPA	Others	2.77	2.63	2.72	2.75	2.74	2.78	2.85	2.87	2.90	2.85	2.69	2.69
		Summer Bridge	2.90	2.37	2.44	2.28	2.59	2.45	2.72	2.63	2.47	2.67	2.67	2.66
	Avg. Cumulative GPA	Others	2.78	2.72	2.84	2.85	2.87	2.88	2.92	2.94	2.88	2.85	2.72	2.68
		Summer Bridge	2.89	2.66	2.73	2.66	2.76	2.69	2.79	2.79	2.75	2.73	2.70	2.70
	Avg. Cumulative Units Earned	Others	15	27	42	55	70	84	98	111	119	127	127	133
		Summer Bridge	15	26	38	49	64	74	91	103	114	124	131	142
	Avg. Term Units Enrolled	Others	13	14	14	14	14	14	14	14	13	13	12	11
		Summer Bridge	17	13	12	12	12	13	13	12	12	12	12	12
	Avg. Term Units Earned	Others	12	13	14	14	14	14	14	14	13	12	12	11
		Summer Bridge	13	12	11	12	12	13	13	12	13	12	12	12
	Probation/Disqualification (%)	Others	18.1%	18.3%	13.6%	12.3%	9.5%	7.0%	5.8%	5.1%	3.7%	4.2%	5.3%	7.2%
		Summer Bridge	15.2%	25.8%	21.1%	16.9%	9.5%	13.2%	4.8%	5.0%	5.7%	6.3%	7.9%	2.7%

**Table 3 Academic performance across terms
(FTFTF cohorts)**

			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
Overall	HC enrolled by the end of terms	Others	5,691	5,413	4,758	4,508	4,142	4,010	3,787	3,639	2,665	2,107	1,154	868
		Summer Bridge	317	301	263	251	226	220	208	201	173	154	104	88
Avg. Term GPA	Others	Others	2.81	2.68	2.72	2.74	2.77	2.83	2.88	2.90	2.87	2.81	2.67	2.67
		Summer Bridge	2.81	2.40	2.41	2.33	2.46	2.51	2.63	2.57	2.52	2.48	2.60	2.56
Avg. Cumulative GPA	Others	Others	2.81	2.77	2.85	2.87	2.89	2.91	2.94	2.95	2.87	2.83	2.70	2.68
		Summer Bridge	2.82	2.66	2.70	2.65	2.68	2.68	2.72	2.72	2.69	2.67	2.64	2.62
Avg. Cumulative Units Earned	Others	Others	15	27	42	55	70	84	98	111	118	126	126	132
		Summer Bridge	16	27	39	50	64	75	89	101	112	122	129	138
Avg. Term Units Enrolled	Others	Others	13	14	14	14	14	14	14	14	13	13	12	12
		Summer Bridge	18	13	12	12	12	13	13	13	12	12	12	12
Avg. Term Units Earned	Others	Others	12	13	14	14	14	14	14	14	13	13	12	12
		Summer Bridge	14	11	11	12	12	13	13	13	12	12	12	12
Probation/Disqualification (%)	Others	Others	16.6%	17.4%	14.3%	12.8%	10.3%	8.3%	7.1%	6.3%	5.4%	4.9%	6.4%	6.4%
		Summer Bridge	16.4%	25.2%	23.6%	23.1%	16.7%	14.5%	10.0%	9.5%	6.9%	6.5%	5.7%	4.5%