Service-Learning and Graduation: Evidence from Event History Analysis

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This research employed Event History Analysis to understand how service-learning participation is related to students' graduation within six years. The longitudinal dataset includes 31,074 new undergraduate students who enrolled in a large western U.S. public university from Fall 2002 to Fall 2009. The study revealed that service-learning participation had a significant positive relationship with graduation for both first-time freshmen and new undergraduate transfers. Furthermore, participation in upper division service-learning courses had larger correlations with graduation than participating in lower division service-learning courses, and service-learning participation had larger correlations with graduation for new undergraduate transfers than for first-time freshmen.

The lower rate of graduation with a baccalaureate degree and increased time to degree completion have caught the attention of policy makers, educators, and researchers in recent years. Many states and higher education institutions have implemented intervention programs to promote timely graduation. Service-learning (SL) has been recognized as a high-impact practice (HIP) (Brownell & Swaner, 2010; Kuh, 2008) but there are few studies on the long-term effects of SL on graduation. This study applies Event History Analysis (EHA) on longitudinal data to understand service-learning's long-term relationship with graduation.

Graduation and Time to Degree

Nationally, among first-time, full-time undergraduate students who began their pursuit of a bachelor's degree at a 4-year degree-granting institution in Fall 2007, 39.4% graduated within four years, 55.1% graduated within five years, and 59.4% graduated within six years. The 4-, 5-, and 6-year graduation rates are even lower for all 4-year public institutions at 33.5%, 52.3% and 57.7% respectively (Kena et al., 2015). In addition, time to graduation with a baccalaureate degree has increased markedly in the United States (Bound, Lovenheim, & Turner, 2012). The median time to earn a Bachelor's degree from public institutions in 2008 was 55 months for all degree recipients, 63 months for graduates who started at a 2-year public institution, and 80 months for those who delayed entry into postsecondary education (Cataldi et al., 2011).

Many states have implemented performance-based funding initiatives to encourage higher educational institutions to improve graduation and shorten time to degree. By June 2015, 32 states had a funding formula or policy in place to allocate a portion of funding based on performance indicators, and five other states are currently transitioning to some type of performance funding (National Conference of State Legislatures, 2015). More and more higher education institutions have implemented graduation initiatives. For example, in 2007, the presidents and chancellors of nearly two dozen public postsecondary systems created the Access to Success Initiative to increase the number of college-educated adults, and to graduate more young people from low-income and minority families (Engle & Lynch, 2009). The most common component among these initiatives is to identify HIPs and integrate them into intervention strategies.

Theoretical Framework

Several theoretical models have been developed to explain the multiple influences on students' successful degree completion. The current study was guided by the intersection of integration (Tinto, 1993), involvement (Astin, 1999), and engagement (Kuh, Kinzie, Schuh, Whitt, & Associates, 2005) models. Although each of these models provides a unique lens to analyzing issues of persistence and graduation, they share a focus on three main factors: individual (e.g., family background, attitudes, goals); institutional (e.g., size, programs, struc-

tures); and student-institution interactions (e.g., social integration, academic engagement).

These models acknowledge the important roles students' individual characteristics and previous life experiences hold as they enter into and interact within higher education contexts. Though a robust body of research has found that particular individual student characteristics, such as gender, race and ethnicity, economic status, and academic preparedness correlate with persistence and degree completion (Astin & Oseguera, 2005; Crisp & Nora, 2010; DeAngelo, Franke, Hurtado, Pryor, & Tran, 2011; Pike, Hansen, & Childress, 2014), these characteristics are not necessarily inevitable determinants of which students can succeed. Recent studies have shown that many institutions have demonstrated progress in increasing graduation rates for many students represented by these traits (Nguyen, Bibo, & Engle, 2012a; Nguyen, Bibo, & Engle, 2012b; Lynch & Engle, 2010a; Lynch & Engle, 2010b). Such findings support the notion that what happens at institutions matters. In the next section, we review the models framing this study to elaborate on the student-institution interaction components.

Integration and Involvement Models

Tinto's (1993) theory of college student departure is the most widely cited theory of college student persistence and degree completion. Based on the notion that dropping out from higher education represents a form of social withdrawal, this model asserts that integration is crucial to the process of student adaptation to the college culture. That is, integration is a process of developing a sense of belonging and coming to share the institution's values. This integration theory posits that students enter higher education with an initial level of commitment to their goals and the cultural values of their institutions. Students' levels of commitment determine their degree of integration into, or acceptance of, the academic and social value systems of their respective campuses. In turn, students' levels of integration into the academic and social contexts of their campuses shape their subsequent commitments to their goals and their institution. These commitments, in turn, determine students' likelihood of success.

Whereas Tinto's (1993) integration model emphasizes the internal sense of belonging by adapting to the university culture, Astin (1999) offered the concept of college student involvement to focus on students' behaviors. Astin posited that the quality and quantity of students' involvement – their activities – in college are important factors in predicting educational outcomes. According to this theory, college students' involvement is associated with higher levels of satisfaction with the college experience, persistence, and completion. Specifically, this theory of involvement suggests that experiences in college, such as interaction with faculty members and membership in student groups, are associated with learning and success outcomes. Like Tinto's integration model, the involvement model emphasizes how a student develops a sense of belonging to the institution.

Engagement Theory

In line with Astin's (1999) involvement theory, the concept of student engagement highlights the impact of students' experiences in college on their learning and success outcomes. Similarly, this model emphasizes the role of the institution in implementing practices that promote student engagement. Most often associated with the work of Kuh and his colleagues (Kuh et al., 2005), this model of engagement suggests that it is high-impact practices that promote students' participation in educationally purposeful activities and enhances students' levels of learning and likelihood of success in college. According to Kuh (2008), high-impact practices are effective because they provide opportunities for students to experience and take part in the intellectual culture of the college or university.

Service-learning as
High Impact Practice (HIP)

Service-learning (SL) is recognized as one HIP (Brownell & Swaner, 2010; Kuh, 2008) and has become a popular pedagogical approach for enhancing student learning (Chupp & Joseph, 2010). SL is a pedagogy in which students learn by active participation in organized services that address community issues and is linked to academic study through structured reflection. Compared to other experiential learning approaches such as field work and internships, SL is unique in that it combines meaningful community service with related academic content, ties the two with critical analysis, and focuses on civic learning outcomes (Furco, 1996).

Numerous studies conducted over the last two decades have documented the positive impacts of SL on students' personal development (Bringle, Clayton, & Hatcher, 2013; Celio, Durlak, & Dymnicki, 2011; Eyler & Giles, 1999; Yorio & Ye, 2012), social development (Astin & Sax, 1998; Celio et al; Eyler, 2000; Jacoby, 2009; Yorio & Ye), and academic learning (Bringle et al.; Celio et al.;

Eyler, Giles, Stenson, & Gray, 2001; Novak, Markey, & Allen, 2007; Warren, 2012; Yorio & Ye).

Researchers also have found that the positive impacts of SL on students may be moderated by certain factors (Aronson et al., 2005; Roldan, Strage, & David, 2004; Whitley, 2014). These factors are related to SL courses, faculty, or students, including course discipline; the level of the course; the type of course (e.g., general education vs. non-general education, major requirement vs. elective); the size of the SL courses; the degree the SL experience is integrated into the course learning objectives; students' demographics (e.g., socioeconomic status, gender, race and ethnicity, first-generation status); and students' academic abilities (e.g., higher GPA).

However, there is limited understanding of the relationships between SL and long-term outcomes such as persistence, graduation, and post-graduation employment. A few studies found a positive relationship between SL participation and students' persistence in school (Bringle, Hatcher, & Muthiah, 2010; Gallini & Moely, 2003). Matthews, Dorfman, and Wu (2015) found significantly higher starting salaries and shorter time to receive a first raise for graduates with SL experience. There is only one published study examining the relationship between SL and graduation (Lockeman & Pelco, 2013), which found that students who participated in SL courses during their undergraduate years were more likely to earn a baccalaureate degree than students who did not participate in SL coursework.

Research Design

We have limited studies linking SL and graduation primarily because of two barriers: data availability and research method. It is difficult for researchers to track students' SL participation and progression toward graduation, and there is no agreed-upon method to model the effects of SL on graduation as a longitudinal process. In this study, we examined SL participation and graduation across terms and attempt to overcome both barriers.

Particularly, this study employed large-scale longitudinal data and applied EHA to answer the following three questions: (a) Is SL participation associated with students' graduation within six years?, (b) If so, are there any differential effects of SL participation among different SL courses (lower vs. upper division) or among different student populations (first-time freshmen vs. new undergraduate transfers)?, and (c) Are there certain periods of time in which SL participation is more predictive of graduating within four, five, or six years?

The present study not only responded to the call for more longitudinal studies on SL and graduation, but also expanded upon the Lockeman and Pelco (2013) study in the following ways. First, this study expanded the dataset by including multiple entering undergraduate cohorts for both first-time freshmen and new undergraduate transfers. Second, this study operationalized SL participation to include both the given and the previous time periods, rather than only in the given time periods. Previous research has suggested that students' prior SL experiences are related to subsequent SL experiences (Jameson, Clayton, & Bringle, 2008), so this cumulative view of SL participation allowed us to capture the potential influences of SL participation in the previous terms. Third, the present study focused on how the different levels of SL course participation, the timing of SL participation, and the related underlying factors may moderate or mediate students' likelihood of graduation in a particular term. Finally, the study tracked and analyzed students' SL participation and graduation term-by-term, rather than year-by year, over six years. This analysis provided a more detailed view of the dynamic relationship between students' SL participation and graduation within six years.

Event History Analysis

SL courses are usually offered in every semester and students may take them in any semester during their undergraduate years. These conditions raise challenges in evaluating SL with longitudinal data. First, the status of a student's SL participation may vary across terms because students may take SL courses in any term. Second, the effect of SL may be sensitive to when a SL course was taken; there possibly are certain time periods in which taking SL is more influential than in other periods. In a longitudinal process, we need to examine the potential time-varying effects of SL participation. Finally, it is common for certain students to drop out of school at any time permanently or temporarily, particularly in the early terms (Chen, 2012; DesJardins, Ahlburg, & McCall, 2002; Ryan, 2004). This is related to the so-called "*right-censured*" data that we will discuss in detail in the next section.

To capture the temporal nature of SL participation and to accurately estimate the effects (in particular the time-varying effects) of SL on graduation, we employed EHA. With roots in biostatistics and epidemiology, EHA adopted different names across different scientific disciplines – survival analysis, duration models, hazard models, or failure-time models. EHA is an empirical technique that allows the researcher to study the occurrence and timing of events in a longitudinal process (DesJardins, 2003),

and has been recently used in higher education research to investigate the temporal aspects of student dropout and degree completion (Chen, 2008, 2012; DesJardins et al.; Yue & Fu, 2017). EHA focuses on events that are important to the dependent variable and analyzes data obtained by observing individuals over time. It can examine the underlying causal mechanisms behind event occurrence so as to control for censored data and to explore the impact of time-dependent variables on outcomes (Allison, 1982, 1984; Singer & Willett, 2003).

In our study, the event of interest is graduation with a Bachelor's degree in a term within six years. If a student has not graduated at the end of an observation period, this may indicate that either the student continued enrollment, graduated elsewhere, or dropped out; thus, the time of graduation is unknown. All the cases for which graduation is unknown are right-censored, but they must be considered in estimation with longitudinal events to avoid biases or loss of information (Alison, 1984).

Right-censored data provide incomplete information; whether or when the event occurs for the censored individuals is unknown, but nonoccurrence of the event, by the censoring time, is known. EHA can handle this uncertainty by incorporating information about right-censored cases. In our study, we tracked students term by term. In each term (referred to as "risk period" in EHA terminology), we only counted students who were enrolled in that term. The pool of these students, the "risk set," includes all individuals eligible to experience the event in that term at the institution studied. Students who graduated or were censored in one term would be dropped out of the "risk set" in future time periods so that everyone remains in this set only up to the last term of enrollment.

Method

Data

The SL program under study was established in 1988 and currently offers approximately 150 SL course sections each year. All SL courses are uniquely identified in the institution's enterprise information system and designated as "S" sections in registration catalogs. A university academic committee reviews all SL courses. To be approved, courses must meet the following requirements: (a) the SL component is integral to and supportive of the academic focus of the course; (b) the course has a mechanism to introduce the service ethic; (c) students are required to perform at least 15 hours of academically relevant community service; (d) SL accounts for at least 15% of the total course grade; and (e) ongoing structured opportunities for critical reflection on the service experience are provided.

Data in the study included eight entering cohorts of first-time full time freshmen (*N*=19,709) and new full time undergraduate transfers (*N*=11,365) from Fall 2002 to Fall 2009. The observation period was six years, including six fall and six spring semesters. All students were tracked from the first term to the last enrolled term (if the student graduated or dropped out within six years), or the12th term (if the student did not graduate and remained in school beyond the 12th term). The final person-period dataset included 31,074 students with 210,609 records (*N*=150,948 for first-time freshmen and *N*=59,661 for new undergraduate transfers, per student per enrolled term).

SL course characteristics. This study included 1,520 undergraduate SL courses taken by students during the observation period, covering 185 unique courses in 59 different subjects or majors. There were only three SL courses taken by students in summer sessions and these were folded into the respective previous spring semesters. The majority of SL courses were upper division (UD) courses and non-general education (non-GE) courses. Most of these non-GE courses were required major courses. The general education (GE) SL courses spanned a variety of disciplines.

Student characteristics. At entry, 40.4% of first-time freshmen and 43.7% of new undergraduate transfers were male; 47.6% of first-time freshmen and 44.4% of new undergraduate transfers were eligible for Pell grant; 60.7% of first-time freshmen and 57.1% of new undergraduate transfers were first-generation college-going students (FGS); and 40.5% of first-time freshmen and 34.9% of new undergraduate transfers were under-represented minority students (URM) defined as African American, American Indian, and Hispanic or Pacific Islander. However, the proportions of these four characteristics increased across terms, especially in the later terms.

Among 11,365 new full time undergraduate transfers in the dataset, 4.9% were freshmen, 13.8% were sophomores, 69.3% were juniors, and 11.9% were seniors. These students had already earned 65.3 college units on average at entry.

By the end of six years, 50.5% (9,955 of 19,709) first-time freshmen and 73.0% (8,300 of 11,365) new undergraduate transfers had graduated with a Bachelor's degree. First-time freshmen mainly graduated in the late terms (8th to 12th) while new transfers mainly graduated in the early terms (4th to 8th). Evidence suggests that students who transferred to other institutions have lower degree completion rates than students who began and complet-

ed their tenure at the same institutions (Alfonso, 2006; Davis, 2012; Dennis, Calvillo, and Gonzalez, 2008; Handel & Williams, 2013; Laanan, 2001; Li, 2010; Monaghan & Attewell, 2015; Peter, Cataldi, & Carroll, 2005). Credit loss, remediation enrollment, and lack of major prerequisites have been identified as mechanisms that influence transfer students' pathways to degree completion (Attewell, Heil, & Reisel, 2012; Bailey, Jaggars, & Jenkins, 2015; Scott-Clayton, Crosta, & Belffield, 2014). As such, these two groups of students were analyzed separately to attempt to capture these potential influences.

Variables

We tracked students term by term for 12 terms. At the end of each term, the graduation status of a student was identified as *the dependent variable*: 1 if graduation occurred and 0 if graduation did not occur.

The independent variable of interest was SL participation by the end of a term, defined in the four different ways as described below.

SL taking group. SL participation status with two categories: 0 = did not take any SL courses and 1= took at least one SL course by the end of a term.

Lower division (LD) and upper division (UD) SL taking group. Previous SL research has identified how the type of course, such as major requirement or GE, is related to student outcomes (Roldan et al., 2004). As such, the following SL participation categories were constructed to capture these potential influences: 0 = did not take any SL courses, 1 = took lower LD SL courses only, 2 = took UD SL courses only, and 3 = took both LD and UD SL courses.

Total number of SL courses taken. The number of SL courses taken by the end of the given term, which is a continuous variable (0, 1, 2 . . . and so on).

The number of LD and UD SL courses taken. This grouping considers students' participation in both LD and UD SL courses taken by the end of term as two separate continuous variables (0, 1, 2 . . . and so on).

We also included four demographic variables (gender, URM status, FGS status, Pell eligible status) and two academic performance variables – cumulative GPA and cumulative units earned at the beginning of the term as *control variables*. The latter two are included because both have been found to be the most significant factors affecting students' graduation within six years (Yue & Fu, 2017). We used high school GPA of first-time freshmen and transfer GPA of new undergraduate transfers as the cumulative GPA in the beginning of the term for the first terms.

Statistical Models

Within the class of EHA methods, we chose the discrete-time logit hazard model, which can be estimated by a standard maximum likelihood method using a logistic regression procedure. We first specify and estimate a *time-fixing effect model*, assuming the effects of independent variables do not change over time. This model provides the estimated overall effect of the independent variables across all time periods. However, an independent variable's effect may increase or decrease over time, in alignment with certain events occurring at specific time periods. In fact, both time-dependent and time-independent variables can have time-varying effects. To further explore the possibility of the time-varying effects of the independent variables, we then specify and estimate a *time-varying effect model* that allows the effects of the independent variables to differ from period to period, examining the unique effects of the independent variables in each period. The detailed model specification and reference can be found in the literature (Singer & Willett, 2003; Yue & Fu, 2017).

In both models, the slope parameters (βs) indicate the effects of the independent variables and can be interpreted in two ways. First, it is the computed odds ratio, Exp(β), that assesses the relative probability the event of the dependent variable will occur. An Exp(β) larger than 1 indicates a positive effect of the independent variable while an Exp(β) smaller than 1 indicates a negative effect. The farther the Exp(β) is from 1, the greater the effect is. For example, Exp(β) = 1.254 for SL taking (1= took at least one SL courses and 0= did not take any SL courses) means the odds of graduating for students who took at least one SL course is 1.254 times of those who did not take any SL courses. Alternatively, a simple transformation of the β's offers a direct interpretation: $100(e^{\beta} -1)$ is the percentage change in the odds of graduation for a one unit increase in X, holding other variables constant. Therefore, Exp(β) = 1.109 for the total number of SL courses taken means the odds of graduating would increase 10.9% if students took one more SL course.

Considering the possible moderating influences of the factors related to faculty and course performance in the literature (Aronson et al., 2005; Roldan, Strage, & David, 2004; Whitley, 2014), we conducted an expanded analysis including the moderating variables. The variables related to faculty members who taught SL courses were full-time status, tenured/tenure track status, and SL training

experience. The variables related to students' performance in SL courses were course grades and course passing rate.

Results

SL Participation

Table 1 summarizes students' SL participation across terms within the observation period of six years. SL courses were offered every semester and students took SL courses at different points of time along their educational pathway. More students initially took SL courses in the early terms, particularly in the first two terms (23.0% for first-time freshmen and 17.1% for new undergraduate transfers). After that, initial participation varied throughout the subsequent terms. Overall, we found that approximately 10% of enrolled students, including both first-time freshmen and new transfers, took SL courses in a semester, which is similar to the finding reported by Lockeman and Pelco (2013). We also found that 52.5% of first-time freshmen and 40.7% of new undergraduate transfers took at least one SL course during the six years, which is almost double what Lockeman and Pelco reported. These results indicate that SL participation rates vary across the two institutions in their study and ours.

Graduation by SL Participation

Table 2 presents the percentages of graduation across terms by SL participation status. The percentage of graduation is calculated as the number of students who graduated in a term divided by the number of students who had "survived" to (or did not graduate before that term and continuously enrolled in) that term. The differences in the percentage of graduation among SL taking subgroups indicate how SL participation was associated with students' graduation at the end of a term. A larger difference indicates a greater association. In addition, the stable differences across terms indicate that the SL participation-graduation relationship was similar across terms.

SL taking group. For both first-time freshmen and new undergraduate transfers, on average, the percentage of graduated students who participated in SL courses was statistically significantly higher than for those who did not participate in SL courses (10.5% vs. 3.6% and 21.6% vs. 9.4%, respectively). This was true for most terms starting in the 7th term for first-time freshmen and the 3rd term for new undergraduate transfers. However, the difference between first-time freshmen SL participants and non-participants slightly increased in the later terms. For new undergraduate transfers, the difference between SL participants and non-participants became larger after the 5th term. There were much larger differences across terms for new undergraduate transfers than for first-time freshmen, indicating that SL had a stronger relationship with graduation for new transfers than for first-time freshmen.

LD and UD SL taking groups. For first-time freshmen, on average, there was a statistically significant difference between students who took LD SL courses and those who did not take any SL courses (5.1% vs. 3.6%). However, the differences in most terms were not statistically significant. There were no statistically significant differences between first-time freshmen who took both LD and UD SL courses and those who took only UD SL courses, on average (20.1% vs. 18.9%) or in most terms. However, there were statistically significant differences between first-time freshmen who took only UD SL (18.9%) or a combination of UD and LD SL courses (20.1%) and those who took only LD SL courses (5.1%) or did not take any SL courses (3.6%), on average and in the 6th or later terms. These results indicate that UD SL courses had a stronger relationship with graduation for first-time freshmen.

For new undergraduate transfers, on average, there were statistically significant differences in the percentage of graduated students among all four groups. The percentages of graduated students who took a combination of LD and UD SL courses (27.2%) and those who took only UD SL courses (23.0%) are both much larger than the percentages of graduated students who took only LD SL courses (12.8%) and those who did not take any SL courses (9.4%). These results indicate that UD SL courses have a stronger relationship with graduation for new undergraduate transfers, too.

The total number of SL courses taken. On average, students who took two or more SL courses had the significantly highest percentage of students who had graduated in a term, followed by students who took only one SL course. Further, students who did not take any SL course had the significantly lowest percentage that had graduated in a term. This pattern was similar for both first-time freshmen and new undergraduate transfers. Overall, taking more SL courses had a stronger relationship with graduation across terms for both groups of first-time freshmen and new transfers.

The *number of LD SL courses taken.* For first-time freshmen, on average, students who took two or more LD SL courses had the significantly highest percentage that had graduated in a term, followed by students who took only one LD SL course. Further, students who did not take any LD SL course

Table 1
Summary of SL Taken

1a. Initial SL course taken

		Term												Didn't take	Grand Total
		1st term	2nd term	3rd term	4th term	5th term	6th term	7th term	8th term	9th term	10th term	11th term	12th term		
First-time full time freshmen	Headcount	2,658	1,867	915	708	746	762	859	729	437	326	193	142	9,367	19,709
	% of row	13.5%	9.5%	4.6%	3.6%	3.8%	3.9%	4.4%	3.7%	2.2%	1.7%	1.0%	0.7%	47.5%	100.0%
New full time undergraduate transfers	Headcount	989	954	808	710	413	363	167	96	41	35	31	13	6,745	11,365
	% of row	8.7%	8.4%	7.1%	6.2%	3.6%	3.2%	1.5%	0.8%	0.4%	0.3%	0.3%	0.1%	59.3%	100.0%

1b. The total number of SL courses taken within 6 years

		Number of SL courses taken within six years												Grand Total
		0	1	2	3	4	5	6	7	8	9	10	11	
First-time full time freshmen	Headcount	9367	6483	2611	861	246	76	34	13	12	4		2	19709
	% of row	47.5%	32.9%	13.2%	4.4%	1.2%	0.4%	0.2%	0.1%	0.1%	0.0%		0.0%	100.0%
New full time undergraduate transfers	Headcount	6745	3414	965	191	36	8	3	1	1		1		11365
	% of row	59.3%	30.0%	8.5%	1.7%	0.3%	0.1%	0.0%	0.0%	0.0%		0.0%		100.0%

1c. SL courses taken across terms

	# of SL courses taken in a term	Term												Grand Total
		1st term	2nd term	3rd term	4th term	5th term	6th term	7th term	8th term	9th term	10th term	11th term	12th term	
First-time full time freshmen	Total HC	19709	18821	16343	15557	14428	13940	13337	12785	9818	8058	4641	3511	150948
	0	86.6%	88.9%	92.9%	93.1%	92.1%	90.4%	88.8%	87.8%	89.7%	88.6%	89.1%	88.9%	89.9%
	1	12.7%	10.8%	6.9%	6.6%	7.5%	9.2%	10.6%	11.6%	9.6%	10.8%	10.5%	10.4%	9.7%
	2, 3, 4	0.6%	0.3%	0.2%	0.3%	0.4%	0.4%	0.5%	0.6%	0.7%	0.6%	0.4%	0.7%	0.5%
New full time undergraduate transfers	Total HC	11365	10772	9622	9057	6710	5115	2654	1890	995	739	438	304	59661
	0	91.4%	90.3%	90.1%	88.6%	91.0%	88.1%	90.7%	90.8%	91.6%	90.1%	90.2%	92.1%	90.2%
	1	8.3%	9.5%	9.5%	10.8%	8.6%	11.6%	9.0%	8.7%	7.7%	9.5%	9.8%	7.9%	9.5%
	2, 3, 4	0.3%	0.3%	0.4%	0.6%	0.4%	0.4%	0.3%	0.5%	0.7%	0.4%			0.4%

Table 2
Graduation by SL Taking Status

		Term											Grand
	SL taking group	1st term	2nd term	3rd term	4th term	5th term	6th term	7th term	8th term	9th term	10th term	11th term	12th term	Total
2a. SL taking group														
First-time full time freshmen	Didn't take any SL	0.0%	0.0%	0.0%	0.0%	0.1%a	0.8%a	1.6%a	17.9%a	12.7%a	33.4%a	14.3%a	31.9%a	3.6%a
	Took at least one SL	0.0%	0.0%	0.0%	0.0%	0.1%a	0.8%a	2.3%b	20.9%b	16.3%b	38.8%b	22.3%b	39.3%b	10.5%b
New full time undergraduate transfers	Didn't take any SL	0.0%	0.3%a	1.9%a	20.4%a	15.9%a	37.3%a	19.4%a	35.0%a	17.2%a	32.9%a	16.9%a	27.3%a	9.4%a
	Took at least one SL	0.1%	0.4%a	3.2%b	23.3%b	23.2%b	48.4%b	28.3%b	44.2%b	23.0%b	39.9%b	29.7%b	36.4%a	21.6%b
2b. LD and UD SL taking group														
First-time full time freshmen	Didn't take any SL	0.0%	0.0%	0.0%	0.0%	0.1%a	0.8%a	1.6%a	17.9%a	12.7%a	33.4%a	14.3%a	31.9%a	3.6%a
	Took LD SL only	0.0%	0.0%	0.0%	0.0%	0.0%a	0.4%a	1.6%a	15.0%b	11.3%a	31.8%a	15.4%a	32.2%a	5.1%b
	Took UD SL only	0.0%	0.0%	0.0%	0.0%	0.2%a	2.1%b	3.2%b	26.3%c	19.9%b	43.5%b	26.4%b	41.9%b	18.9%c
	Took LD and UD SL	0.0%	0.0%	0.0%	0.0%	0.2%a	0.8%a,b	2.8%b	24.5%c	19.7%b	42.5%b	26.0%b	45.3%b	20.1%c
New full time undergraduate transfers	Didn't take any SL	0.0%	0.3%	1.9%a,c	20.4%a	15.9%a	37.3%a,c	19.4%a	35.0%a	17.2%a	32.9%a	16.9%a	27.3%a	9.4%a
	Took LD SL only	0.0%	0.0%	0.7%a	15.6%a	14.9%a	33.8%a	15.8%a	37.9%a,b	10.57a%	33.9%a	15.0%a,b	19.4%a	12.8%b
	Took UD SL only	0.1%	0.6%	3.7%b	25.0%b	24.9%b	50.9%b	30.9%b	44.4%b	25.6%b	42.7%a	31.6%b	39.6%a	23.0%c
	Took LD and UD SL	0.0%	0.0%	4.8%b,c	16.5%a,b	19.1%a,b	47.9%b,c	27.8%a,b	53.1%b,c	25.0%a,b	31.7%a	41.7%b,c	47.1%a	27.2%d
2c. Total number of SL courses taken														
First-time full time freshmen	Didn't take any SL	0.0%	0.0%	0.0%	0.0%	0.1%a	0.8%a	1.6%a	17.9%a	12.7%a	33.4%a	14.3%a	31.9%a	3.6%a
	Took one SL	0.0%	0.0%	0.0%	0.0%	0.0%a	0.9%a	2.3%b	19.2%a	14.9%b	36.0%a	20.0%b	36.6%b	8.1%b
	Took two SL or more	0.0%	0.0%	0.0%	0.0%	0.2%a	0.7%a	2.3%a,b	24.3%b	18.8%c	43.0%b	25.4%c	42.9%c	17.4%c
New full time undergraduate transfers	Didn't take any SL	0.0%	0.3%a	1.9%a	20.4%a	15.9%a	37.3%a	19.4%a	35.0%a	17.2%a	32.9%a	16.9%a	27.3%a	9.4%a
	Took one SL	0.1%	0.2%a	2.4%a	21.8%a	23.1%b	47.9%b	27.6%b	41.7%b	23.2%a	39.2%a	26.7%a,b	28.8%a	19.3%b
	Took two SL or more	0.0%	2.7%b	9.5%b	30.4%b	23.3%b	49.9%b	30.0%b	49.8%b	22.6%a	41.3%a	35.6%b	52.0%b	31.4%c
2d. The number of LD SL courses taken														
First-time full time freshmen	Didn't take any LD SL	0.0%	0.0%	0.0%	0.0%	0.1%a	1.0%a	1.9%a	20.5%a	15.2%a	37.3%a	19.0%a	35.9%a	5.6%a
	Took one LD SL	0.0%	0.0%	0.0%	0.0%	0.0%a	0.5%b	2.1%a	17.9%b	14.6%a	35.9%a	20.4%a	38.5%a	7.5%b
	Took two LD SL or more	0.0%	0.0%	0.0%	0.0%	0.2%a	0.3%a,b	0.9%a	18.4%a,b	12.7%a	36.5%a	17.4%a	35.3%a	10.3%c
New full time undergraduate transfers	Didn't take any LD SL	0.0%	0.3%	2.3%a	21.8%a	19.0%a	42.5%a	23.7%a	38.5%a	20.5%a	36.8%a	23.0%a	32.4%a	12.6%a
	Took one LD SL	0.0%	0.0%	1.2%a	16.5%b	16.5%a	39.5%a	19.0%a	43.9%a	16.3%a	34.1%a	27.8%a	25.0%a	16.2%b
	Took two LD SL or more	0.0%	0.0%	5.0%a	5.9%a,b	9.4%a	24.2%a	27.3%a	39.1%a	7.1%a	26.7%a	10.0%a	50.0%a	17.4%a,b
2e. The number of UD SL courses taken														
First-time full time freshmen	Didn't take any UD SL	0.0%	0.0%	0.0%	0.0%	0.1%a	0.6%a	1.6%a	16.8%a	12.2%a	32.8%a	14.7%a	32.0%a	4.0%a
	Took one UD SL	0.0%	0.0%	0.0%	0.0%	0.2%b	1.7%b	3.0%b	24.2%b	18.3%b	40.8%b	24.7%b	41.7%b	17.6%b
	Took two UD SL or more	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%a,b	3.6%b	31.9%c	25.3%c	50.2%c	31.0%c	47.8%b	26.5%c
New full time undergraduate transfers	Didn't take any UD SL	0.0%	0.3%a	1.8%a	20.1%a	15.9%a	37.0%a	19.0%a	35.3%a	16.4%a	33.0%a	16.6%a	26.0%a	9.6%a
	Took one UD SL	0.1%	0.3%a	2.9%b	22.4%a	24.1%b	50.3%b	30.5%b	43.8%b	25.8%b	38.3%a,b	31.8%b	34.4%a,b	21.0%b
	Took two UD SL or more	0.0%	4.3%b	12.0%c	35.9%b	26.5%b	52.2%b	30.8%b	49.7%b	24.8%a,b	47.7%b	36.0%b	57.6%b	34.7%c

Note. Values in the same column and subtable not sharing the same suffix were significantly different at $p < .05$ in the two-sided test of equality for column proportions. Cells with no suffix were not included in the test. Tests were adjusted for all pairwise comparisons using the Bonferroni correction.

have the significantly lowest percentage of students who had graduated. However, within most of the individual terms, the differences among these three LD SL groups were not statistically significant. For new undergraduate transfer students, there are no statistically differences among the three LD SL groups, on average or in most terms.

The number of UD SL courses taken. For both first-time freshmen and new undergraduate transfers, on average, students who took two or more UD SL courses have the significantly highest percentage of students who had graduated in a term, followed by students who took only one UD SL course. Students who did not take any UD SL course have the significantly lowest percentage of graduated students. Furthermore, for both first-time freshmen and new undergraduate transfers, on average, students who took two or more UD SL courses and students who took one UD SL course had much higher percentages of graduation than students who did not take any UD SL course (26.5% and 17.6% vs. 4.0% for first-time freshmen, 34.7% and 21.0% vs. 9.6% for new undergraduate transfers). Overall, increased participation in UD SL courses is associated with higher graduation percentages for both first-time freshman and new transfer students.

Modeling the Relationship between SL Participation and Graduation

In the following, we employed EHA, particularly the discrete-time logit hazard models to analyze the relationship between SL participation and graduation when considering four demographic variables: gender, URM status, FGS, and Pell grant eligible status. We also considered two academic performance variables at the beginning of the term (Cumulative GPA and cumulative units' earned in the beginning of terms) as the controlling variables in the models. To simplify the interpretation of statistical results, we only reported the estimated odds ratios [Exp(β)] of graduating in a term for different SL participation groups and the corresponding model R-squares (Nagelkerk's R-square) in Table 3. The detailed statistical results from time-fixing effect models were reported in Table 4 to analyze the influences of covariates in graduation across terms within six years.

SL taking group. The time-fixing effect models in the left-hand panel in Table 3 explained 53.2% and 37.4% of the total variance in the dependent variable for first-time freshmen and new undergraduate transfers, respectively. SL participation had a significantly positive relationship with graduation for both first-time freshmen and new undergraduate transfers. Based on the estimated odds ratio of graduation and the percentage change in the odds of graduation, first–time freshmen who took at least one SL course were 25.4% more likely to graduate in the end of a term during this six-year period than who those who did not do so. Similarly, new undergraduate transfers who took at least one SL course were 59.0% more likely to graduate in the end of a term during this six-year period than those who did not do so.

LD and UD SL taking group. Based on the estimated odds ratio of graduation and the percentage change in the odds of graduation in Table 3, first-time freshmen who took only UD SL courses or a combination of LD and UD SL courses were significantly more likely to graduate than those who did not take any SL courses (40.3% and 40.9%, respectively). Similarly, new undergraduate transfers who took only UD SL courses or a combination of LD and UD SL courses were significantly more likely to graduate than those who did not take any SL courses (72.0% and 37.7%, respectively). However, for both first-time freshman and new transfer student groups there was no statistically significant difference in likelihood of graduation when comparing students who took only LD SL courses to those who did not take any SL courses.

The total number of SL courses taken. The total number of SL courses taken had a statistically significant positive relationship with graduation for both first-time freshmen and new undergraduate transfers. One additional SL course taken was associated with an increase in the likelihood of graduation by 10.9% for first-time freshmen and by 33.9% for new undergraduate transfers.

The number of LD and UD SL courses taken. Taking one additional UD SL course was significantly and positively associated with an increase in the likelihood of graduation by 21.0% for first-time freshmen and 46.2% for new undergraduate transfers. In addition, taking one additional LD SL course was significantly associated with a decrease in the likelihood of graduation for new undergraduate transfers. There is no statistically significant relationship between the number of LD SL courses taken and the likelihood of graduation for first-time freshmen.

Differential Relationships of SL Participation with Graduation

The results above suggest two differential relationships between SL participation and student graduation. First, participation in UD SL courses had a stronger positive association with graduation than participation in LD SL courses. Second, SL participation had a stronger positive association

Table 3
Estimated Odds Ratios of Graduating in a Term for SL Taking Status from Time-fixing and Time-varying Effect Models

		Overall effects from time-fixing effect models (95% CI for odds ratio)		Time-varying effects from time-varying effect models									
				3rd term	4th term	5th term	6th term	7th term	8th term	9th term	10th term	11th term	12th term
3a. Estimated odds ratios for SL taking group													
First-time full time freshmen	Took SL courses	1.254*	(1.187 - 1.325)			0.638	1.032	1.386*	1.143*	1.208*	1.112	1.503*	1.144
	R-Square-Nagelkerke	*0.532*				*0.395*	*0.347*	*0.239*	*0.478*	*0.264*	*0.361*	*0.194*	*0.280*
New full time undergraduate transfers	Took SL courses	1.590*	(1.501 - 1.684)	1.611*	1.067	1.572*	1.498*	1.704*	1.440*	1.395	1.332	1.868*	1.587
	R-Square-Nagelkerke	*0.374*		*0.232*	*0.231*	*0.160*	*0.275*	*0.150*	*0.226*	*0.163*	*0.202*	*0.147*	*0.274*
3b. Estimated odds ratios for LD and UD SL taking group													
First-time full time freshmen	Took LD SL courses	1.021	(0.950 - 1.098)			0.168	0.533*	1.193	0.992	0.953	0.945	1.082	1.004
	Took UD SL courses	1.403*	(1.311 - 1.501)			1.642	2.117*	1.605*	1.230*	1.324*	1.217*	1.790*	1.200
	Took LD and UD SL courses	1.409*	(1.301 - 1.526)			2.680	0.592	1.383	1.249*	1.427*	1.210*	1.686*	1.260*
	R-Square-Nagelkerke	*0.533*				*0.418*	*0.362*	*0.240*	*0.478*	*0.267*	*0.362*	*0.200*	*0.281*
New full time undergraduate transfers	Took LD SL courses	0.982	(0.856 - 1.128)	0.342	0.740*	1.000	0.984	0.846	1.242	0.585	1.113	0.911	0.608
	Took UD SL courses	1.720*	(1.619 - 1.827)	1.816*	1.146*	1.703*	1.612*	1.926*	1.433*	1.598*	1.485*	1.980*	1.909*
	Took LD and UD SL courses	1.377*	(1.148 - 1.651)	2.655	0.601*	1.069	1.290	1.558	1.936*	1.359	0.848	3.115*	2.862
	R-Square-Nagelkerke	*0.376*		*0.239*	*0.234*	*0.164*	*0.277*	*0.158*	*0.227*	*0.173*	*0.206*	*0.160*	*0.296*
3c. Estimated odds ratios for the total number of SL courses taken													
First-time full time freshmen	# of SL courses taken	1.109*	(1.082 - 1.137)			1.196	0.902	1.082	1.088*	1.122*	1.079*	1.116*	1.035
	R-Square-Nagelkerke	*0.532*				*0.394*	*0.374*	*0.238*	*0.487*	*0.265*	*0.361*	*0.190*	*0.279*
New full time undergraduate transfers	# of SL courses taken	1.339*	(1.290 - 1.391)	1.650*	1.101*	1.281*	1.239*	1.293*	1.222*	1.154	1.207	1.456*	1.566*
	R-Square-Nagelkerke	*0.374*		*0.238*	*0.232*	*0.157*	*0.272*	*0.146*	*0.225*	*0.162*	*0.203*	*0.150*	*0.294*
3d. Estimated odds ratios for the number of LD and UD SL courses taken													
First-time full time freshmen	# of LD SL courses taken	0.968	(0.929 - 1.009)			0.942	0.475*	0.903	0.979	0.949	0.959	0.933	0.955
	# of UD SL courses taken	1.210*	(1.171 - 1.249)			1.561	1.391*	1.209*	1.159*	1.242*	1.171*	1.260*	1.093
	R-Square-Nagelkerke	*0.533*				*0.396*	*0.359*	*0.239*	*0.479*	*0.268*	*0.363*	*0.194*	*0.280*
New full time undergraduate transfers	# of LD SL courses taken	0.871*	(0.791 - 0.958)	0.712	0.661*	0.807	0.849	0.883	1.121	0.650	0.925	1.070	1.119
	# of UD SL courses taken	1.462*	(1.403 - 1.524)	1.853*	1.187*	1.391*	1.333*	1.430*	1.252*	1.342*	1.319*	1.632*	1.796*
	R-Square-Nagelkerke	*0.376*		*0.242*	*0.235*	*0.161*	*0.276*	*0.151*	*0.225*	*0.174*	*0.207*	*0.157*	*0.301*

Note. Controlling variables were Gender, URM status, FGS status, Pell eligible status, cumulative GPA and cumulative units earned at the beginning of the term. The odds ratios for the first two terms were not be reported since there were only few students who graduated in both terms.
*$p < 0.05$.

with graduation for new transfer students than first-time freshman. To determine if both differential relationships are statistically significant, 95% confidence intervals (CIs) for the odds ratios are reported in the left-hand panel in Table 3. If two odds ratios have non-overlapping confidence intervals, they are necessarily significantly different (even through it is not necessarily true that they are not significantly different if they have overlapping confidence intervals) (Knezevic, 2008).

The 95% CI for the odds ratio of the number of UD SL courses taken was above that for the number of LD SL courses taken, without any overlap for first-time freshmen (1.171-1.249 vs. 0.929-1.009) or for new undergraduate transfers (1.403-1.524 vs. 0.791-0.958). The 95% CI for the odds ratios of students who took only UD SL courses or students who took a combination of both LD and UD SL courses were above that for students who took only LD SL courses, without any overlap (1.311-1.501 or 1.301-1.526 vs. 0.950-1.098 for first-time freshmen and 1.619-1.827 or 1.148-1.651 vs. 0.856-1.128 for new undergraduate transfers).

Regarding the relationship of SL participation with student graduation between first-time freshmen and new transfers, the 95% CI for the odds ratio of SL participation for new undergraduate transfers was above that for first-time freshmen without any overlap, which was true in terms of both the total number of SL courses taken (1.290-1.391 vs. 1.082-1.137) and SL taking group (1.501-1.684 vs. 1.187-1.325). Thus, both differential relationships were statistically significant. More specifically, participation in UD SL courses had a statistically significant stronger positive association with graduation than participation in LD SL courses. And SL participation had a statistically significant stronger positive association with graduation for new transfer students than first-time freshman.

Further investigation indicated that both differential relationships were related to certain common factors moderating the relationships of SL participation with graduation as described in the next paragraphs. Table 4 compares the characteristics related to SL courses, faculty, and students for both LD and UD SL courses and for both first-time freshmen and new undergraduate transfers.

Significantly more UD SL courses were non-GE courses, the majority of which were also major-related courses, than were LD SL courses (96.2% vs. 54.0%). Particularly, UD SL courses taken by students were significantly closer to students' major areas. For example, 68.3% of UD SL courses taken by students were in students' major colleges, compared to 30.7% for LD SL courses. Furthermore, 40.4% of UD SL courses taken by students were in students' major departments whereas only 20.3% of LD SL courses taken were in students' major departments. The second set of factors relate to the characteristics of faculty members who taught SL courses. Significantly more UD SL courses were taught by full-time faculty members (65.1% vs. 54.4%), tenured/tenure track faculty members (49.1% vs. 29.6%), or faculty members who had SL training experience (32.1% vs. 27.0%) than LD SL courses. The last set of factors in Table 4 is students' performance in SL courses. Students in UD SL courses received significantly higher course grades and course passing rates than students in LD SL courses (3.21 vs. 2.97 on a 4.0 scale for the average course grade and 94.2% vs 89.6% for the course passing rate).

As will be discussed below, these characteristics may explain why SL participation had a stronger association with graduation for new transfer students than for first-time freshman. Compared to first-time freshmen, new transfers were significantly more likely to take UD SL courses (84.9% vs. 50.7%) and non-GE SL courses (93.4% vs. 70.2%). They were significantly more likely to take SL courses within their major colleges (67.7% vs. 47.8%) and major departments (40.4% vs. 29.4%) and were significantly more likely to take the SL courses taught by full-time faculty members (61.8% vs. 56.7%), tenured/tenure track faculty members (42.3% vs. 36.0%), or faculty members who had SL training experience (29.8% vs. 28.0%). In addition, they also performed significantly better than first-time freshmen in SL courses in terms of course grade (3.18 vs. 3.08 on a 4.0 scale) and course passing rate (93.4% vs. 91.9%).

Time-varying effects of SL taking. The time-varying effects models (in the right panels in Table 3) provide the term-specific odds ratios of graduation in a term across terms. For all four types of SL participation status, the estimated odds ratios varied across terms. However, there is no clear pattern or trend regarding in which term SL participation was more associated with graduation. In most terms, the direction and the size of the relationships were similar to the overall relationship from the time-fixing effect models. That the estimated odds ratios varied across terms without any clear patterns or trends indicates that taking SL courses in a term has a significantly positive relationship with students' graduation in any sequential terms.

The influences of covariates in graduation. Table 5 provides the detailed results from time-fixing effect models for SL participation defined as the number of SL courses taken. The time-fixing effect models allow us to evaluate the overall influences of covariates on graduation across terms within six

Table 4
Factors Moderating the Relationships of Service-learning with Graduation

4a. Comparisons between lower and upper division SL courses

		Lower division	Upper division
SL course enrollment	Number of SL courses taken	537	983
	Enrolled Headcount	8,865	13,367
Course characteristics	% of Upper division SL courses	0.0%	100.0%
	% of Non-GE SL courses	54.0%	96.2%***
	% of Students who took SL courses in their major colleges	30.7%	68.3%***
	% of Students who took SL courses in their major departments	20.3%	40.4%***
	Median of Class size	27	28**
Instructor characteristics	% of SL courses taught by full-time instructors	54.4%	65.1%***
	% of SL courses taught by tenured/tenure-track instructors	29.6%	49.1%***
	% of SL courses taught by instructors who had SL training	27.0%	32.1%*
Student performance	Average course grade	2.97	3.21***
	Course passing rate	89.6%	94.2%***

4b. Comparisons between first-time freshmen and new undergraduate transfers

		First-time full time freshmen	New full time undergraduate transfers
SL course enrollment	Number of SL courses taken	1,370	1,099
	Enrolled Headcount	16,089	6,143
Course characteristics	% of Students who took Upper division SL courses	50.7%	84.9%***
	% of Students who took Non-GE SL courses	70.2%	93.4%***
	% of Students who took SL courses in their major colleges	47.8%	67.7%***
	% of Students who took SL courses in their major departments	29.4%	40.%***
	Median of Class size	28	28
Instructor characteristics	% of Students who took SL courses taught by full-time instructors	56.7%	61.8%***
	% of Students who took SL courses taught by tenured/ tenure-track instructors	36.0%	42.3%***
	% of Students who took SL courses taught by instructors who had SL training	28.0%	29.8%*
Student performance	Average course grade	3.08	3.18***
	Course passing rate	91.9%	93.4%***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Independent samples t-tests were used to test the mean difference in course grade, independent samples Median Tests were used for the difference in medians of class size, and Pearson Chi-Square tests were used for the categorical variables.

years. The choices of time-fixing effect models and SL participation defined as the number of SL courses taken was for comparison purposes because both are closer to Lockeman and Pelco (2013).

Among seven variables in the models, the most significant variables were two academic performance measures (cumulative GPA and cumulative units earned in the beginning of terms), followed by the number of SL courses taken and gender, and then Pell eligible status and FGS status in terms of their statistical significances (Wald statistics). First-time freshman students were more likely to graduate within six years if they had higher cumulative GPA and earned more units, took more SL courses, were female, were not eligible for Pell grants, and were first-generation students. These characteristics hold for the new transfer students as well, except that the difference between first-generation students and students who were not first-generation was not statistically significant. In addition, our model found that URM status was not a significant factor related to students' graduation within six years.

The significantly positive association of SL participation with graduation found in this study is consistent with the finding of Lockeman and Pelco (2013), even though we defined SL participation

Table 5
Detailed Results from Time-fixing Effect Models

Variable	β	S.E.	Wald	df	Sig.	Exp(*β*)
5a. First-time full time freshmen						
# of SL courses taken	0.103	0.013	66.320	1	0.000	1.109
Gender (Female compared to Male)	0.224	0.028	61.957	1	0.000	1.251
URM (compared to Non-URM)	–0.045	0.030	2.300	1	0.129	0.956
FGS (compared to Non-FGS)	0.079	0.031	6.688	1	0.010	1.082
Pell eligible (compared to Non-eligible)	–0.190	0.031	38.592	1	0.000	0.827
Cumulative GPA in the beginning of term	0.290	0.029	102.418	1	0.000	1.336
Cumulative units earned in the beginning of term	0.072	0.001	11139.850	1	0.000	1.075
Constant	–10.917	0.118	8554.300	1	0.000	0.000
5b. New full time undergraduate transfers						
# of SL courses taken	0.292	0.019	229.167	1	0.000	1.339
Gender (Female compared to Male)	0.243	0.030	66.139	1	0.000	1.275
URM (compared to Non-URM)	–0.021	0.032	0.437	1	0.509	0.979
FGS (compared to Non-FGS)	0.041	0.031	1.788	1	0.181	1.042
Pell eligible (compared to Non-eligible)	–0.243	0.031	62.113	1	0.000	0.784
Cumulative GPA in the beginning of term	0.746	0.033	508.244	1	0.000	2.109
Cumulative units earned in the beginning of term	0.054	0.001	7290.246	1	0.000	1.056
Constant	–10.650	0.139	5906.454	1	0.000	0.000

differently (number of SL courses taken vs. number of SL credits earned). On the other hand, Lockeman and Pelco found that gender, race/ethnicity, financial need, financial aid, and number of semesters with Pell support were not significant factors affecting student graduation.

Discussion

This study examined how participation in SL courses was related to the graduation of first-time freshman and new transfer students. The overall findings of this study provided evidence that participation in SL courses increased students' likelihood of earning a baccalaureate degree. Moreover, participation in multiple SL courses was associated with an even higher likelihood of degree attainment. Similar to previous research, individual student characteristics, such as cumulative GPA and units earned, gender, and social-economic status, were factors associated with student graduation within six years (Astin & Oseguera, 2005; Crisp & Nora, 2010; DeAngelo et al., 2011; Pike et al., 2014). However, similar to Lockeman and Pelco (2013), controlling for these factors found that SL participation had a significantly positive association with graduation within six years for first-time freshman. In addition, the current study found a significantly positive association with graduation for new transfer students. The present study also found some unique relationships between SL participation and student graduation. First, participation in multiple SL courses had a stronger association than participation in one SL course. Second, participation in UD SL courses had a significantly stronger association with graduation than participation in LD SL courses. Third, SL participation had a significantly stronger association with graduation for new transfer students than first-time freshman.

We propose that the SL-graduation relationship is associated with the ways that SL creates engaging and relevant learning experiences, which promote students' commitment to their educational pursuits. Kuh and his colleagues (Kuh et al., 2005) proposed that increasing student engagement as well as deeper levels of cognitive and behavioral participation enhance students' levels of learning and likelihood of success in college. Research suggests that SL provides the conditions to promote such engagement, particularly through structures that involve autonomy and ownership of the learning process, application of course content in authentic settings, and reflection on personal development (Eyler & Giles, 1999; Hart & King, 2007; Pak, 2016; Yeh, 2010). Moreover, previous research on student retention has found that SL participation increases students' likelihood of continuing enrollment and maintaining an intention to persist toward degree completion (Bringle et al., 2010; Gallini & Moely, 2003). These studies specifically identified that the academic challenge and engagement fostered through SL pedagogy are keys to facilitating student persistence. As such, SL can be viewed as a pedagogy of engagement that fosters students' pursuit of immediate academic goals and long-term aspira-

tions. Further, the current results support previous research that found students' prior SL experiences influence subsequent SL experiences (Jameson et al., 2008). Indeed, multiple experiences with SL courses has a cumulative effect on students' likelihood of graduation (Lockeman & Pelco, 2013).

Interestingly, the present study found this SL-graduation relationship to be significantly stronger for transfer students than for first-time freshman. A substantial body of research has shown that undergraduate students who transfer to a four-year university are less likely to complete baccalaureate degrees within six years than students who persist at the same institution for their academic tenure (Davis, 2012; Dennis et al., 2008; Laanan, 2001; Li, 2010). These studies found that due to academic and social adjustments transfer students struggle to develop a sense of commitment to the institution and to degree completion. Tinto (1993) and Astin (1999) assert that developing such feelings of connectedness, value, and belonging are essential for students to feel satisfaction with the higher education experience and subsequently develop a commitment to graduation. Previous research has found that SL courses foster students' sense of belonging through multiple and frequent interactions with peers, faculty, and community members (Greenberg, 1997; Keup, 2005; Wolff & Tinney, 2006). The findings of the current study suggest that the interactive and collaborative nature of SL courses create experiences that support transfer students' integration into the social and academic communities of their new institutions.

Another explanation for the SL-graduation relationship difference between transfer students and first-time freshman appears to be related to the SL-graduation relationship difference between UD and LD SL courses. Participation in UD SL courses had a significantly stronger association with graduation than participation in LD SL courses. Further analysis suggests these findings were associated with previously identified moderating factors (Table 4). In the present study, UD SL courses were more aligned with students' majors, and transfer students were more likely to take UD SL courses than first-time freshman. Research has found that student outcomes are influenced by the different types of SL courses. In particular, students tend to be more intrinsically motivated to spend more time and effort in courses related to their major areas of study (Roldan et al., 2004; Strage et al., 2002). Thus, taking SL courses associated with their majors may have increased transfer students' intrinsic motivation to engage in academic tasks, which is an academic disposition highly correlated with student persistence and degree attainment (Dennis, Phinney, & Chuateco, 2005; Guiffrida 2006; Robbins, Lauver, Le, Davis, & Langley, 2004).

UD SL courses were also more likely to be taught by full-time faculty and faculty trained in SL practices. As previous research has indicated, the quality of the SL course greatly influences student outcomes (Aronson et al., 2005; Bringle et al., 2010; Jameson et al., 2008). Full-time faculty may be more likely to have established relationships with community partners and to structure courses in ways that better prepare students prior to engaging in the SL experience. Such prior preparation has been associated with more positive outcomes (Aronson et al., 2005). Likewise, SL courses designed by faculty with expertise in SL pedagogy are more likely to include practices that strengthen SL outcomes, such as consistent support and feedback (Ash & Clayton, 2009) and continuous critical reflection opportunities (Eyler & Giles, 1999; Jameson et al., 2008).

Lastly, students' performance in SL courses in this study may have moderated the relationships of SL participation with graduation. Students taking UD SL courses had higher course grades and passing rates than students taking LD SL courses; transfer students had higher SL course grades and passing rates than first-time freshman. As Lockeman and Pelco (2013) found, passing a greater number of SL classes increased students' odds of graduating. We propose that these three factors – alignment of SL courses with students' areas of study, faculty expertise in SL pedagogy and practice, and student performance in SL courses moderated the SL participation-graduation relationship.

Conclusions and Implications

The results of this study suggest that SL is a high-impact practice that increased the likelihood of student graduation. Higher education institutions may want to develop SL initiatives to support efforts to increase graduation rates. Though previous research has found that students benefit from SL earlier in their academic experiences (Bringle et al., 2010; Roldan et al., 2004), the unique relationship of UD SL courses with graduation in this study suggests that institutions should develop initiatives that promote student participation in SL courses across their academic experiences. Providing LD SL courses may be beneficial to students entering the university immediately after high school; however, developing UD SL courses may benefit both the native students advancing in their academic pursuits and transfer students as they adjust to new social and academic communities. The unique UD SL course relationship with graduation also sug-

gests that institutions should consider promoting SL course development across disciplines. Such initiatives should address the professional development of faculty, so they can design high-quality SL courses, and advisors, so they can guide students toward SL courses aligned within their majors.

The results of this study and the proposed recommendations for institutions must be considered within the limitations of this study, which we identify here and then propose directions for future research. This study was conducted at a large state university in the western U.S., in which the general characteristics and the specific SL program may be very different from other institutions. As evident by the large number of SL courses and the high percentage of students participating in these courses, this university demonstrates a strong commitment to SL program development. The university's Center for Community Engagement and Service-Learning provides online modules for students and faculty about SL principles, goals, and practices; provides professional development institutes; supports ongoing SL faculty learning communities; and facilitates university-community partnerships. Replicating this form of analysis across different institutions could uncover other SL participation-graduation relationships or confirm those in the present research. Though we tried to identify the time-varying relationship of SL participation with graduation, we were not able to determine a clear pattern. The time-varying effects may not relate to SL participation in general but rather to participation in specific SL courses. It might be productive to analyze if SL participation in particular courses, in specific terms, is more important for students who are in specific majors than in other majors. Further, this study did not control for self-selection – whether students voluntarily chose to take a SL course or if it was a requirement. Without accounting for this factor, an estimate of the relationship of SL participation and graduation would be biased. This may lead to overestimation; students may be more motivated to select SL courses, which may influence their persistence to succeed. Thus, our analysis may suffer from self-selection bias and needs to be addressed in future research by accounting for students' reasons for course selection. Many institutions, including the one in this study, are implementing multiple high-impact practices to support student persistence and degree completion. Participating in one or more high-impact practices increases the likelihood of graduation (Finley & McNair, 2013); therefore, future research should account for students' participation in combinations of HIPs. Lastly, we suggest that researchers employ mixed-methods, integrating qualitative approaches, to provide a rich description of students' experiences, perceptions, and behaviors specific to particular SL courses. Moely, Furco, and Reed (2008) note that since SL is enacted across a range of disciplines and course types, there is a variance in the quality of courses and subsequent impacts. Qualitative approaches would extend knowledge by probing more deeply into the conditions of SL experiences, such as the type of service, location, duration, and nuanced procedures that foster students' pursuit of their academic goals.

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