

Paper [ENGAGE: Co-curricular Profile for Engineering Students at Cal Poly, San Luis Obispo]

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Montana is a graduate student at Cal Poly San Luis Obispo, currently earning her M.S. in Higher Education Counseling and Student Affairs. She is originally from San Diego, CA and earned her B.A. in History at UCLA. In addition to being a graduate student, Montana is the Graduate Assistant at the Cal Poly Transfer Center, and works closely with New Student and Transition Programs, specializing in the Transfer Orientation Experience. She is passionate about diversity, equity and inclusion, which has led her to pursue research opportunities surrounding these topics. As a former foster youth, low-income and first-generation college student herself, Montana understands the difficulty students often face when trying to acclimate to their campus environment. Inspired by her own experiences, she strives to create a stronger sense of belonging for underrepresented minority students on college campuses. Her top five Clifton Strengths are: Futuristic, Discipline, Focus, Restorative, Achiever.

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ENGAGE: Co-curricular Profile for Engineering Students at a Four-Year, Primarily Undergraduate Polytechnic University

Abstract

There are many studies¹⁻⁸ supporting the importance of informal education opportunities for college students. For many engineering and computer science students, informal educational opportunities often come in the form of co-curricular activities, such as student clubs. These co-curricular activities give space for students to put their studies into context, help students build identities as engineers or computer scientists, and provide social outlets where students can find emotional support, peer accountability and immediate feedback.

In this work-in-progress, we wanted to measure co-curricular engagement of students at Cal Poly, San Luis Obispo (Cal Poly). Cal Poly is a primarily undergraduate polytechnic university with a strong student club culture. To begin this study, we employed the PosSE survey⁶ which is a validated instrument for measuring out-of-class engagement of engineering students to help provide a profile of out-of-class activities by Cal Poly undergraduates. For this paper, we compare the PosSE survey data from Cal Poly against a “predominately white institution”⁶ located in the Mid-Atlantic of the United States which looks to be an R1 institution.

We find remarkable similarities between out-of-class activities between the two different student populations, despite the different missions of the two universities. Similarities include the types of out-of-class activities, reasons for participating in out-of-class activities, and barriers to participating in out-of-class activities. A highlight of some of the differences include: research activities were more highly valued at the R1 school, where design competition teams were more highly valued at Cal Poly. It also appears that Cal Poly’s strong club culture promotes a greater sense of belonging to the college than in the R1 school, whereas students at the R1 school were more likely to appreciate professional and intellectual development. At this time, this work falls short of correlating student success with involvement in co-curricular activities. Future research looks at making these correlations and investigating institutional barriers preventing minority populations from participating in out-of-class activities.

Importance of out-of class activities

Prior research has highlighted the numerous advantages of co-curricular and extracurricular activities. Co-curricular activities are key to developing self-identity, social networks and to increase career prospects¹. Some studies have shown out-of-class activities were shown to have a positive positive influence on student academic success. These positive activities range from living in a residence hall, academic clubs and faculty-related research projects. Other out-of-class

activities, such as athletics, full-time work and involvement in social Greek life may have negative outcomes on student success ^{8,9}.

More recently, research has been conducted specifically on engineering students factors for participation in co-curricular and extra-curricular activities as well as positive and negative student outcomes ^{5,6,9}. Lack of time is the top cited factor that prevents students participating in co-curricular activities, followed by cost and lack of knowledge about co-curricular opportunities. Top reasons for participating in co-curricular activities include alignment with personal interests and to gain experiences to improve employment opportunities. Top positive outcomes of co-curricular participation include personal/professional development, communication skills and social engagement. Meanwhile, top negative outcomes of co-curricular participation include reductions in free time, scheduling pressures, increased academic timelines and increased financial cost.

For the purposes of this paper, we will use the terms out-of-class activities to mean either co-curricular activities or extra-curricular activities. Co-curricular activities are those activities that support a student's learning of their chosen major. While co-curricular activities in engineering certainly include activities that apply in-class learning such as engineering competition clubs and faculty-led research projects, we also classify co-curricular activities as those activities that support professional skills needed by engineers, such as project management and communication skills. Extra-curricular activities are activities which don't directly relate to engineering, but still may impart professional skills such as leadership skills. We recognize that there is not a clear dichotomy of co-curricular and extra-curricular activities. Students who participate in an engineering club may only participate in a social-level, whereas students who participate in Habitat for Humanity clubs may be practicing engineering skills.

Postsecondary Student Engagement (PosSE) Survey Overview

The PosSE survey was spearheaded by Dr. Denise Simmons at Virginia Tech as part of an NSF CAREER award⁶. Beyond student demographic information, the PosSE survey asks survey respondents to 1) identify the type of out-of-class activities they participate in, 2) what factors promoted and hindered involvement in out-of-class activities (examples: "gain experiences that make me competitive in the job market" vs. "lack of time", 3) the positive and negative outcomes from participation in out-of-class activities (examples: "personal development" vs. "academic timeline extended"), and 4) affectual responses about their involvement as a student at their institution. Survey results were published in 2017 based on 133 undergraduate and graduate students from a university in the Mid-Atlantic portion of the United States.

Methods

Using a modified PosSE survey, we proceeded with a quantitative research method. The modified PosSE survey was sent via email to all engineering students at Cal Poly in May of 2020. We received 534 survey responses, of which 454 responses were “mostly complete”.

The eventual purpose of this study is to 1) determine a base-line of student involvement in out-of-class activities, 2) determine if these out-of-class activities were “co-curricular” or extracurricular, 3) if the type of activity can be correlated to student success and 4) identify any systemic barriers that prevent some groups of student in participating in co-curricular activities with a special emphasis on equitable participation in co-curricular activities.

Our version of the PosSE survey was nearly identical to the PosSE survey as published ⁶. We did omit a generic “student clubs” out-of-class activity as we felt this category was not specific enough as the rich diversity of student clubs at Cal Poly which includes over 200 clubs in just the college of engineering.

Similarities and differences in the PosSE survey results

Table 1 shows the demographics of the two survey populations from the university from the Mid-Atlantic portion of the United States (from hereon referred to the PosSE university) and Cal Poly. Survey respondents at Cal Poly show similar gender profiles, with more Asian respondents than the PosSE university. Since Cal Poly is a primarily undergraduate institution, the number of graduate students at the PosSE university is much greater. Finally, the PosSE university students surveyed were not limited to only engineering students, whereas at Cal Poly, only engineering students were polled.

		PosSE University	Cal Poly
gender	male	65	223
	female	65	202
	not reported	3	100
	queer/non binary	x	10
race	asian	21	162
	black	8	0
	hispanic	11	30
	white	87	198
	other	6	14
	n/a		116
Classification	1st year	20	50
	sophomore	19	72
	junior	16	121
	senior	14	178
	5th year and beyond	8	84
	graduate	56	29
Major	Science	18	

Technology	6	
Engineering	107	534
Mathematics	2	

Table 1. Survey respondent demographics

Out-of-class activities for PosSE university students versus Cal Poly's students are shown in Table 2. Again, the "student club" category was omitted from the survey at Cal Poly because the experiences in Table 2 at Cal Poly are mostly driven by student clubs. Biggest differences between the PosSE university and Cal Poly is that students at Cal Poly are more likely to participate in design competitions and less on research. This is in-line with our expectations of comparing a presumably R1 PosSE University with a primarily undergraduate institution. To a lesser extent, students at the PosSE university were less likely to have part or full-time employment and more likely to list "service" as a common out-of-class activity.

	PosSE University		Cal Poly	
	Number	Percentage	Number	Percentage
sports	63	47.37%	252	55.51%
student clubs/orgs	58	43.61%		
research	54	40.60%	128	28.19%
job	51	38.35%	297	65.42%
engineering outreach	49	36.84%	194	42.73%
service	48	36.09%	140	30.84%
pre-professional	47	35.34%	246	54.19%
professional experience	44	33.08%	213	46.92%
culture/faith/gender/identity	41	30.83%	181	39.87%
living-learning community	41	30.83%	129	28.41%
design competition team	36	27.07%	281	61.89%
music/dance	30	22.56%	105	23.13%
international	21	15.79%	62	13.66%
government	14	10.53%	16	3.52%
greek life, service	13	9.77%	41	9.03%
environmental	12	9.02%	78	17.18%
greek life, social	12	9.02%	55	12.11%
film/theater/vis arts	7	5.26%	57	12.56%
media, publication	7	5.26%	24	5.29%
military	4	3.01%	5	1.10%
other			130	28.63%

Table 2. Out-of-class activities

There are many reasons to participate in out-of-class activities. Figure 1 shows the factors in the PosSE survey that promote involvement in out-of-class activities. Respondents were asked to rate from a scale of 1 to 6 (matching the PosSE survey Likert scale) where a response of "1" is "Strongly disagree" and a response of 6 is "Strongly agree". From Figure 1, we see remarkable

similar reasons cited for participating in out-of-class activities. PosSE university students are more likely to participate in out-of-class activities to make a positive impact on the campus or community whereas Cal Poly students felt they had more time to participate in out-of-class activities and were more likely to participate in activities that break down gender or racial barriers.

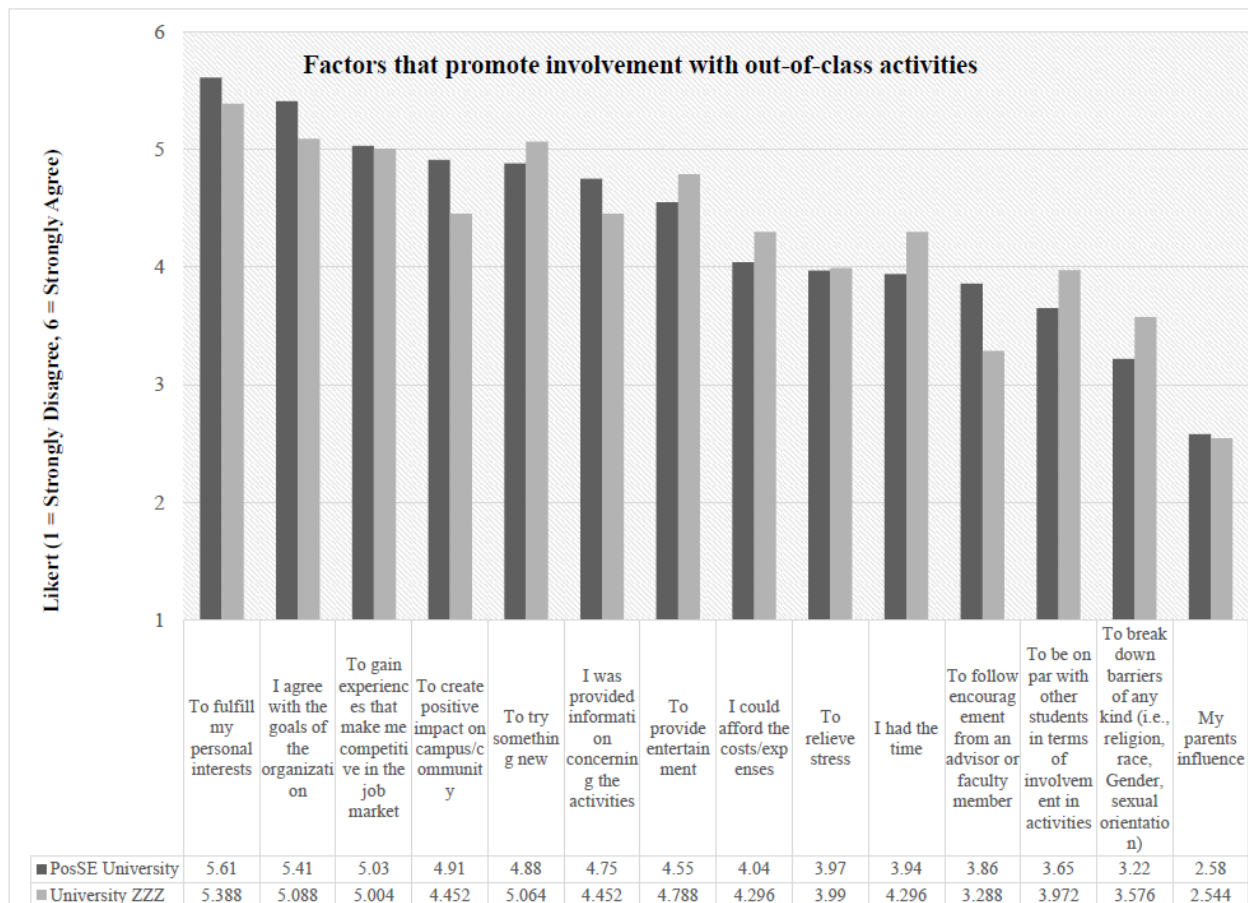


Figure 1. Factors that promote involvement with out-of-class activities

Likewise, there are many barriers for students to participate in out-of-class activities. Results of the survey on barriers are in Figure 2. Cal Poly students are more likely to fear a negative impact to their education, claim to be more introverted and lack the motivation to participate in out-of-class activities.

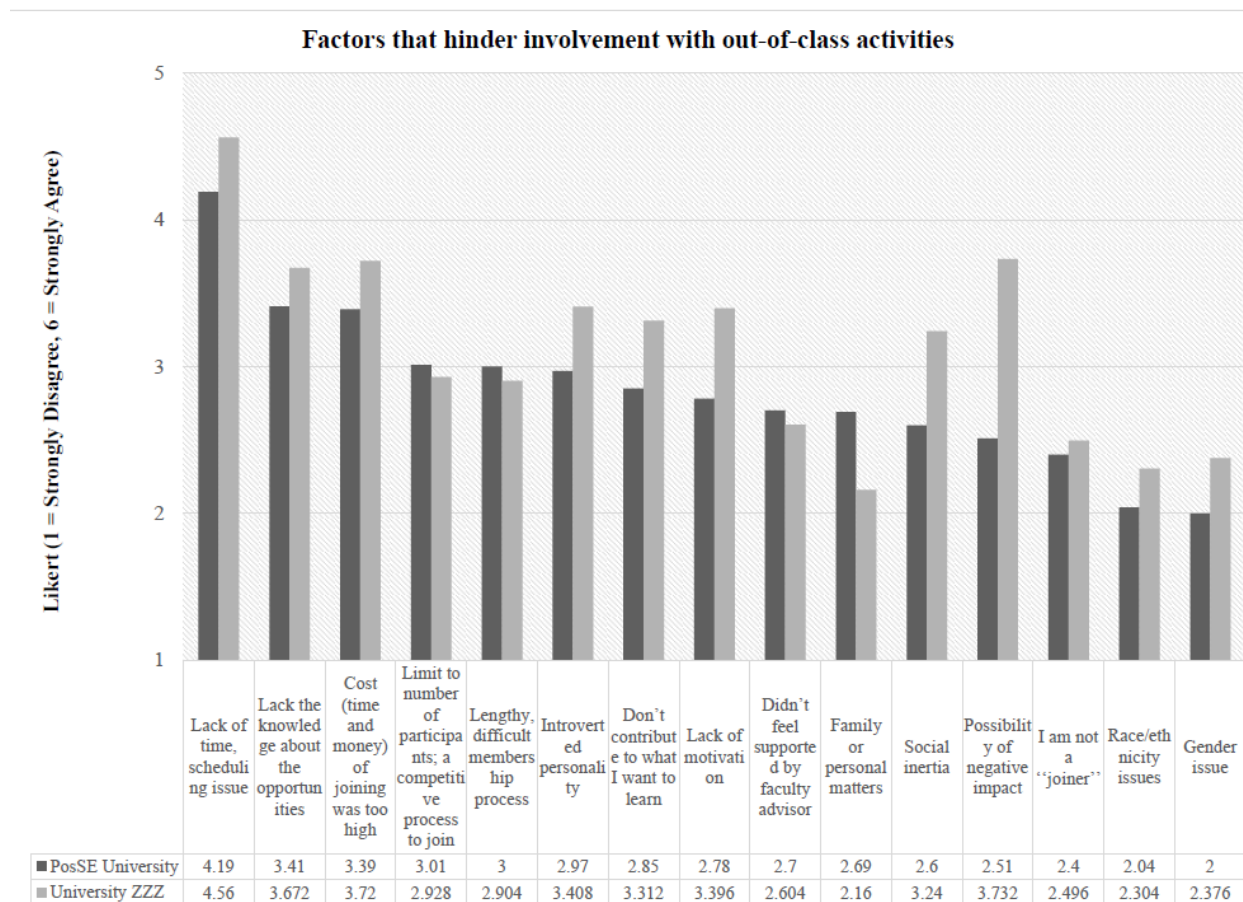


Figure 2. Factors that hinder involvement with out-of-class activities.

Figures 3 and 4 summarize the positive and negative outcomes perceived by students from out-of-class activities. Again, there is remarkable similarity in the survey results. From Figure 3, we can see that PosSE university students are more likely to appreciate the intellectual, academic or professional gains from their out-of class activities whereas Cal Poly students derive a larger sense of belonging to their college.

Perhaps troubling for Cal Poly, as seen in Figure 4, students were more likely to cite negative outcomes to their GPA and health than PosSE university students.

Discussion, Limitation and Future Work

We plan to issue a modified PosSE survey for the next 3 years at Cal Poly, as part of a research project investigating transfer student success. Transfer students at Cal Poly are a large source of diversity and a pathway that we are trying to grow. The goal of the transfer-student research project is to identify and address any systemic barriers for participation of underrepresented students. Do transfer students participate in activities that we associate with successful students, like co-curricular activities?

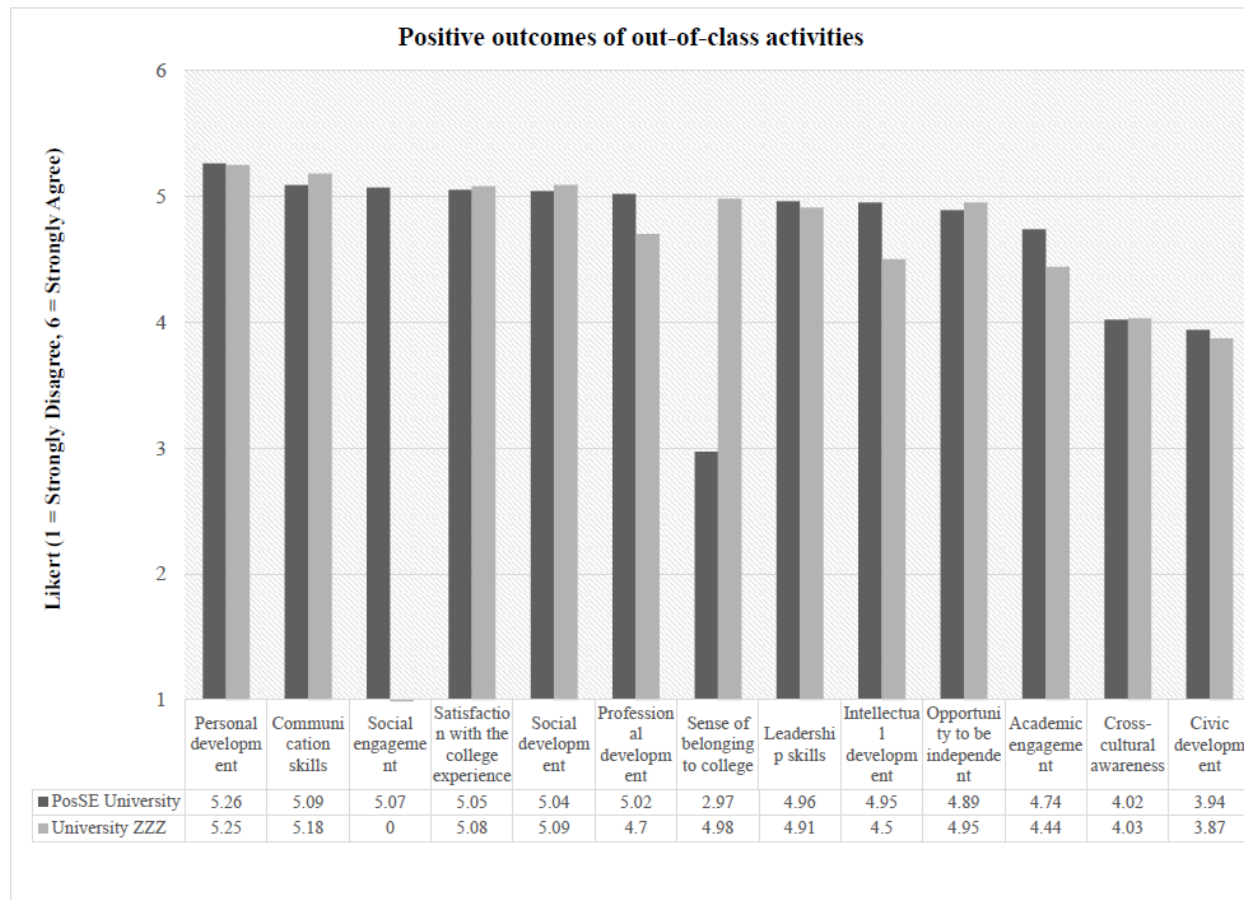


Figure 3. Positive outcomes of student participation in out-of-class activities

We are also interested in understanding if the type of out-of-class activity correlates to student success. As academics, we highly promote co-curricular activities that support in-class learning. But it could be that the social aspects of co-curricular and a broader range of out-of-class activities support student success. In this regard, COVID-19 has provided a unique opportunity. We conducted the PosSE survey at the very early stages of the COVID pandemic and did not catch the full impact of COVID-forced distance-learning on out-of-class activities. Future work includes re-issuing the PosSE survey to measure the impact that COVID has had on out-of-class activities, and future survey will hopefully measure the recuperation of out-of-class activities that were impacted by the pandemic.

One shortcoming of using the PosSE survey for our research goals is that student participation in an out-of-class activity could be more or less co-curricular, thus making it difficult to discern if the type of activity is important to student success. Is a student who is a club member of an IEEE club, but only participates in social events through the club participating in a co-curricular activity? To remedy this, in the next iteration of the survey, we plan on asking students to rate

their own personal involvement with their out-of-class activities. We also plan on asking students to self-report their GPA as a measure of student success.

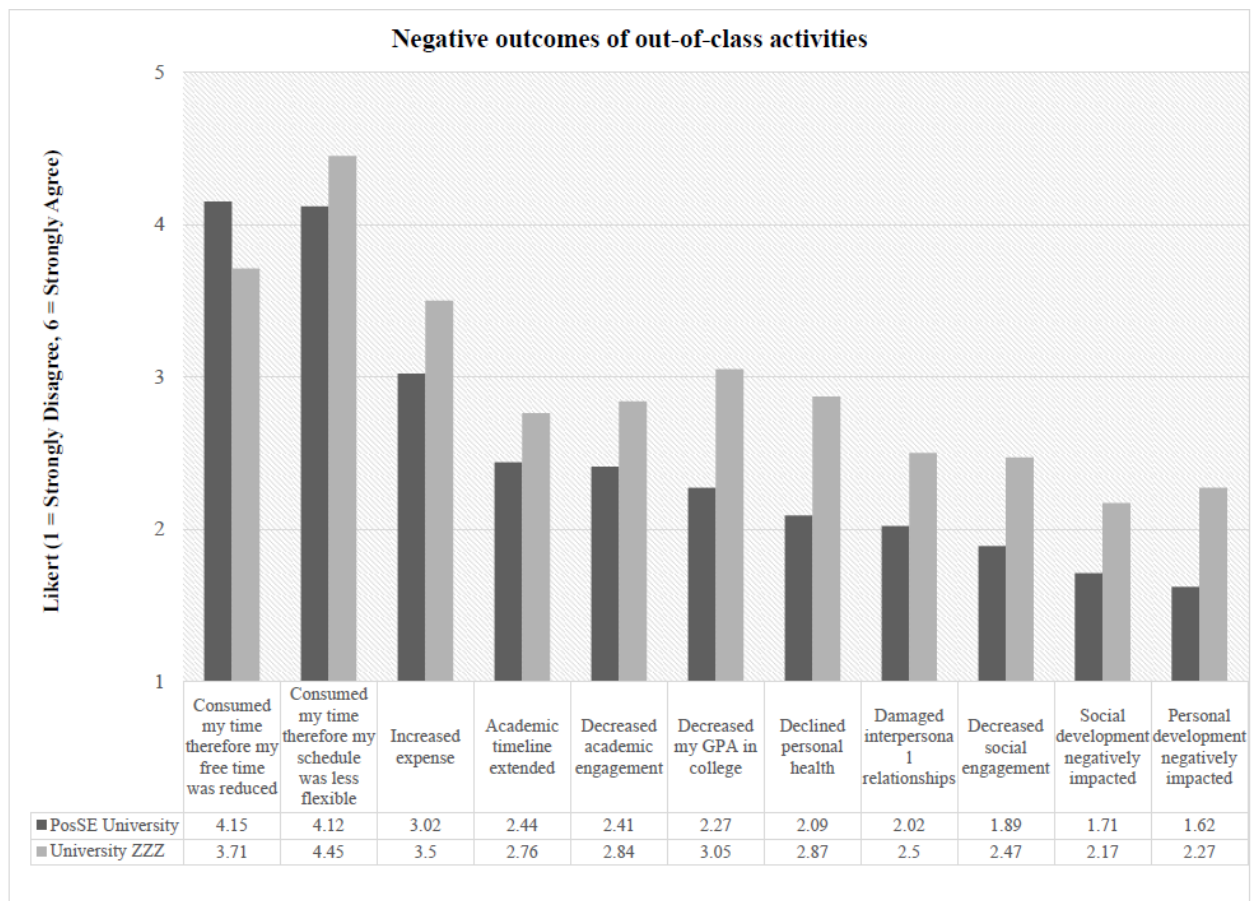


Figure 4. Negative outcomes of student participation in out-of-class activities

At this time, we have yet to complete an analysis of the affective results of the modified PosSE survey, but will be included in future work. The original PosSE survey affective research has moved in the direction of a climate survey¹⁰, and less of an analysis of the effectiveness of co-curricular activities, and thus the comparisons are of limited use. Future iterations of our survey will be shortened (currently the PosSE survey as we issued has over 140 questions), de-emphasizing the affective questions in favor of a shorter survey which will hopefully provide more complete survey responses.

We welcome input on our analysis and future suggestions.

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