Table 1: Demographics

	SAU Undergraduate Residential		SAU Study Abroad (Fall/Winter & Spring/Summer)		National Norming Group[1]	
	Pre	Post	Pre	Post	Pre	Post
Sample Size	155	80	46	26	24,000	
% male	16	14	7	4	31	
% female	84	86	93	96	69	
% non-European	8	5	7	4	33	
% international	1	1	9	4	7	
% Health sciences	39	41	33	35	16	
% Business majors	13	13	22	23	19	
% Social Sciences	11	15	11	12	11	
% Education	11	14	4	4	9	
% STEM majors	10	6	13	15	12	
% Arts/Humanities	5	6	9	--	15	
% Other majors	11	4	8	11	18	
% new/freshmen	43	33	9	--	26	
% sophomore	23	31	35	38	20	
% junior	12	15	35	27	27	
% senior	19	20	15	27	27	
% graduate	3	1	6	8	--	
Mean cumulative GPA (standard deviation)		3.69 (.31)		3.61 (.39)		

(1) Source: https://gpi.central.edu/supportDocs/Interpretative_guide.pdf

Table 2: GPI Matrices

	SAU Undergraduate Residential			SAU Study Abroad			Private BA and MA Norming Group*	
	Pre	Post	Diff	Pre	Post	Diff	Mean Score	Diff**
Cognitive Knowing	3.50	3.59	+0.09	3.66	3.92	+0.26	3.61	+0.11
	(.46)	(.44)	+0.20	(.35)	(.45)	+0.64		
Cognitive Knowledge	3.34	3.29	-0.05	3.39	3.65	+0.26	3.56	+0.27
	(.62)	(.64)	-0.08	(.54)	(.51)	+0.50		
Interpersonal Identity	4.12	4.22	+0.10	4.09	4.25	+0.16	4.09	+0.15
	(.48)	(.56)	+0.19	(.47)	(.36)	+0.38		
Interpersonal Affect	3.69	3.66	-0.03	3.72	4.02	+0.30	3.79	+0.13
	(.44)	(.41)	-0.07	(.34)	(.36)	+0.86		
Interpersonal Social Responsibility	3.82	3.90	+0.08	3.74	4.00	+0.26	3.69	+0.06
	(.51)	(.51)	+0.16	(.40)	(.44)	+0.62		
Interpersonal Social Interaction	3.37	3.38	+0.01	3.50	3.78	+0.28	3.48	+0.13
	(.42)	(.48)	+0.02	(.36)	(.38)	+0.76		
Well-Being	3.81	3.86	+0.05	3.76	4.08	+0.32	Not reported	
	(.46)	(.47)	+0.11	(.37)	(.39)	+0.84		
Global Citizenship	3.54	3.57	+0.03	3.61	3.92	+0.31	Not reported	
	(.46)	(.50)	+0.06	(.40)	(.35)	+0.82		

Numbers represent means (standard deviations) for each Global Perspective Inventory matrix
Pre- to post-test effect sizes (change from pre- to post-study abroad experience in standard deviation units)
* Represents 9,442 students from 47 institutions: https://gpi.central.edu/supportDocs/Interpretative_guide.pdf
** Represents change in scores, following a study abroad experience, for more than 700 students in 50 programs over the past 2 years

1. Before any study abroad experience, how do students who choose to study abroad compare to other undergraduate residential students at SAU? How do SAU students compare to the national norming group?

Compared to other undergraduate residential students at SAU, the students who choose to study abroad are more likely to be female; more likely to major in Business or STEM fields; and are more likely to be upperclassmen. Because of this, and because upperclassmen tend to score higher than freshmen across all GPI scales (Interpretive Guide, p. 14), it is important to compare GPI scores for SAU students prior to any study abroad experiences.

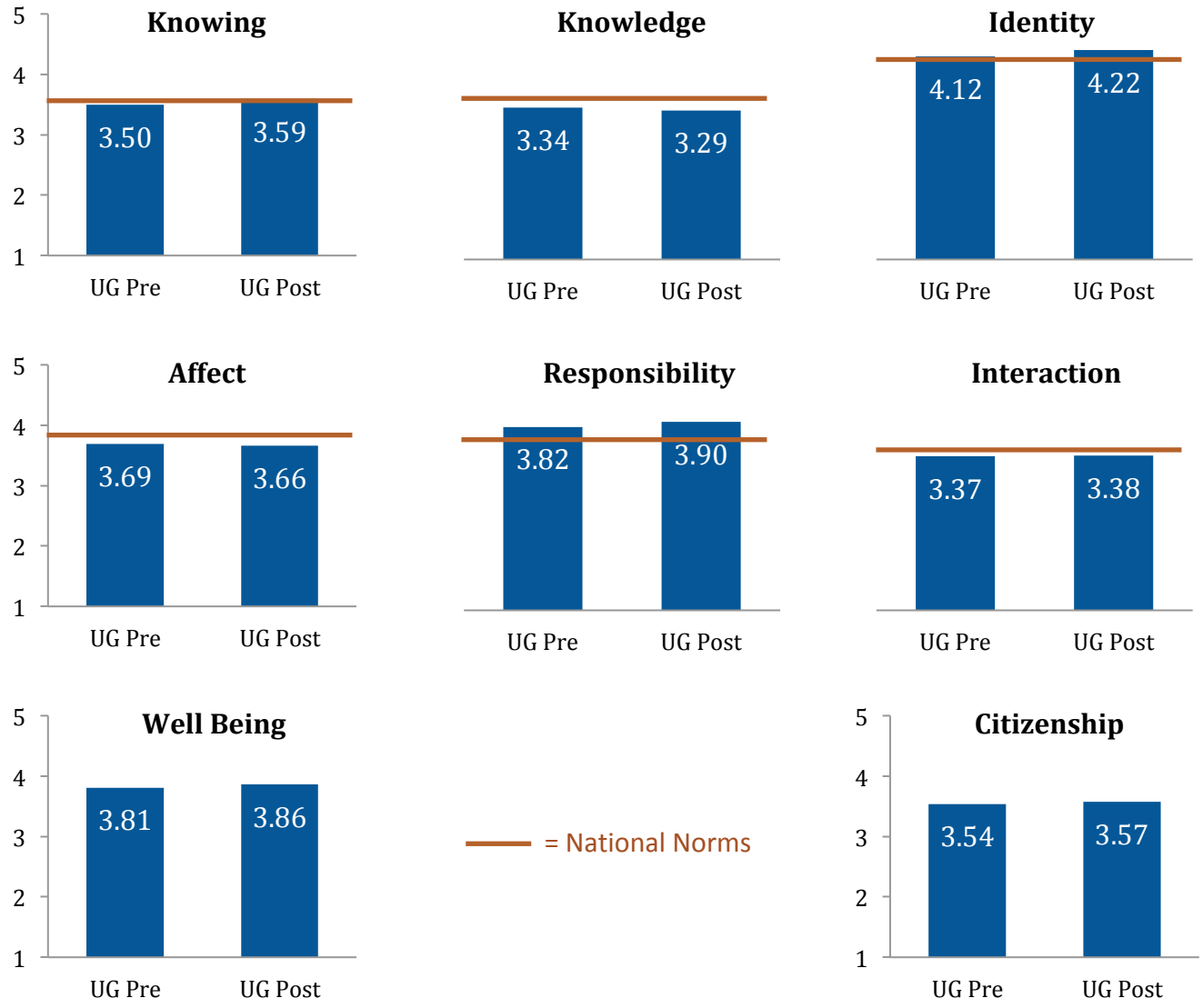


Table 3: Differences between SAU study abroad and other residential undergraduate students

	Knowing	Knowledge	Identity	Affect	Responsibility	Interaction	Well-being	Citizenship
SAU Study Abroad	3.66	3.39	4.09	3.72	3.74	3.50	3.76	3.61
SAU UG Residential	3.50	3.34	4.12	3.69	3.82	3.37	3.81	3.54
Mean Difference	0.16	0.05	-0.03	0.03	-0.08	0.13	-0.05	0.07
95% CI Lower Bound	-0.01	-0.25	-0.40	-0.26	-0.48	-0.03	-0.44	-0.17
Effect Size	+0.34	+0.08	-0.07	+0.07	-0.15	+0.30	-0.11	+0.16
95% CI Upper Bound	+0.67	+0.41	+0.26	+0.40	+0.18	+0.63	+0.22	+0.49

In spite of any demographic differences, GPI matrix scores at SAU for students who chose to study abroad did not differ significantly from other SAU undergraduate residential students (prior to any study abroad experience). Overall, SAU students scored relatively highest in interpersonal identity, well being, and interpersonal social responsibility. SAU students scored relatively lowest in interpersonal social interaction and cognitive knowledge.

Because no standard deviations are reported for the norming group, it is not possible to determine if GPI scores for SAU students differ significantly (beyond random chance or sampling error) from the norming group. If we assume GPI score standard deviations for the norming group are equal to those of all SAU students (pre-study abroad experience), then we at least estimate effect sizes (differences between GPI scores for SAU students, prior to any study abroad experience, and the norming group in terms of standard deviation units) for each GPI matrix:

Table 4: Differences between SAU students (prior to study abroad experience) and the norming group

	n	Knowing	Knowledge	Identity	Affect	Responsibility	Interaction
SAU Pre-Study Abroad	201	3.54	3.35	4.11	3.70	3.80	3.40
Private BA/MA norms	24,000	3.61	3.56	4.09	3.79	3.69	3.48
Mean Difference		-0.07	-0.21	0.02	-0.09	0.11	-0.08
Effect Size		-0.15	-0.34	+0.04	-0.20	+0.22	-0.19

Cohen (1969), after warning that interpretations of effect sizes depend on the context (p. 25), provides a frame of reference for interpreting effect sizes: effect sizes greater than 0.50 are *medium* or *noticeable*, while effect sizes greater than 0.80 are *large* or *grossly perceptible*. Using that frame of reference, there are no noticeable differences in global perspective between SAU students (prior to any study abroad experience) and the national norming group. In terms of global perspective, SAU students are average.

Source: Cohen, J. *Statistical power for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum

2. If SAU students, prior to any study abroad experience, score average in global perspective, what impact does a study abroad experience have? Do students completing a study abroad experience score higher on the GPI matrices?

To determine the effect of a study abroad experience on the global perspective of SAU students, results from the GPI were compared for students prior to and following the study abroad experience. Effect sizes were calculated to determine the potential impact of the study abroad experience on students.

Table 5: GPI scores for SAU students prior to and following the study abroad experience

		Knowing	Knowledge	Identity	Affect	Responsibility	Interaction	Well-being	Citizenship
SAU Study Abroad Students	Pre	3.66	3.39	4.09	3.72	3.74	3.50	3.76	3.61
	Post	3.92	3.65	4.25	4.02	4.00	3.78	4.08	3.92
	Gain	0.26*	0.26*	0.16	0.30*	0.26*	0.28*	0.32*	0.31*
	Lower	+0.15	+0.01	-0.10	+0.36	+0.13	+0.26	+0.34	+0.33
	Effect**	+0.64	+0.50	+0.38	+0.86	+0.62	+0.76	+0.84	+0.83
	Upper	+1.13	+0.99	+0.86	+1.36	+1.11	+1.26	+1.34	+1.33

* p<0.05

** Lower and Upper display the bounds of a 95% confidence interval for each effect size

SAU students participating in study abroad experienced significant, noticeable increases in 7 of the 8 global perspective matrices. The confidence intervals reported for each effect size indicate that these increases may be large ("grossly perceptible"), with the largest gains reported in interpersonal affect, well being, global citizenship, and interpersonal social interaction (a relative weakness of SAU students).

While these results are encouraging, they do not prove that the study abroad experience *caused* an increase in global perspective. The increase in scores could be due to a biased sample of students completing the post-study abroad survey or due to factors beyond study abroad (such as a natural maturation in students or other experiences on campus at SAU).

One way to better determine the impact of study abroad would be to compare gains made by study abroad students to gains made by students who did **not** participate in study abroad.

Table 6: Pre- and post-study abroad GPI scores for SAU students not participating in study abroad

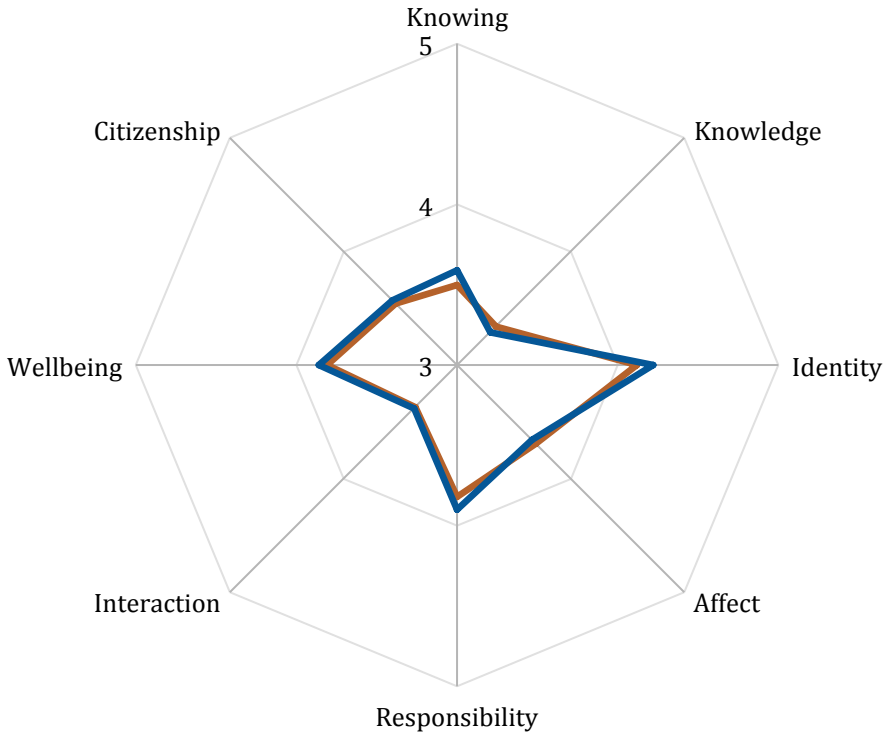
		Knowing	Knowledge	Identity	Affect	Responsibility	Interaction	Well-being	Citizenship
SAU No Study Abroad	Pre	3.50	3.34	4.12	3.69	3.82	3.37	3.81	3.54
	Post	3.59	3.29	4.22	3.66	3.90	3.38	3.86	3.57
	Gain	0.09	-0.05	0.10	-0.03	0.08	0.01	0.05	0.03
	Lower	-0.07	-0.35	-0.08	-0.34	-0.11	-0.25	-0.16	-0.21
	Effect**	+0.20	-0.08	+0.19	-0.07	+0.16	+0.02	+0.11	+0.06
	Upper	+0.47	+0.19	+0.46	+0.20	+0.43	+0.29	+0.38	+0.33

* p<0.05

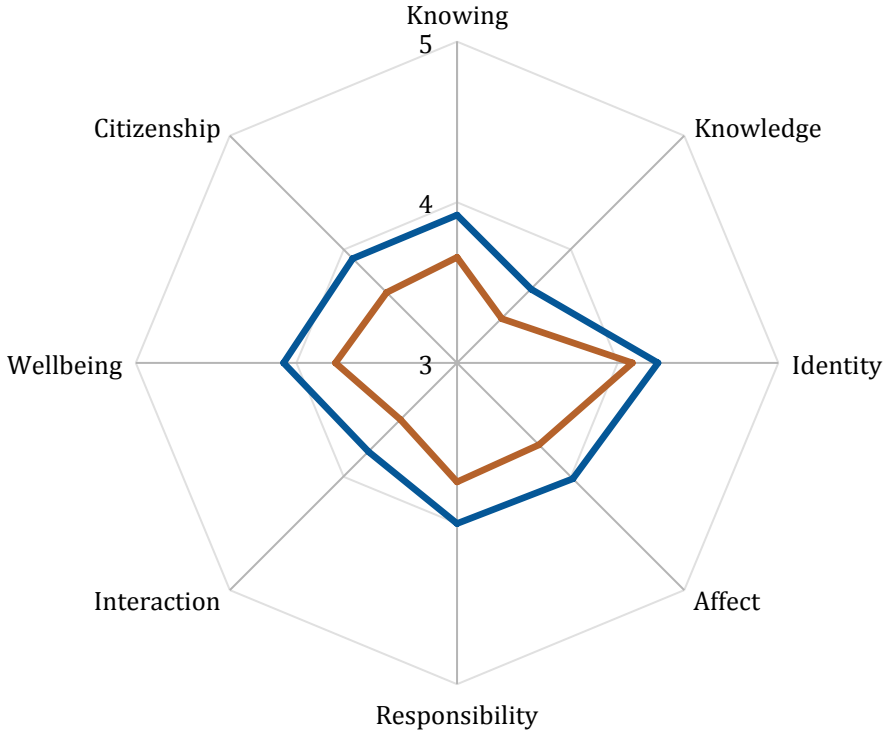
** Lower and Upper display the bounds of a 95% confidence interval for each effect size

The confidence interval bounds for the effect sizes indicate that SAU students who did not participate in study abroad experienced no significant (and certainly no noticeable) gains in global perspective. This provides further support for concluding that the study abroad experience is associated with a significant, noticeable increase in global perspective.

The following radar charts visualize the growth in global perspective matrices for students who did and did not participate in study abroad. The orange (inner) line represents GPI scores prior to any study abroad experience and the blue (outer) lines represent post-study abroad scores:

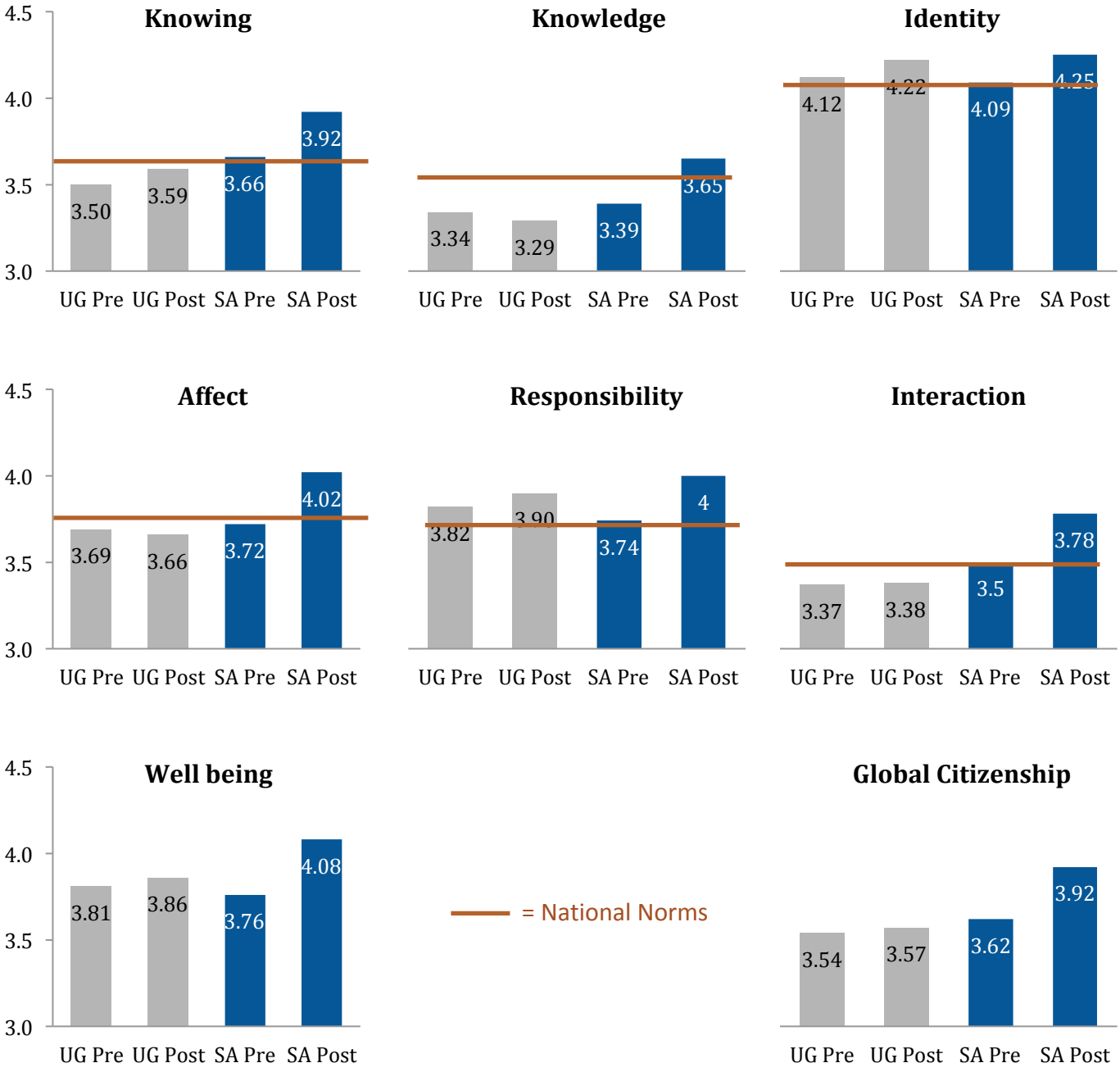


Upper Chart: SAU Undergraduate Residential students (who did not participate in study abroad)



Lower Chart: SAU students who did participate in study abroad

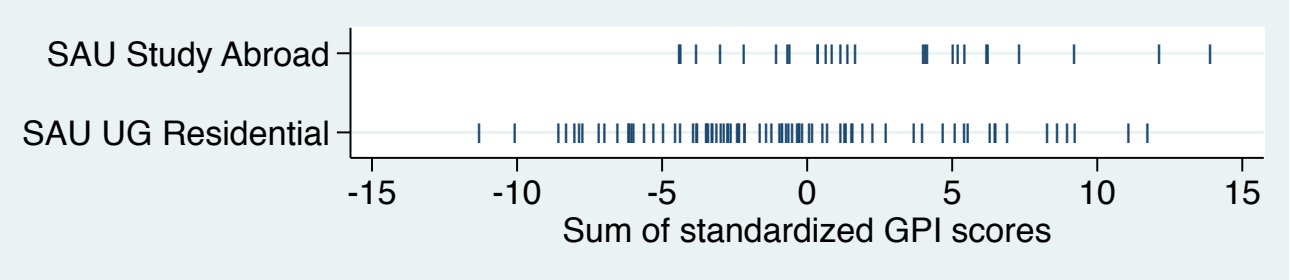
The radar charts, along with the bar charts below, further demonstrate how the study abroad experience is associated with increases in global perspective. Whereas SAU students prior to the study abroad experience were average in global perspective, SAU students participating in study abroad rate significantly higher in global perspective.



Undergraduate Residential (UG) and Study Abroad (SA) GPI scores pre- and post-study abroad experience

How much of the increase in global perspective is associated with study abroad and how much of it is due to demographic differences between study abroad students and the general undergraduate residential population at SAU? Recall that study abroad students were more likely to be female, more likely to major in business or STEM fields, are less likely to be freshmen, and have slightly lower GPAs. Could these factors explain why study abroad students outscore students who do not study abroad?

To address this question, a total global perspective score was derived from the data (following the study abroad experience). After standardizing each global perspective matrix (to have a mean of zero and a standard deviation of one), the matrices were summed to create a GPI total score. GPI total scores for SAU students ranged from -11.29 to 13.91, with higher scores indicating a higher level of global perspective. The following graph displays the GPI total scores for all study abroad and undergraduate residential students in this study:



As expected, the graph shows that study abroad students tended to earn higher GPI total scores. To address whether these higher scores are due to the study abroad experience or due to demographic differences between the groups, a hierarchical regression analysis was conducted.

The first regression model attempted to account for variance in GPI total scores through demographic variables (age, gender, cumulative GPA, class). As the table shows, none of the coefficients in the model were statistically significant and the overall model only accounted for 2.5% of the variance in GPI total scores. The second model, which included a variable identifying which students participated in study abroad, found that study abroad participation does predict GPI total scores (accounting for 10% of the variance). This model finds that participating in study abroad is associated with a 3.5 point gain in GPI total scores (a scale that only spanned 25 points in our sample).

Table 7: Regress GPI total scores on demographic variables and study abroad

	Model 1		Model 2	
	Coeff.	(S.E.)*	Coeff.	(S.E.)*
Constant	4.979	(7.453)	0.122	(6.448)
Age	0.025	(0.084)	0.088	(0.087)
GPA	-1.633	(1.810)	-0.811	(1.555)
Male?	0.411	(1.517)	1.110	(1.433)
Upperclass?	1.052	(1.223)	0.071	(1.275)
Study Abroad?	-----	-------	3.557*	(1.146)
R-squared	0.0255	(p=0.54)	0.1034	(p=0.04)

* Robust standard errors (Huber/White/sandwich estimator)

Thus, the regression analysis demonstrates that the study abroad experience predicts higher GPI total scores even after controlling for demographic factors such as age, gender, and GPA.

Even with using robust standard error estimates, there may be concerns that the data in this study do not follow the assumptions necessary for a linear regression analysis. A permutation test, which does not require parametric assumptions, can be used to determine if the study abroad experience is significantly associated with higher GPI total scores.

The logic of a permutation test begins by assuming the study abroad experience had NO impact on students' global perspectives. If this assumption is true, then the 106 students who completed the survey come from a single group (we cannot distinguish the 26 study abroad students from the 80 non-study abroad students, because the study abroad experience had no impact on GPI total scores). Consider two students who completed the survey:

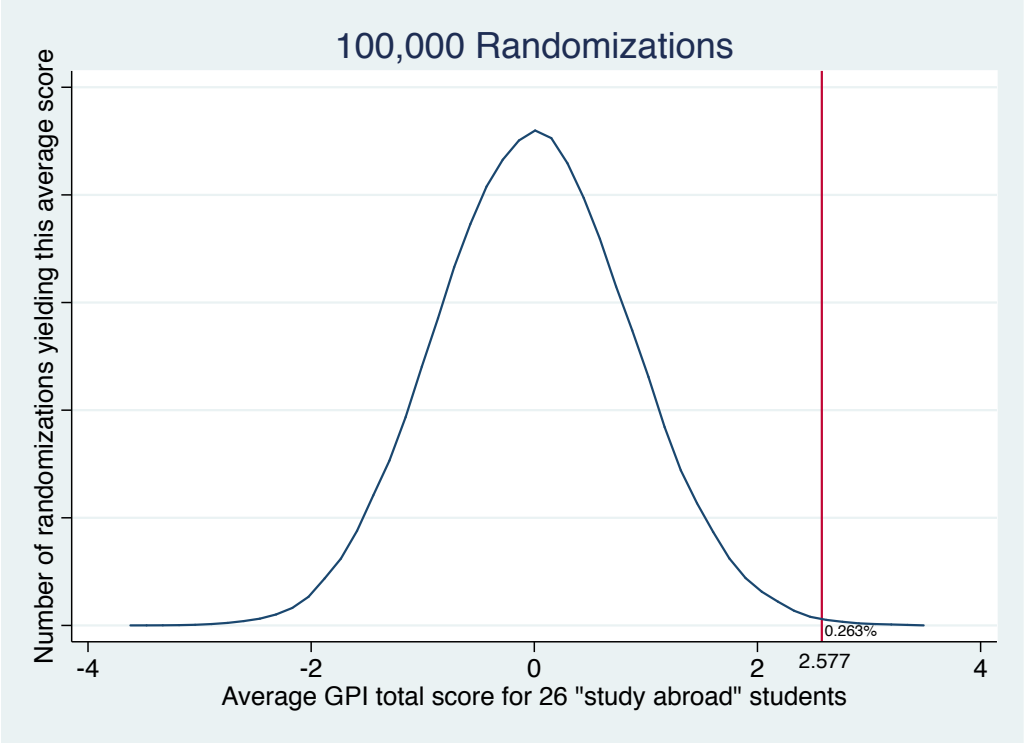
Table 8: Two students completing the GPI

	Study Abroad	Knowing	Knowledge	Identity	Affect	Responsibility	Interaction	Well being	Glb Citizen	GPI Total
Student A	Yes	4.33	5.00	4.80	4.89	4.50	5.00	4.57	4.70	+13.91
Student B	No	3.44	2.00	4.00	3.11	3.17	2.50	3.00	3.00	-11.29

The assumption of our permutation test is that if these students had chosen differently – if Student A had chosen not to participate in study abroad and Student B had chosen to participate – then they still would have gotten the same GPI scores. Under our assumption, Student A was going to get a GPI total score of +13.91 regardless of participating in study abroad. Likewise, Student B was going to get a score of -11.29 even if he or she participated in study abroad.

Under this assumption, we can imagine going back in time and seeing what would have happened if a different group of 26 students had chosen to participate in study abroad. The results we actually observed in this study were that study abroad students had an average GPI total score of 2.577, while students who did not participate in study abroad had an average GPI total score of -0.881. Thus, study abroad students outscored other students by 3.458 points on the GPI total score. If any 26 students were just as likely to participate as any other 26 students – and if the study abroad experience has no impact on GPI total scores -- then it seems unusual that we would observe such a large difference between these groups. The fundamental question in permutation testing is: If the study abroad experience had no impact, how likely were we to observe the results we actually observed in this study?

To answer this question, a computer simulated going back in time and randomly choosing 26 students to participate in study abroad. Since we're assuming study abroad has no impact on GPI total scores, the computer simply needed to select 26 students at random and calculate the average GPI total score for those 26 students. The computer ran this simulation 100,000 times (replications) and found that only 263 of the 100,000 replications yielded results as or more extreme than what we observed. In other words, if the study abroad experience has no impact on global perspective, then we had only a 0.263% chance of observing results where 26 students would outscore the remaining 80 by at least 3.458 points. Therefore, we conclude that the assumption is unlikely to be true and the study abroad experience is likely to have had a significant impact on students' global perspectives.



Other interpretations of effect sizes in this study:

For students participating in study abroad, the average effect size for the GPI matrices is +0.68. This effect size is equivalent to a gain of 25 percentile points (an average student who participates in study abroad would be expected to score at the 75th percentile following the study abroad experience). Another interpretation is that if we choose two SAU students at random – one who participated in study abroad and one who did not – there is a 70% chance the study abroad student would have a higher global perspective.

For SAU students not participating in study abroad, the average effect size for the GPI matrices is +0.07. This can be interpreted as saying non-study abroad effects (maturation, other experiences at SAU) are equivalent to a gain of 3 percentile points (an average student who does not participate in study abroad would be expected to score at the 53rd percentile by the end of the semester).

---

3. How does the impact of the SAU study abroad experience compare to the impact of study abroad experiences at other institutions?

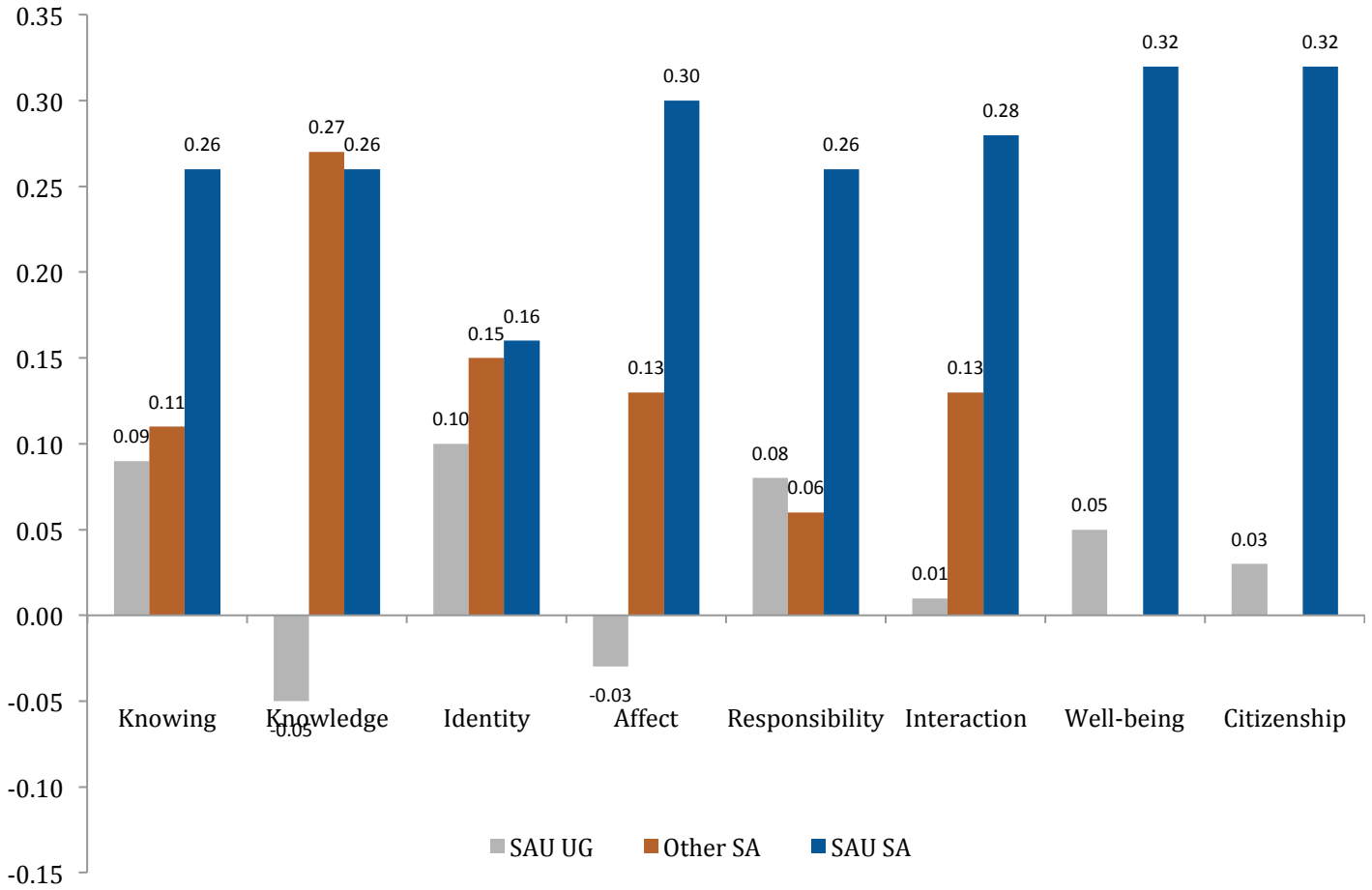
To address this question, we can compare the gains made by SAU students to gains reported for the norming group.

Table 9: Increases in GPI scores for study abroad students at SAU and other institutions

	Knowing	Knowledge	Identity	Affect	Responsibility	Interaction	Well-being	Citizenship
SAU UG Residential	0.09	-0.05	0.10	-0.03	0.08	0.01	0.05	0.03
SAU Study Abroad	0.26	0.26	0.16	0.30	0.26	0.28	0.32	0.32
Other Study Abroad(1)	0.11	0.27	0.15	0.13	0.06	0.13	--	--

(1) Source: https://gpi.central.edu/supportDocs/Interpretative_guide.pdf
Represents change in scores, following study abroad, for more than 700 students in 50 programs over the past 2 years

GPI score gains from SAU students participating in study abroad were greater than or equal to the score gains from students at other institutions participating in study abroad. From this, we have evidence that the SAU study abroad experience is as or more effective than the average study abroad experience at other institutions.



Further study:

1) Item-level responses
2) Control for more factors (bigger sample)