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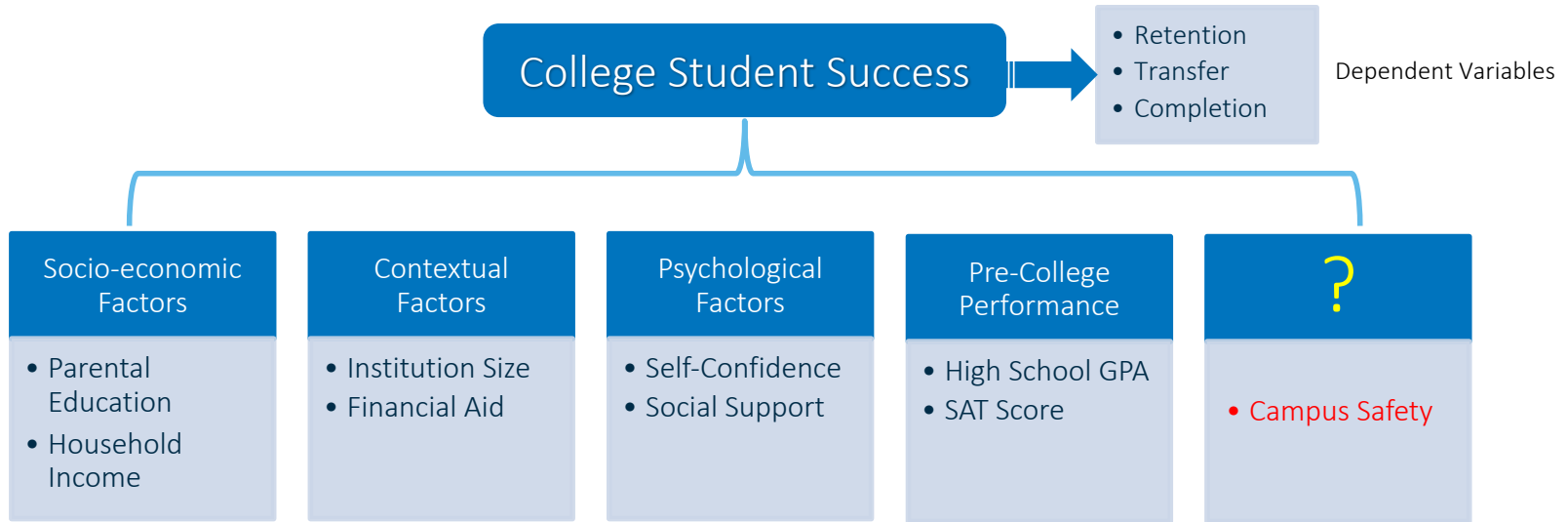Doctoral Student
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Introduction

Predictors of College Student Success (Lotkowski et al., 2004)

- 130 Research Tier 1 (R1) public and private universities were analyzed using different statistical procedures in SAS® Enterprise Guide® and SAS® Visual Analytics

Research Questions

1 How does campus crime distribute among public and private R1 universities?

2 How does campus crime affect student retention and completion?

3 How does socio-economic and contextual factors influence retention and completion?

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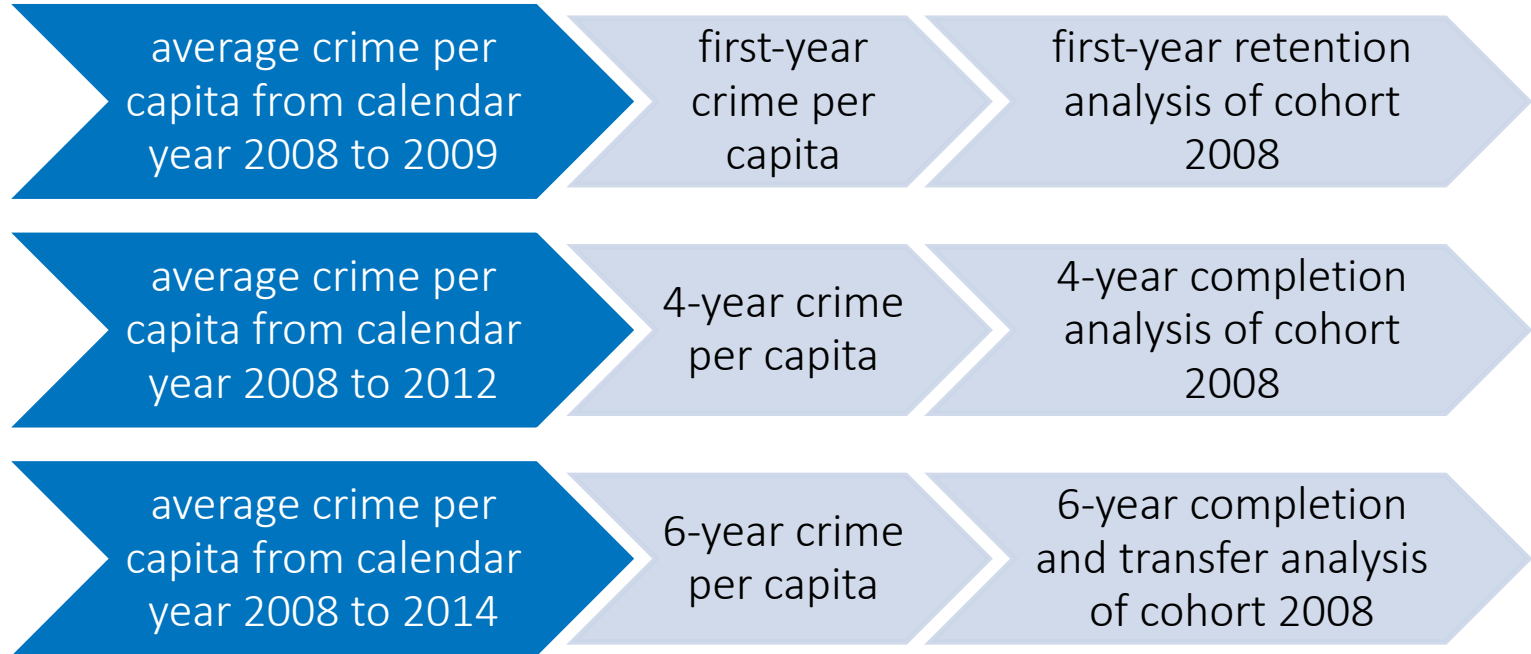
Data Sources & Processing

College Scorecard (U.S. Department of Education)

- First-year retention, 4-year completion, 6-year completion, and 6-year transfer rates
- Socio-economic factor: Affordability = Household Income ÷ Cost of Attendance
- Contextual factors: e.g., institution type (public/private), admission rate, and SAT score, etc.
- 130 Research Tier 1 (R1) universities: cohort 2008, 2009, 2010, 2011, and 2012

Campus Safety and Security Data Analysis Cutting Tool (U.S. Department of Education)

- Average Crime per Capita = Total Crimes Excluding Hate Crimes ÷ Total Enrollment
- Calculate first-year, 4-year, and 6-year average crime per capita

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Data Sources & Processing (Continued)

average crime per capita from calendar year 2008 to 2009	first-year crime per capita	first-year retention analysis of cohort 2008
average crime per capita from calendar year 2008 to 2012	4-year crime per capita	4-year completion analysis of cohort 2008
average crime per capita from calendar year 2008 to 2014	6-year crime per capita	6-year completion and transfer analysis of cohort 2008

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Data Sources & Processing (Continued)

An Example of the Panel Dataset

|	UNITID	Cohort	INSTNM	ADM_RATE	SAT_AVG	RET_FT4	Crime1_p	Crime4_p	Crime6_p
1	100663	2008	University of Alabama at Birmingham	0.851	1108	0.8156	0.0334367805	0.1437581339	0.2067274001
2	100663	2009	University of Alabama at Birmingham	0.8357	1107	0.7997	0.0570871895	0.1680467608	0.2207501218
3	100663	2010	University of Alabama at Birmingham	0.8243	1108	0.7873	0.0707250727	0.1623675077	0.2190226058
4	100663	2011	University of Alabama at Birmingham	0.7223	1107	0.7991	0.0685461581	0.1547816473	0.2210245071
5	100663	2012	University of Alabama at Birmingham	0.7223	1107	0.8016	0.0674595969	0.1435445796	0.2149990921
6	100751	2008	The University of Alabama	0.6039	1104	0.8349	0.1068674589	0.3465027669	0.5606459222
7	100751	2009	The University of Alabama	0.587	1122	0.8483	0.1186040522	0.3775326236	0.6034941621
8	100751	2010	The University of Alabama	0.5358	1155	0.8645	0.1170823761	0.4104036757	0.6345996062
9	100751	2011	The University of Alabama	0.4353	1158	0.8537	0.1511732323	0.4410260415	0.6531058447
10	100751	2012	The University of Alabama	0.5308	1172	0.87	0.1677020903	0.4610071627	0.658858354
11	100858	2008	Auburn University	0.7081	1166	0.8618	0.0251098243	0.1095247604	0.1745207668
12	100858	2009	Auburn University	0.795	1184	0.8745	0.0389597349	0.139973893	0.207199518
13	100858	2010	Auburn University	0.7867	1221	0.8879	0.0561297661	0.1480144404	0.2410859997
14	100858	2011	Auburn University	0.7	1204	0.9001	0.0588667058	0.1639753376	0.2634566451
15	100858	2012	Auburn University	0.7723	1217	0.8946	0.0677856682	0.1857277648	0.2712419924

Descriptive Statistics

Correlation of Selected Measures
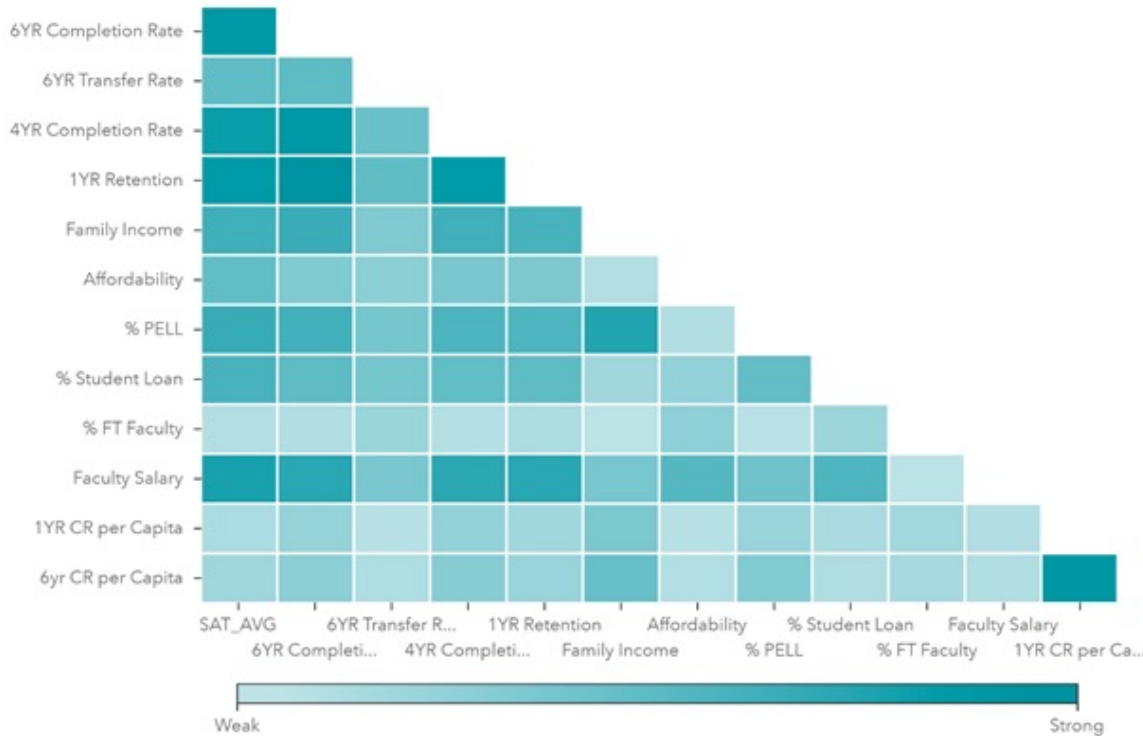
- Correlation is a mutual relationship or connection between two or more things

- The darker boxes show the completion and transfer rates have strong correlations to SAT and Faculty Salary

- Family Income has a somewhat strong correlation to SAT, Completion, and Retention

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Descriptive Statistics (Continued)

Crime Rates and Completion Rates by Institution Type
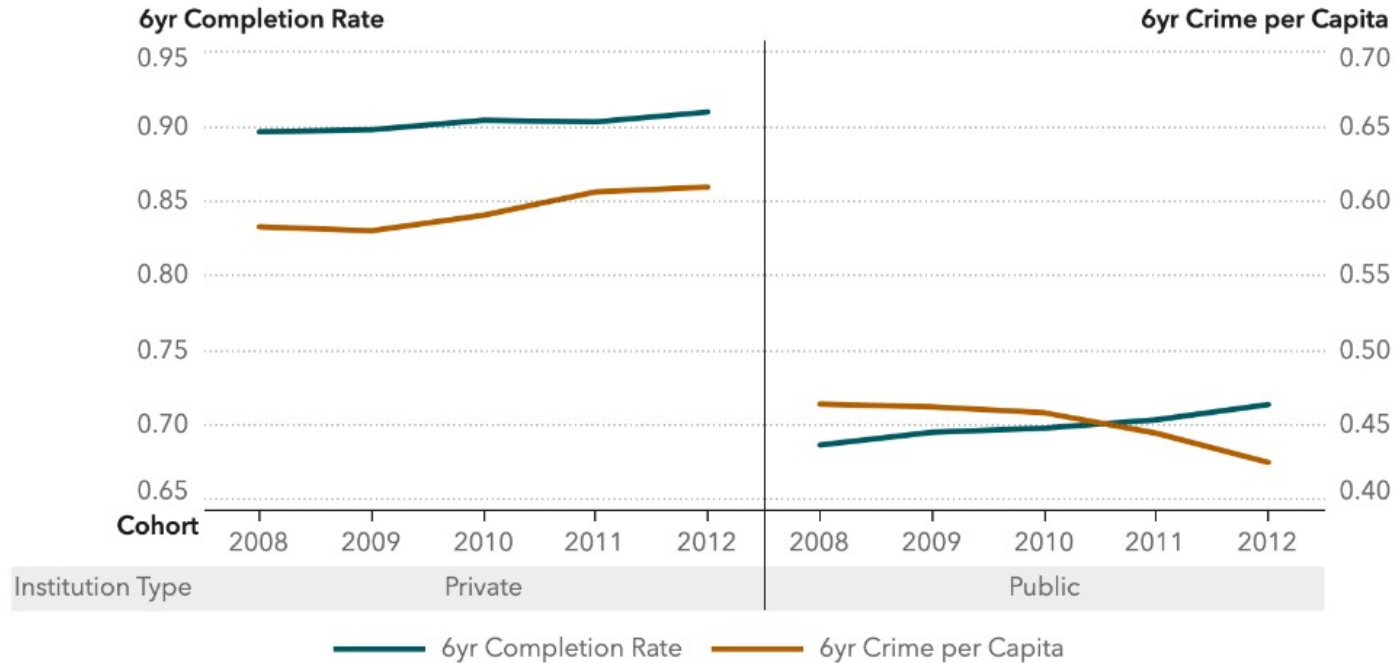
Descriptive Statistics (Continued)

Institutions with the Highest 6-Year Average Crime per Capita

Private R1 Universities

Private Institution ▼	6yr Completion Rate	6yr Crime per Capita ▼
Boston College	0.92	1.81
University of Rochester	0.86	1.24
Syracuse University	0.82	1.22
Duke University	0.95	1.08
Case Western Reserve University	0.82	0.98
Johns Hopkins University	0.93	0.97
Brandeis University	0.89	0.85
Vanderbilt University	0.93	0.84
Washington University in St Louis	0.94	0.83
Dartmouth College	0.95	0.82

Public R1 Universities

Public Institution ▲	6yr Completion Rate	6yr Crime per Capita ▼
University of California-Santa Cruz	0.77	2.05
University of Colorado Boulder	0.70	1.62
West Virginia University	0.58	1.48
University of Hawaii at Manoa	0.58	1.10
University of Wisconsin-Madison	0.86	1.08
University of California-San Diego	0.86	1.01
University of Oregon	0.71	1.01
University of Michigan-Ann Arbor	0.91	0.86
Michigan State University	0.79	0.86
Colorado State University-Fort Collins	0.68	0.85

Descriptive Statistics (Continued)

Geographic Distribution of 6-Year Campus Crime per Capita

6-Yr CR (Crime Rates) by Institution Type

6yr CR per Capita

2.0484984084 —
0.0037211664 —

Institution_Type
● Private   ● Public

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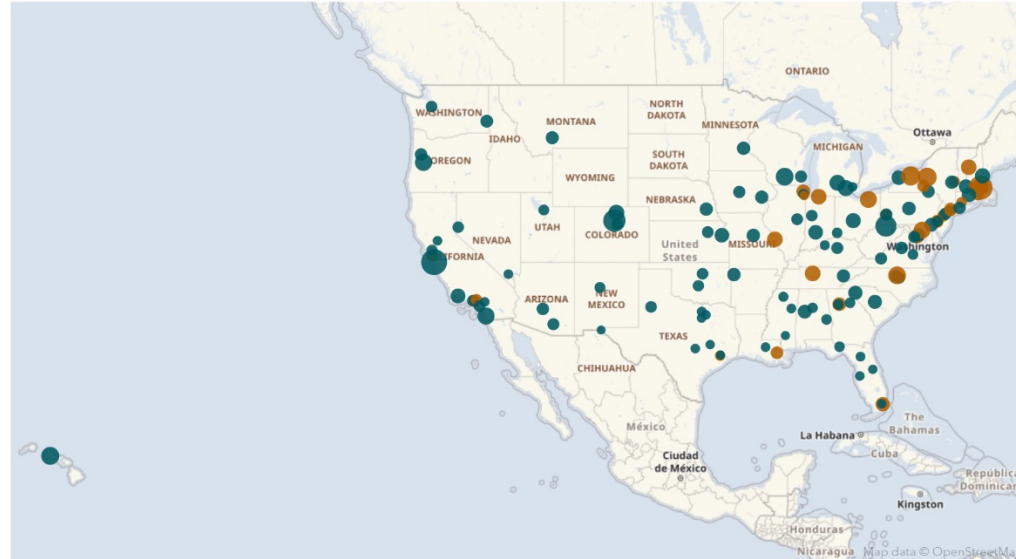
Inferential Statistics

Procedures of Panel Regression Modeling (Gutierrez and Sanford, 2015)

Random-Effects Model

If $p < 0.05$ in the Hausman Test for Random Effects, then

Fixed-Effects Model

Accepts the results of the Fixed-Effects Model

Hausman and Taylor Model (specified correlated variables)

If $p > 0.05$ in the Hausman Test against Fixed Effects, then accepts the results of the Hausman & Taylor Model

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Inferential Statistics (Continued)

Sample Code of Modeling 4-Year Completion

```
/*4-year Completion*/

/*Run Random Effects Model on 4-Year Completion*/
proc panel data = cohort_crime_merged_c;
id UNITID Cohort;
model C100_4 =
CONTROL ADM_RATE SAT_AVG INEXPFTE AVGFACSAL PFTFAC
PCTPELL PCTFLOAN Income_Cost UGDS_NRA UGDS_WOMEN
Crime4_p
/ Ranone;
run;
```

Inferential Statistics (Continued)
Sample Code of Modeling 4-Year Completion

```
/*Hausman Test for Random Effects (p<0.05)suggests we should use fixed effects model*/
/*Run Fixed Effects Model on 4-Year Completion*/
proc panel data = cohort_crime_merged_c;
id UNITID Cohort;
model C100_4 =
CONTROL ADM_RATE SAT_AVG INEXPFTE AVGFACSAL PFTFAC
PCTPELL PCTFLOAN Income_Cost UGDS_NRA UGDS_WOMEN
Crime4_p
/ fixone;
run;
```

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Inferential Statistics (Continued)

Sample Code of Modeling 4-Year Completion

```
/*Run Hausman and Taylor Model on 4-Year Completion*/
proc panel data = cohort_crime_merged_c;
id UNITID Cohort;
instruments correlated = (CONTROL ADM_RATE SAT_AVG INEXPFTE AVGFACSAL PFTFAC
PCTPELL PCTFLOAN Income_Cost);
model C100_4 =
CONTROL ADM_RATE SAT_AVG INEXPFTE AVGFACSAL PFTFAC
PCTPELL PCTFLOAN Income_Cost UGDS_NRA UGDS_WOMEN
Crime4_p
/ htaylor;
run;
/*Reject Hausman and Taylor Model and Use Fixed Effects Model*/
```

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Results of Panel Regression

	First-year Retention	4-year Completion	6-year Transfer	6-year Completion
Institution Type (Private)	0.075***			
Average SAT Score	0.0002***	0.0004***	-0.0003***	0.0005***
Percent Full-time Faculty			-0.071*	
Percent Pell Grant		0.086*		0.071**
Affordability		-0.029***		-0.009*
Percent Female				0.204*
1 yr. Crime per Capita	-0.007	-	-	-
4 yr. Crime per Capita	-	0.007	-	-
6 yr. Crime per Capita	-	-	0.003	0.006
Intercept	0.551	0.116	0.406	0.103
Observations	130	130	130	130
R-Squared	0.259	0.994	0.092	0.993
Model	Hausman & Taylor	Fixed-Effects	Random-Effects	Fixed-Effects

$*p<0.05, **p<0.01, ***p<0.001$;

Only showing significant socio-economic and contextual factors.

- Campus crime is not associated with student retention, transfer, or completion.

- R1 universities that enroll students with higher SAT scores tend to report higher retention and completion rates as well as lower transfer rates.

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Limitations

Secondary Data

- Official statistics may reflect the biases of those in power
- Actual Crime VS Reported Crime
- Limiting what you can find out compared to primary data
- Definition & measurement of crime may change overtime
- College Scorecard: First-Time-In-College (FTIC) students only
- Campus Safety dataset: All students (undergrad, grad, and others)

Generalization & Future Directions

R1 Universities

R2 Universities

Teaching-oriented Institutions
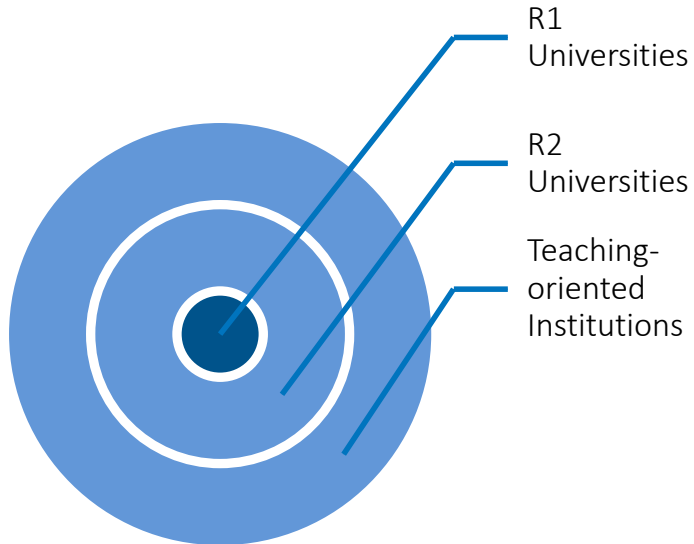
Generalizability

- Investigate less research-focused and more teaching-oriented universities.

Accuracy

- Explore crime rates in the university zip code area.
- Use long-term data.
- Examine datasets with the high school GPA indicator.

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Strengths

- Panel data analysis contains more variability and degrees of freedom compared to cross-sectional data analysis

- Secondary data analysis is cost-effective and can generate timely results

- National dataset can produce results that are more generalized

- The significant effects of SAT score and Pell grant on retention/completion are consistent with findings in our internal research

- As an exploratory study, our research findings can provide background knowledge for original research design, such as campus survey

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Discussions

- Campus crime is not a deciding factor for continuing education.

- SAT average score is the prime determinant for retention and completion.

- Less affordable colleges have higher 4- and 6- year completion rates.

- Students might give quality of education, the profile of the faculty, and other opportunities more importance while choosing their higher education pathways.

- Our study builds a strong foundation for future research on campus crime and student success.

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Acknowledgement

We thank the intellectual and technical support by the Office of Decision Support (ODS), University of South Florida (USF), especially the members of the Student Success Research & Analytics (SSRA) Team.

Our deepest gratitude goes to our advisor, Dr. Shabnam Mehra – Director of SSRA for her continued guidance. We would also like to pay our sincere acknowledgements to Glendalis Gonzalez for assisting the documentation and presentation of this research.

SSRA collaboratively monitors and supports the core vision of USF. Through the collection, analysis and dissemination of data, SSRA elevates institutional planning, policy development, governmental reporting, and strategic decision-making processes.

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References

- Gutierrez, R. G., & Sanford, K. 2015. "Working with Panel Data: Extracting Value from Multiple Customer Observations." *SAS Global Forum Proceedings 2015*. Paper SAS1755-2015.

- Lotkowski, V. A., Robbins, S. B., & Noeth, R. J. 2004. "The Role of Academic and Non-Academic Factors in Improving College Retention." *ACT Policy Report*. American College Testing ACT Inc.

- Mansfield, P. M., & Warwick, J. 2006. "Gender Differences in Students' and Parents' Evaluative Criteria when Selecting a College." *Journal of Marketing for Higher Education*, 15: 47-80.