



QUASI EXPERIMENTAL DESIGN STUDY

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Outline

- Data Sources
 - Research Questions
 - Outcome Measures
 - Hypotheses
 - Matching Method
 - Data Analysis Method
 - Results
 - Summary Findings & Discussion
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Data Sources

1. AIMS² Program Data*

2. CSUN's Institutional Research

*AIMS² participants in the QED study are limited to CSUN students.



Research Questions

1. How do the outcome measures of higher education success vary for AIMS² participants in comparison to a matched control group?
 - How do the outcomes vary with regard to gender?
 2. Among AIMS² participants, which components of the programs are more effective?
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Outcomes and Project Performance Measures

Gateway Course completion (Measure 1a/1b)

Grade notation of A, B, C, or credit in low-success courses*

On-track to Completion (Measure 6b/6.2)

Completed a minimum of 24 units per year

Number of units earned in 1st and 2nd year

Good academic standing (Measure 1b/1.2)

Not on Probation

Cumulative GPA 1st and 2nd year

Persistence in STEM (Measure 3b/3.2 & 6a/6.1)

Retention in CECS from fall to spring, Overall Retention in CECS

Degree completion (Measure 6c/6.3)

Degree completion in CECS, within 3 years

Program Type

Research Experience

*courses were pre-selected as part of grant objectives

Hypotheses

Hypothesis₁ : AIMS² participants will have higher rates of gateway **course completion** in comparison to matched, control group.

Hypothesis₂ : AIMS² participants will have higher rates for **On-track to degree** completion in comparison to matched, control group.

Hypothesis₃ AIMS² participants will earn higher **number of units** in comparison to matched, control group.

Hypothesis₄ AIMS² participants will have higher rates for **good academic standing** in comparison to matched, control group.

Hypothesis₅ AIMS² participants will have higher grade point averages (**GPA**) in comparison to matched, control group.

Hypothesis₆ AIMS² participants will have higher rates of **persistence** rates in STEM in comparison to matched, control group.

Hypothesis₇ AIMS² participants will have higher rates of **students completing degrees** in comparison to matched, control group

Hypothesis_{1-7a} *Female* AIMS² participants will have higher success with regard to the measured outcomes in comparison to matched, female control group.

Hypothesis₈ Outcome success will vary among AIMS² participants with regard to their participation level in the various **programs** (e.g. research, peer-mentoring etc.)

Matching Method

Comparison Group

- *First-Time Freshmen/Transfers*
- *Entry Cohort Year*
- *Majoring in CECS*

Baseline Differences

- *First-Generation*
- *Full-time Enrollment*
- *Low-income (PELL)*
- *Admissions GPA*
- *Transfer Units*

Propensity Score Matching

- Calculates the conditional probability of a case being assigned to the treatment group using logistic regression.
- Predicting/independent factors were selected based on their influence on the exposure (self-selection in being an AIMS² participant) as well as their influence on the outcome.

Group Size Comparisons

	Baseline (N=2,127)		Propensity Score Matching (N=131)	
	AIMS ²	Comparison	AIMS ² Treatment	Matched Control
First-time Freshmen	69	2,058	69	62
	(N=1,079)		(N=155)	
First-time Transfers	82	997	82	73

AIMS² participants and comparison students in the study are limited to CSUN students with entry years of 2016,2017,2018,2019

Equivalencies

Freshmen

	Baseline (N=2,127)			Propensity Score Matching (N=131)		
	AIMS² % of Total/ mean(sd) (N= 69)	Comparison¹ % of Total/ mean(sd) (N=2,058)	Sig. (<i>p</i>)	AIMS² % of Total/ mean(sd) (N=69)	Comparison % of Total/ mean(sd) (N=62)	Sig. (<i>p</i>)
<i>Race/Ethnicity</i>						
African American/Black	3%	4%		3%	2%	
Asian	9%	7%		9%	3%	
Latinx/Hispanic	82%	82%		81%	87%	
White	7%	5%		7%	3%	
Unknown	0%	2%		0%	0%	
Multi-Race	0%	0.8%		0%	0%	
International	0%	0.1%		0%	0%	
<i>Gender</i>			.001			.01
Female	33%	14%		33%	17%	
Male	67%	87%		67%	83%	
<i>Age²</i>	18.3 (.4)	18.4 (.5)		18.3 (.4)	18.5 (.9)	
<i>First-Generation</i>	77%	59%	.01	77%	73%	
<i>Low-income (PELL)</i>	83%	65%	.01	83%	71%	
<i>Admissions GPA</i>	3.5 (.4)	3.3 (.4)	.01	3.5 (.4)	3.4 (.5)	
<i>Full-time 1st semester</i>	100%	98%				
<i>Transfer Units</i>	11.9 (16.1)	6.6(18.8)	.01	11.9 (10.5)	9.5(14.3)	
Cohort 1, 2016 Fall	12%	19%		12%	16%	
Cohort 2, 2017 Fall	22%	27%		22%	18%	
Cohort 3, 2018 Fall	44%	26%		44%	29%	
Cohort 4, 2019 Fall	23%	28%		23%	37%	

Equivalencies

Transfer Students

	Baseline (N=1,079)			Propensity Score Matching (N=155)		
	AIMS ² % of Total/ mean(sd) (N=82)	Comparison ¹ % of Total/ mean(sd) (N=997)	Sig. (p)	AIMS ² (N=82)	Comparison (N=73)	Sig. (p)
<i>Race/Ethnicity</i>			.01			.01
African American/Black	4%	2%		4%	1%	
Asian	10%	13%		10%	7%	
Latinx/Hispanic	74%	53%		74%	53%	
White	9%	25%		9%	33%	
Multi-Race	2%	2%		2%	0%	
Unknown	1%	5%		1%	6%	
International	0	0.1%		0%	0%	
<i>Gender</i>			.01			
Female	28%	12%		28%	25%	
Male	72%	88%		72%	75%	
<i>Age²</i>	25.0 (4.6)	25.5 (5.3)		25.0 (4.6)	25.6 (4.8)	
<i>First-Generation</i>	62%	47%	.01	62%	53%	
<i>Low-income (PELL)</i>	77%	75%		77%	78%	
<i>Admissions GPA</i>	3.02 (.36)	2.98 (.39)		3.0 (.35)	3.0 (.41)	
<i>Full-time enrolled 1st semester</i>	87%	68%	.01	87%	78%	
<i>Transfer Units</i>	74.1 (16.1)	74.0 (18.8)		74.0 (19)	75.0 (16)	
Cohort 1, 2016 Fall	17%	20%		17%	18%	
Cohort 2, 2017 Fall	24%	29%		24%	29%	
Cohort 3, 2018 Fall	27%	26%		27%	25%	
Cohort 4, 2019 Fall	32%	25%		38%	29%	

Data Analysis

- **Categorical Outcomes**

- Percentages (%)
- Hypothesis test: Chi-square ($p < .05$)
- Effect Size: Odds Ratios

- **Numerical Outcomes**

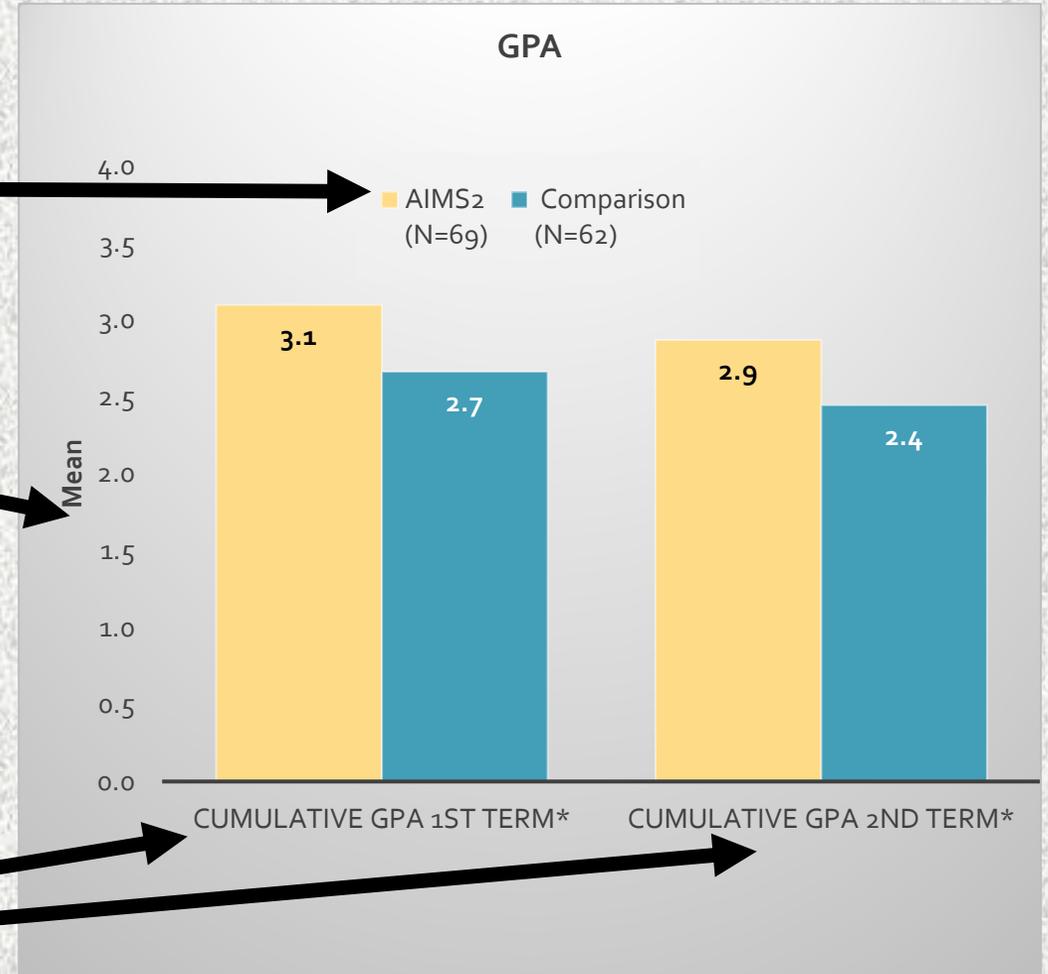
- Means/Standard Deviations $M(SD)$
 - Hypothesis test: t -tests ($p < .05$)
 - Effect Size: Cohen's D
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Figures Orientation

Group and
group size

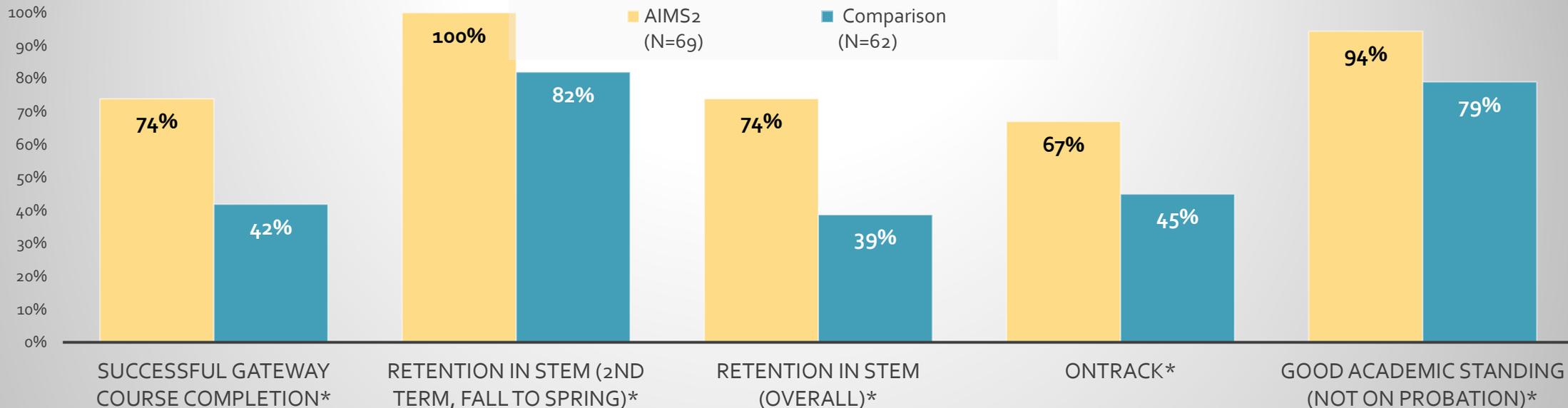
Mean score
or
Percentage

Outcome
Measures

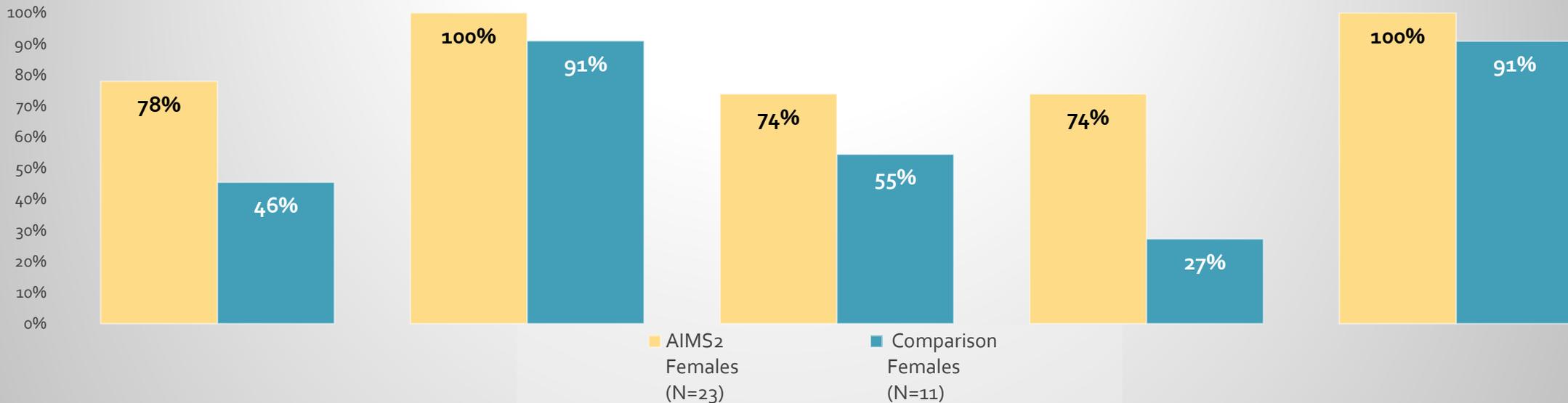


Outcomes for Freshmen

All



females

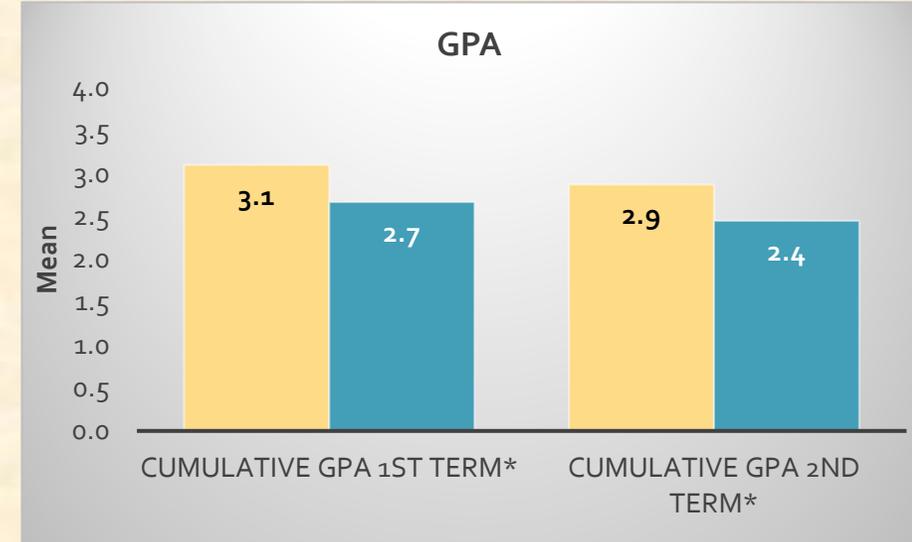
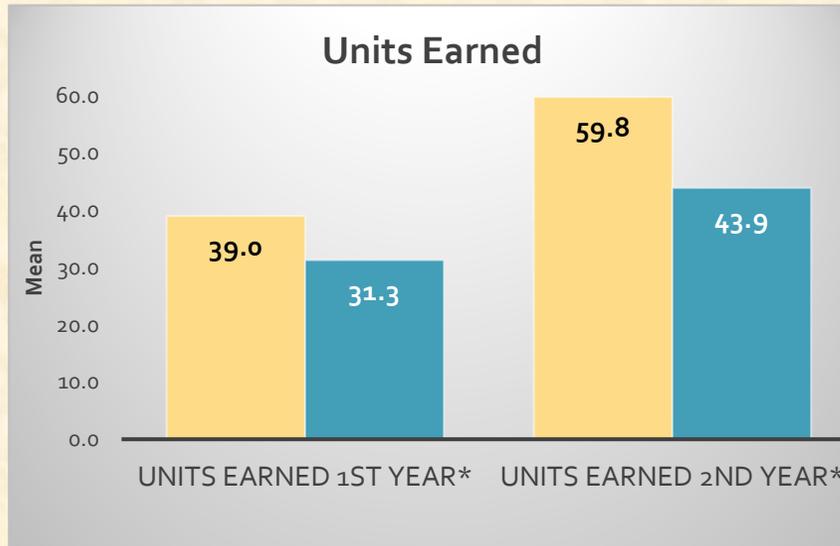


(*) in labels top chart denotes statistical significance ($p < .05$) for overall AIMS vs. Matched control.

Outcomes for Freshmen

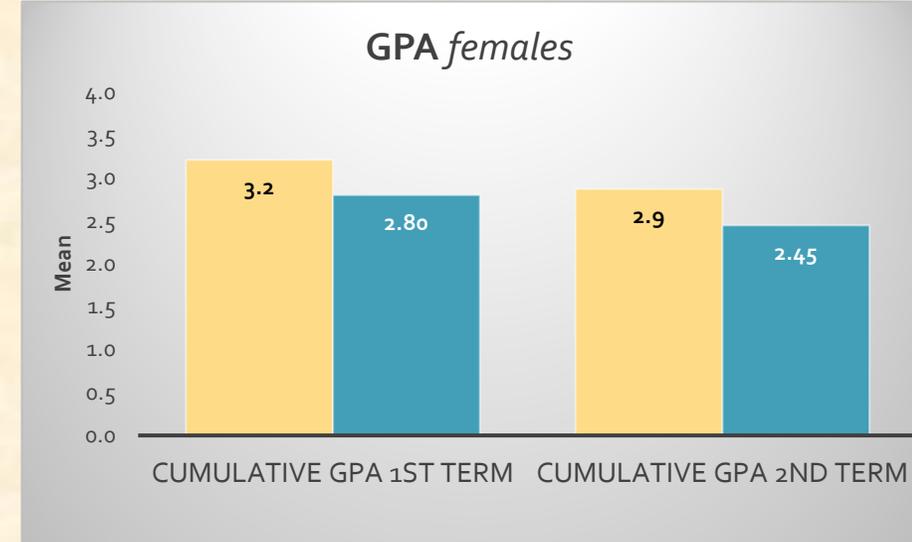
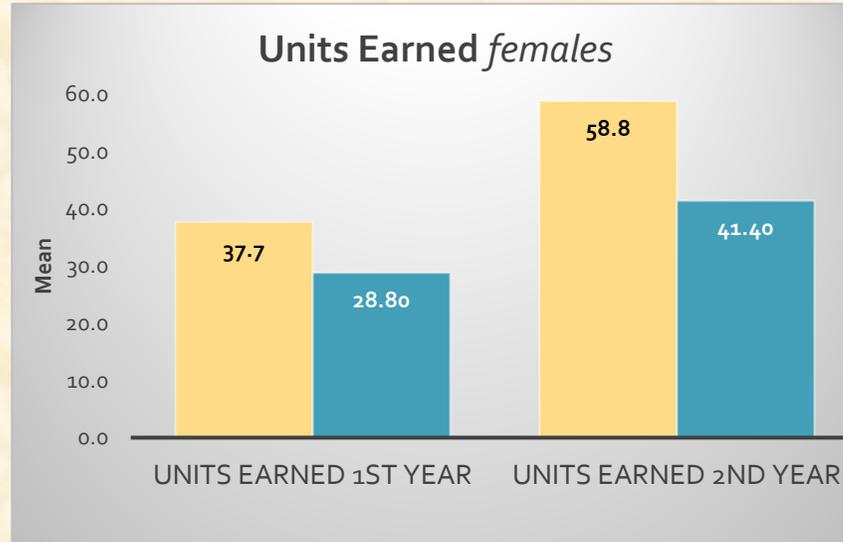
All

AIMS2 (N=69) Comparison (N=62)



females

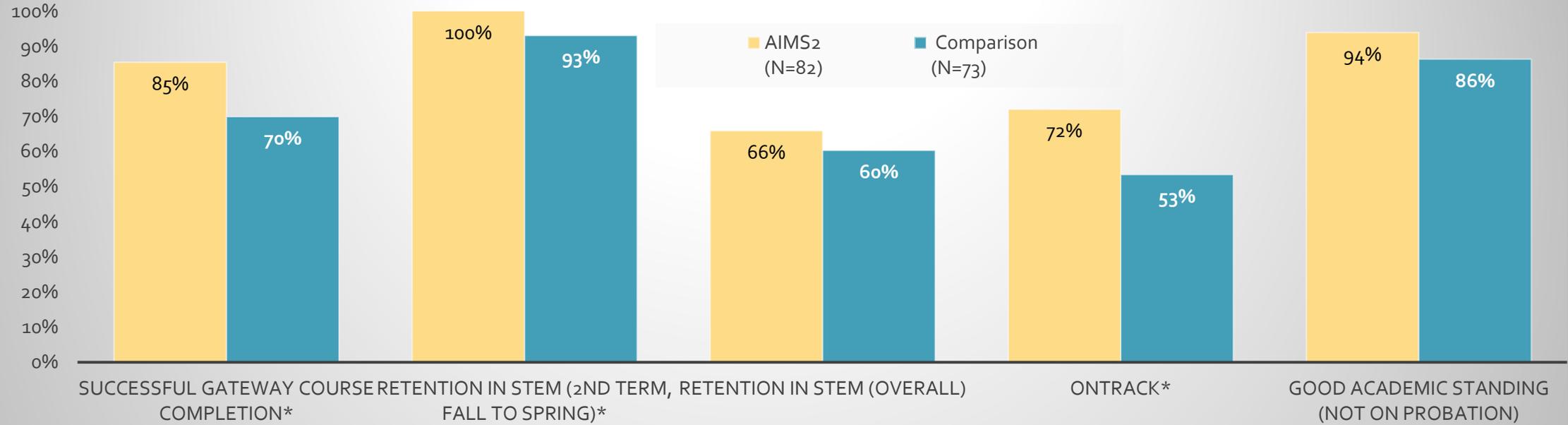
AIMS2 Females (N=23) Comparison Females (N=11)



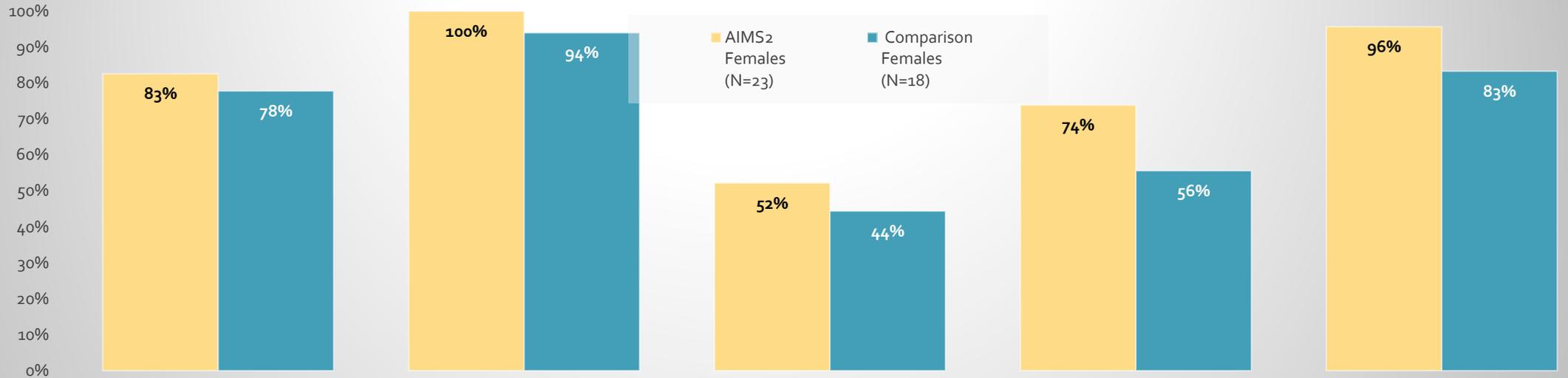
(*) statistical significance ($p < .05$) for overall AIMS vs. Matched control

Outcomes for Transfer Students

All



females

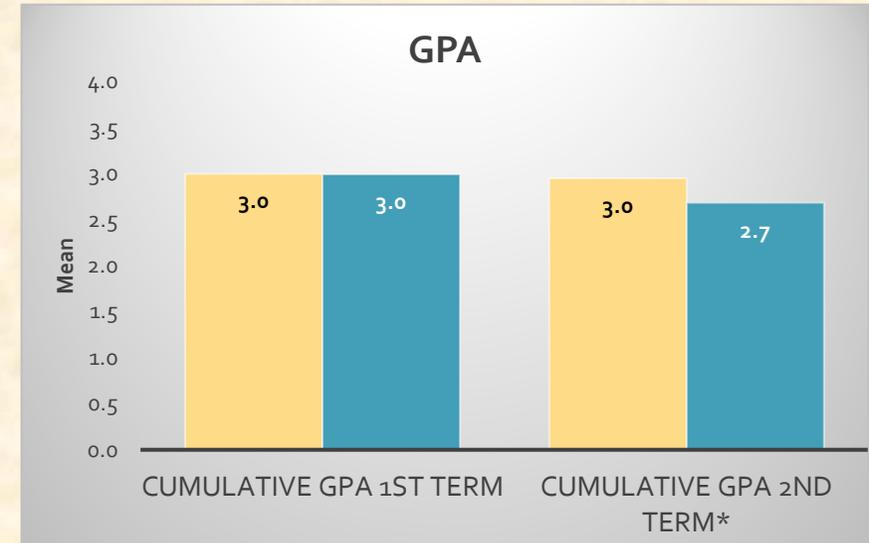


(*) in labels top chart denotes statistical significance ($p < .05$) for overall AIMS vs. Matched control.

Outcomes for Transfer Students

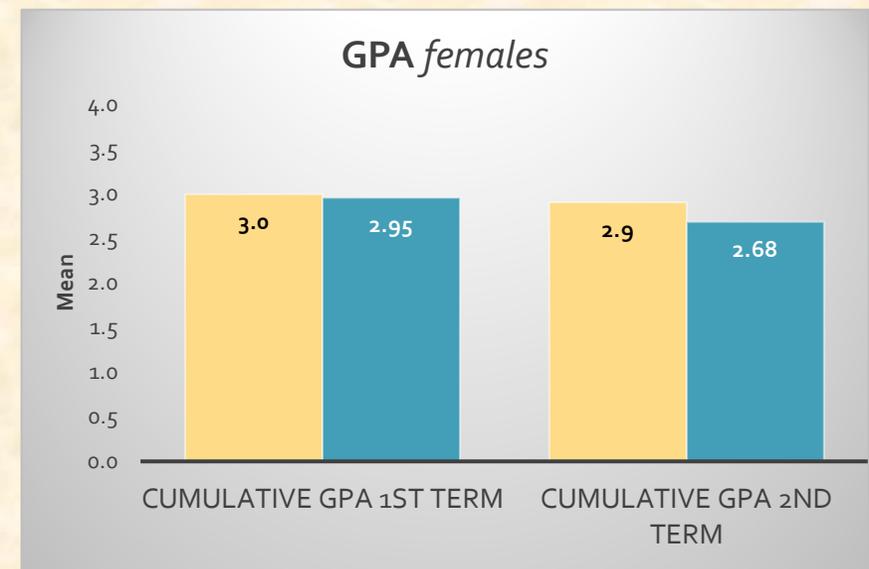
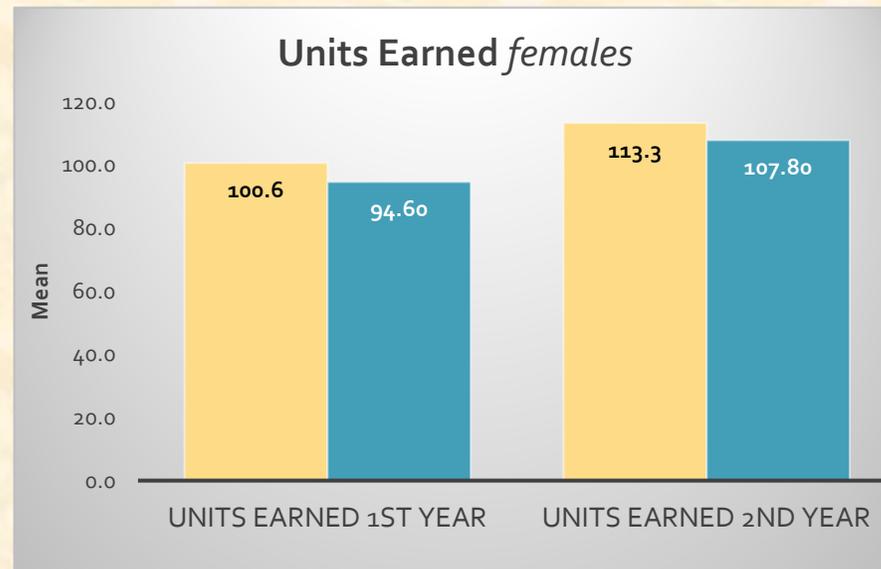
All

AIMS2 (N=82) Comparison (N=73)



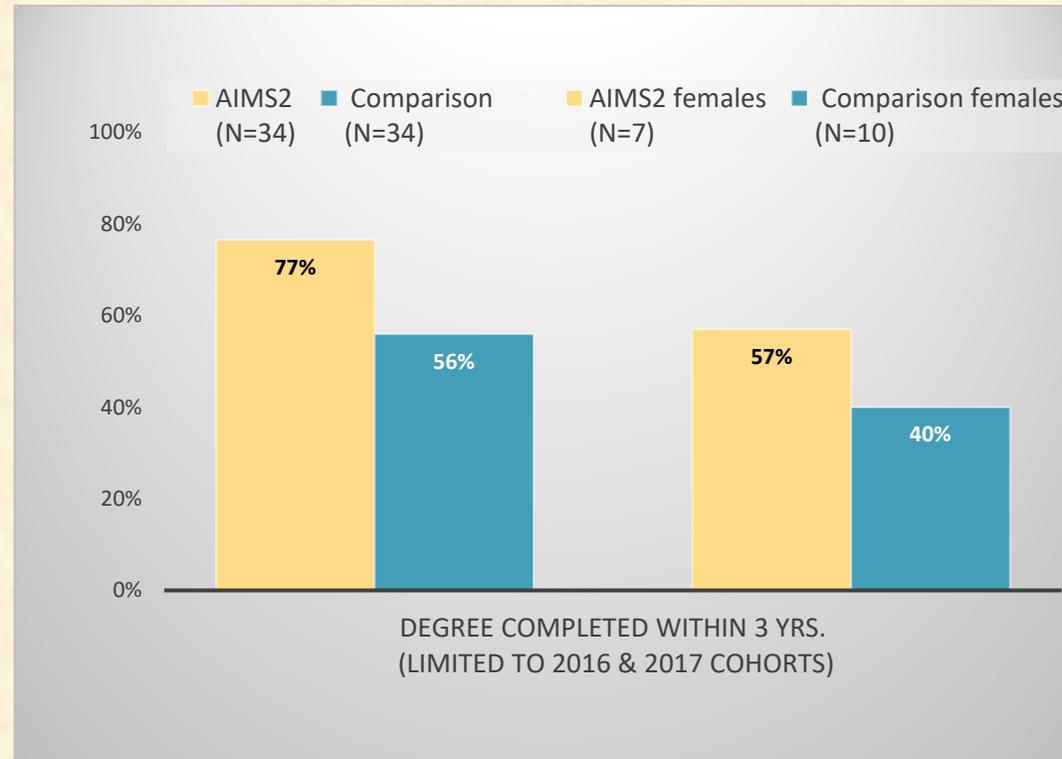
females

AIMS2 Females (N=23) Comparison Females (N=18)



(*) statistical significance ($p < .05$) for overall AIMS vs. Matched control

Degree Completion for Transfer Students



77% of AIMS² students in the 2016 & 17 cohorts completed a degree within 3 years (vs. 56%)

57% of AIMS² females in the 2016 & 17 cohorts completed a degree within 3 years (vs. 40%)

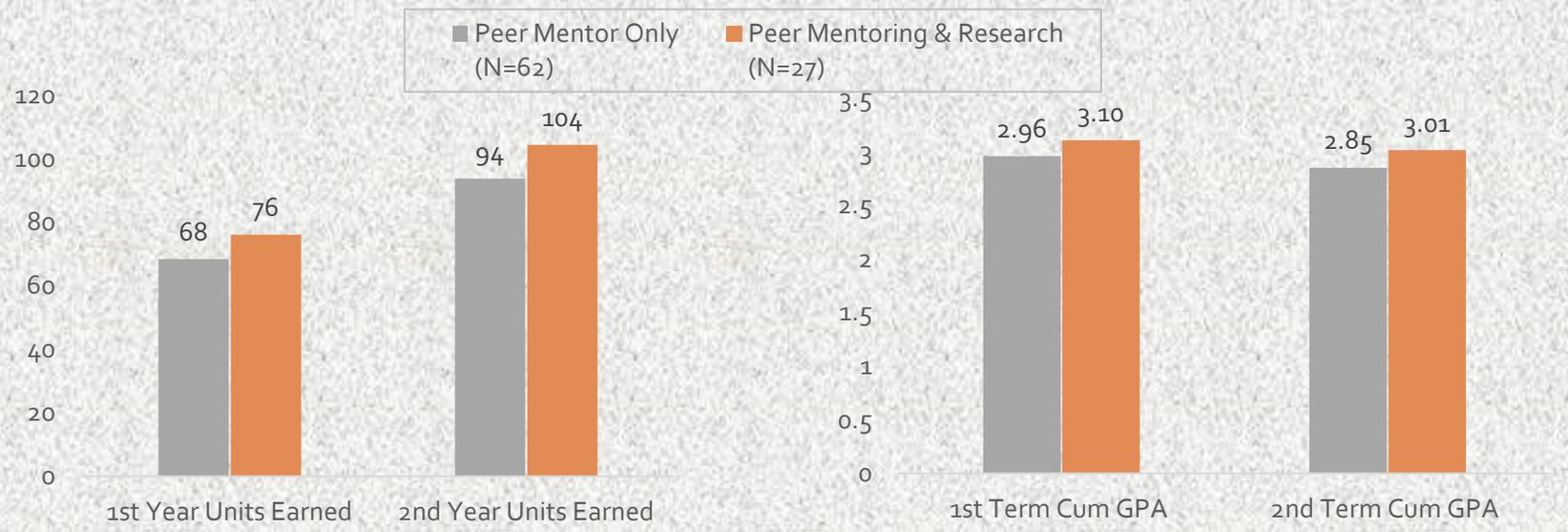
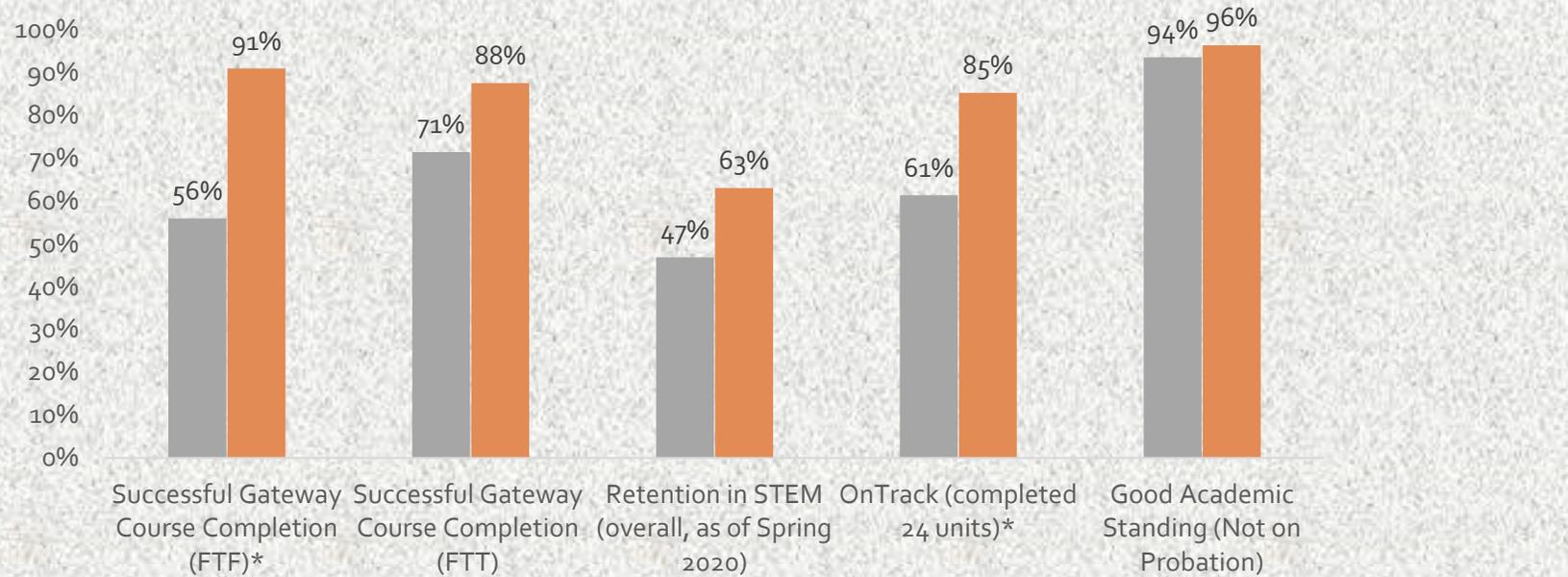
AIMS² Program Participation

	N	Faculty Mentoring	Summer Research	Academic Yr Research	Peer Mentori ng 2018-20
Cohort 1, 2016 Fall	22	22	18	12	
Cohort 2, 2017 Fall	35	35	11	17	
Cohort 3, 2018 Fall	52	52	12	19	47
Cohort 4, 2019 Fall	42	42	0	10	42

AIMS² Program Participation

Outcomes among AIMS² students with regard to program type (e.g. research, peer-mentoring etc.). Limited to 2018 and 2019 cohorts.

Finding: Those who participated in both research and peer mentoring had higher success than those who participated in Peer mentoring only.



(*) statistical significance ($p < .05$) between Peer Mentoring only, and Peer Mentoring & Research group

Summary of Findings

- AIMS² participants are outperforming matched, control group on all outcome measures among freshmen and transfers.
- Statistically significant differences in 9 outcomes for Freshmen and 5 for Transfers.

- **Program Components**

Research component, holding other variables constant, trended towards better outcome measures.

	Freshmen (9)	Transfers (5)
Gateway Course completion	Successful Gateway Course Completion	Successful Gateway Course Completion
Persistence in STEM	Retention in STEM (2nd term, fall to spring)	Retention in STEM (2nd term, fall to spring)
	Retention in STEM (overall)	
OnTrack	Completed 24 units end of yr 1 & yr2	Completed 24 units end of yr 1 & yr2
	Number of Units Earned 1st year	Number of Units Earned 1st year
	Number of Units Earned 2nd year	
Good Academic Standing	Good Academic Standing (Not on Probation)	
	Cumulative GPA 1st term	
	Cumulative GPA 2nd term (N)	Cumulative GPA 2nd term

What has gone well?

With regard to the outcome measures, AIMS² has effectively served its target population – underrepresented groups in STEM, among both freshmen and transfer students.

Areas of increased focus.

Support expanding the research component of the program given the small sample sizes.

Allow for additional time to track degree completion outcomes.

Create a tracking system to see if these short-term outcome measures are sustained over a longer period of time .

Consider additional endogenous factors that may be influencing the outcomes (campus engagement, additional support etc.)

Thank you

