



**FOOTHILL
COLLEGE**

Evaluating New Academic Supports for AB 705 with Matching

Presentation for the RP Conference Post-Conference
Workshop “Supporting Researchers Into and Through
AB 705 Implementation and Evaluation,” April 5, 2019

Doreen Finkelstein, Foothill College
finkelsteindoreen@foothill.edu

12345 El Monte Road
Los Altos Hills, CA 94022

foothill.edu

Foothill College, 12345 El Monte Road, Los Altos Hills, CA 94022 | foothill.edu



In Fall 2018, Foothill College fully implemented AB 705 for math.

New academic supports were added:

- Corequisite for Precalculus
- Tutors for Statistics (except online-only sections)



Evaluation question:

**Did the new academic
supports improve student
success?**



Precalculus + Corequisite

Open enrollment

Stand-alone Precalculus

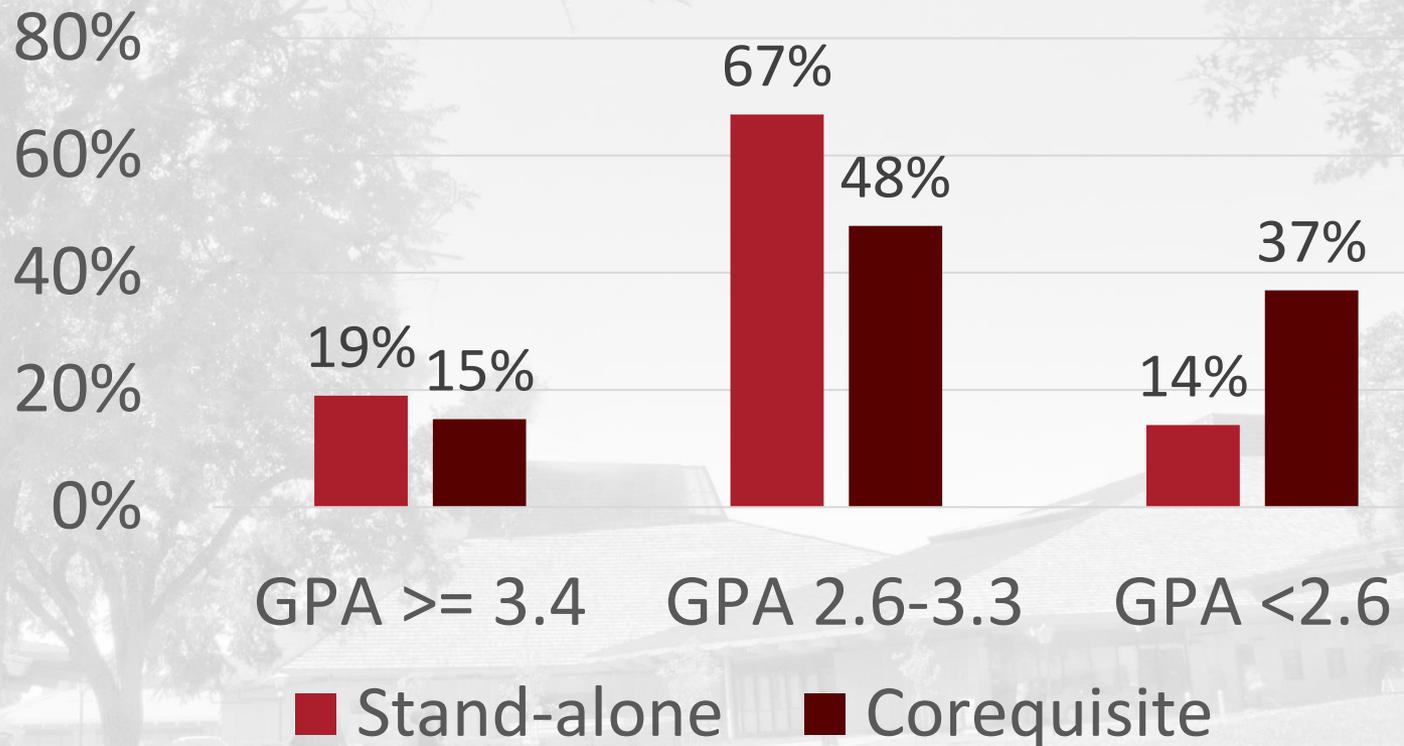
Enrollment based
on: HS GPA, HS
coursework, passing
prerequisite (algebra),
Accuplacer, clearance



**Straight comparison of
success in corequisite
sections to success in stand-
alone sections?**

HS GPA was higher in stand-alone sections than in corequisite sections:

HS GPA of Students Enrolled in
Precalculus: Fall 2018





Problem:

- Difference in HS GPA between groups
- HS GPA is a strong predictor of course success



Approach:

- **Matched** students from corequisite sections with **similar students** from stand-alone sections.

“How would corequisite students have done if they had taken the stand-alone class?”



By matching students:



Control for matched
variables, which leads to:



Better causal inferences



Matched on three variables:

- HS GPA
- Ethnicity (White or Asian vs. Not White or Asian)
- Gender (Male vs. Female)

Used exact matching (Mahalanobis Distance), which allows for analyses of these subgroups within the matched data.

Before matching:

	Stand-alone	Corequisite
HS GPA	2.96	2.75
% Female	37%	36%
% White or Asian	47%	29%

After matching:

	Stand-alone	Corequisite
HS GPA	2.78	2.75
% Female	36%	36%
% White or Asian	29%	29%



Logistic regression results:

- The corequisite was a significant predictor of course success ($p < .01$)

Success rates (Fall 2018 matched data):

HS GPA	Stand-alone	Corequisite
GPA ≥ 3.4	55%	77%
GPA 2.6 – 3.3	36%	64%
GPA < 2.6	41%	47%



What difference did the matching make?

Matched data (Precalculus):

HS GPA	Stand-alone	Corequisite
GPA ≥ 3.4	55%	77%
GPA 2.6 – 3.3	36%	64%
GPA < 2.6	41%	47%

Unmatched data (Precalculus):

HS GPA	Stand-alone	Corequisite
GPA ≥ 3.4	55%	77%
GPA 2.6 – 3.3	46%	65%
GPA < 2.6	40%	45%



What difference did the matching make for Statistics?

(Same procedure, but did not match on gender)

Matched data (Statistics):

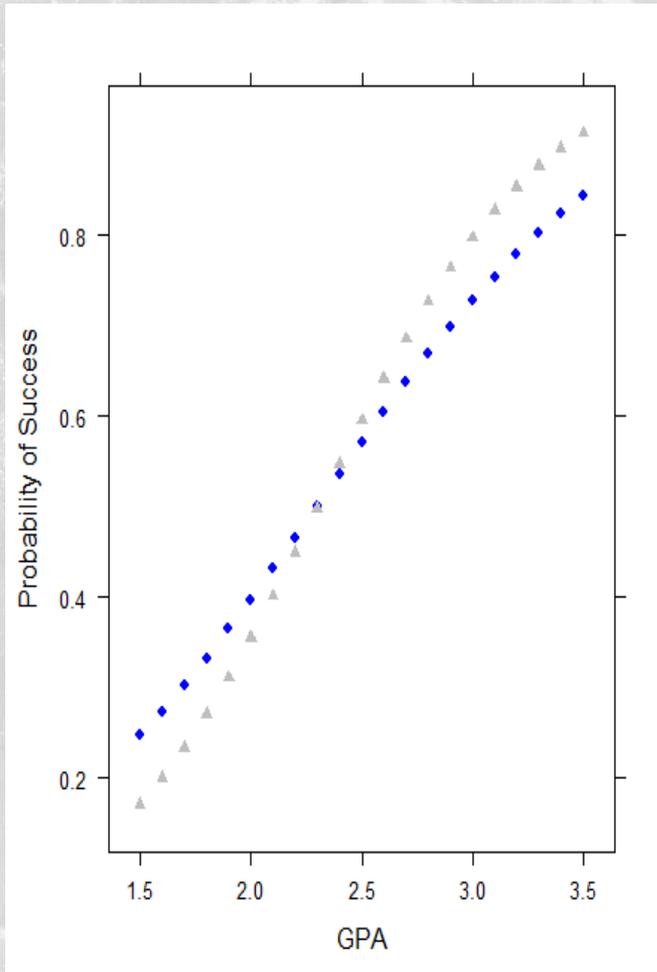
HS GPA	No tutors	Tutors
GPA \geq 3.0	72%	79%
GPA 2.3 – 2.9	44%	48%
GPA $<$ 2.3	44%	34%

Unmatched data (Statistics):

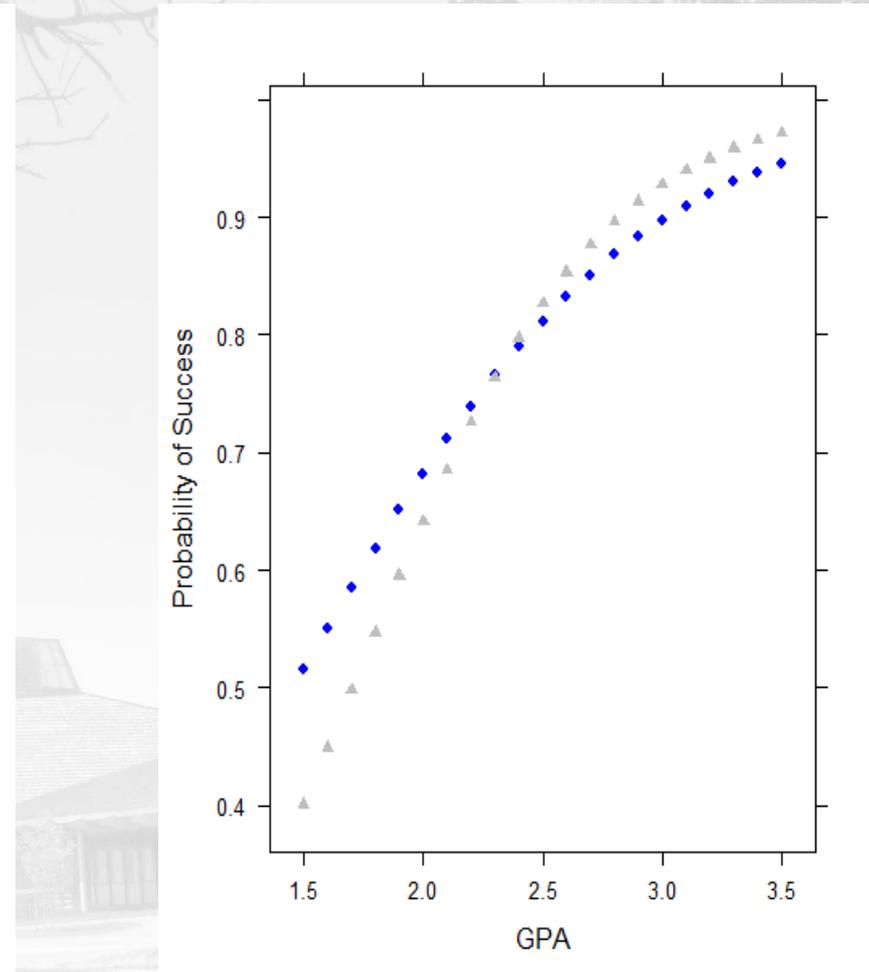
HS GPA	No tutors	Tutors
GPA \geq 3.0	69%	78%
GPA 2.3 – 2.9	50%	48%
GPA $<$ 2.3	29%	33%

Math 10 predicted probability of success, regression of unmatched data (Tutors: grey; No tutors: blue)

White or Asian



Not White or Asian



Advantages to matching:

- Simultaneously control for multiple variables.
- Can disaggregate by matched variables.
- Concept of matching is easy to understand; makes intuitive sense.

Caveats to matching:

- Does **NOT** include all students.
Compares outcomes for the treatment group against outcomes for **similar students** in the control group.
- “Similar” is defined by the variables used during matching.
- Students cannot have missing data on any of the variables used for matching.
- May be difficult to find good matches with a large number of matching variables.



Matching software:

MatchIt package in R

**Daniel E. Ho, Kosuke Imai, Gary King,
Elizabeth A. Stuart (2011). MatchIt:
Nonparametric Preprocessing for Parametric
Causal Inference. Journal of Statistical
Software, Vol. 42, No. 8, pp 1-28.**

<https://gking.harvard.edu/matchit>