

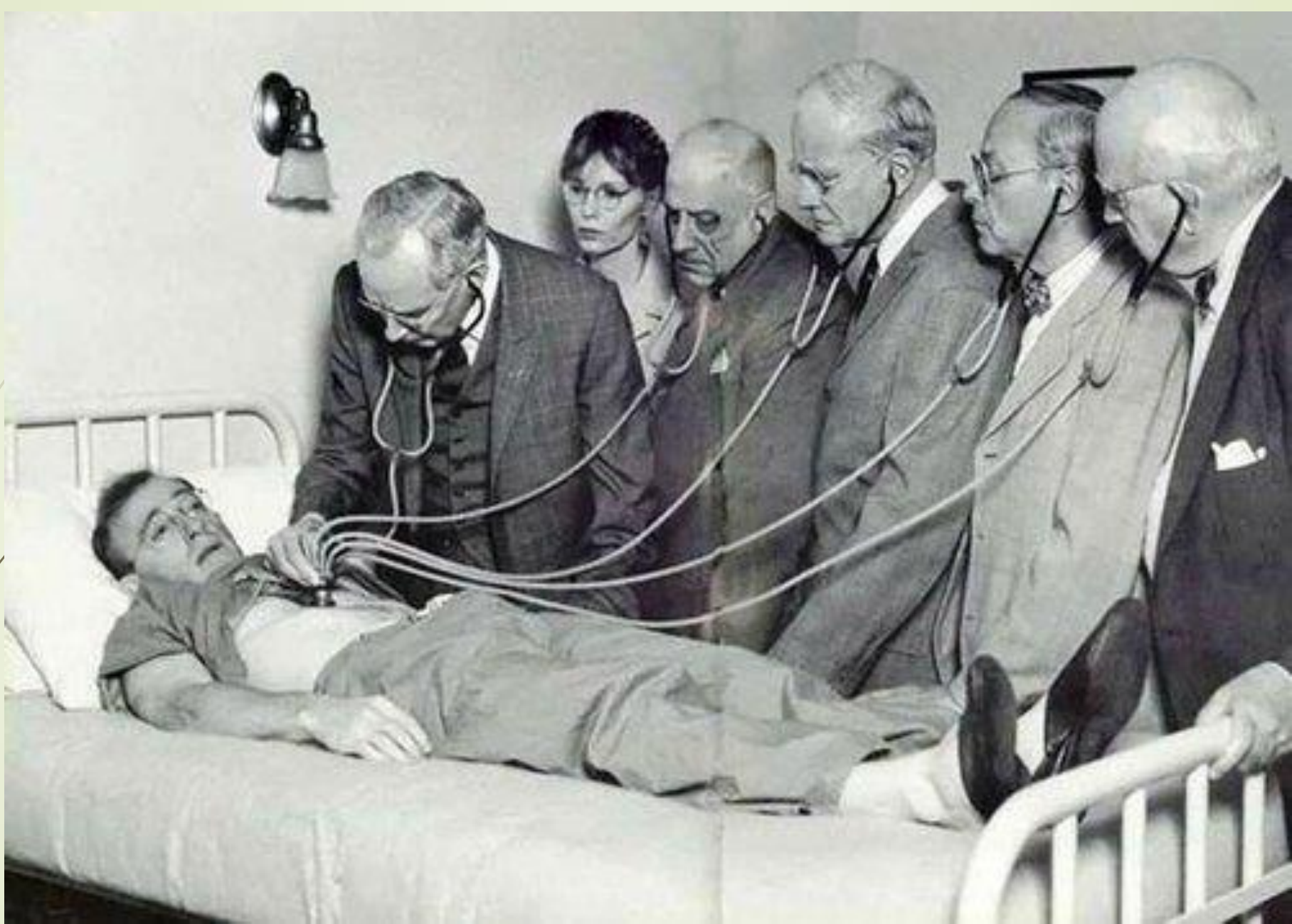


Multiple Measures Assessment Project

Convening of Pilot Colleges

De Anza College

December 4, 2014












Overview

- What are multiple measures?
 - The CAI flow chart – where does MMAP fit in?
 - The data story
 - Research on multiple measures
 - Validation of multiple measures
 - Models of integrating multiple measures with test data
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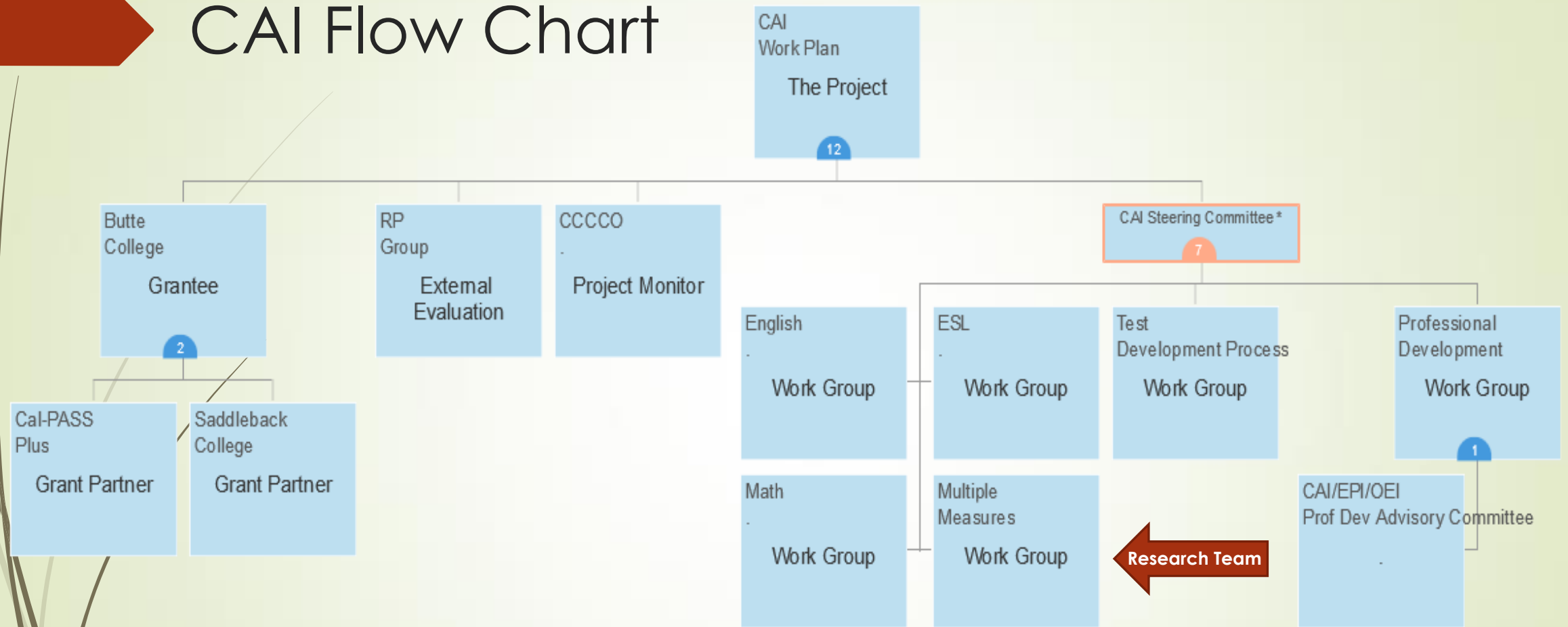


What are multiple measures?

- ▶ High school transcript data
- ▶ High school testing data
- ▶ Noncognitive variables (NCVs)/psychometric data
- ▶ Survey questions/self-reported data
- ▶ Essays/writing samples

- ▶ Historically, multiple measures were not required to be validated
 - ▶ Does not really make sense to ignore them as they impact placement
 - ▶ Need to validate impact of entire placement system on students

CAI Flow Chart




* Steering Committee and Work Groups composed of appointees representing ASCCC, Students, Assessment Professionals, IT, Research, psychometricians, K-12, CSU/UC, Student Services, and other stakeholders.



MMAP

➤ Multiple Measures Assessment Project

- Quantifying students' likelihood of passing any given course in the English and/or math sequence based on academic history/multiple measures
- Looking at noncognitive variables (NCVs) as possible predictors of student success, as well as other downstream uses for NCVs
- Evaluating CCCApply data
- Examining utility (reliability, validity, predictive power) of other survey questions and history indicators as multiple measures
- Does not include protected category information as predictors (e.g., gender, age, ethnicity, etc.)



Research on placement & multiple measures

- ▶ Content validity
- ▶ Criterion validity
- ▶ Arguments-based validity
 - ▶ Validating the outcome of the decision that is made based on the placement system/process
- ▶ Recent scans of multiple measures usage in CCCs show a variety of approaches (RelWest, 2011; WestEd, 2012; WestEd, 2014).
- ▶ Critiques of current placement system as prone to high degree of “severe error” which could be remediated through the use of multiple measures, including HS GPA (Belfield & Crosta, 2013; Scott-Clayton, 2012; Scott-Clayton, Crosta, & Belfield, 2012; Willett, 2013)



The data story

- ▶ Data timeline
 - ▶ First data file delivered on March 3, 2014 (STEPS 2.0 data file)
 - ▶ Second, improved data file with more elements was delivered on 9/3/14; third data file delivered on 10/18/14 (first to include Accuplacer data); fourth data file delivered on 11/4/14
 - ▶ The latest data file (fifth) was delivered on 11/17/14
 - ▶ Every data file takes time (weeks) to vet before new models can be shared
- ▶ Goal of deploying pilot measures in spring 2015 for students enrolling in fall 2015
 - ▶ Short project timeline → pressure to show results and make recommendations even as work is ongoing and data files are still being developed and refined.
 - ▶ The team's data work includes: data screening, feasibility testing, identifying promising areas, and creating models that maximize accuracy of placement
 - ▶ Found sources of psychometric variables/NCVs but data are not yet in hand



What data do we have?

- ▶ Data files

- ▶ About 390,000 cases of students with high school transcript data linked to enrollment in English at a California community college.
- ▶ Similar file for math enrollments
- ▶ ESL file in development

- ▶ Data elements

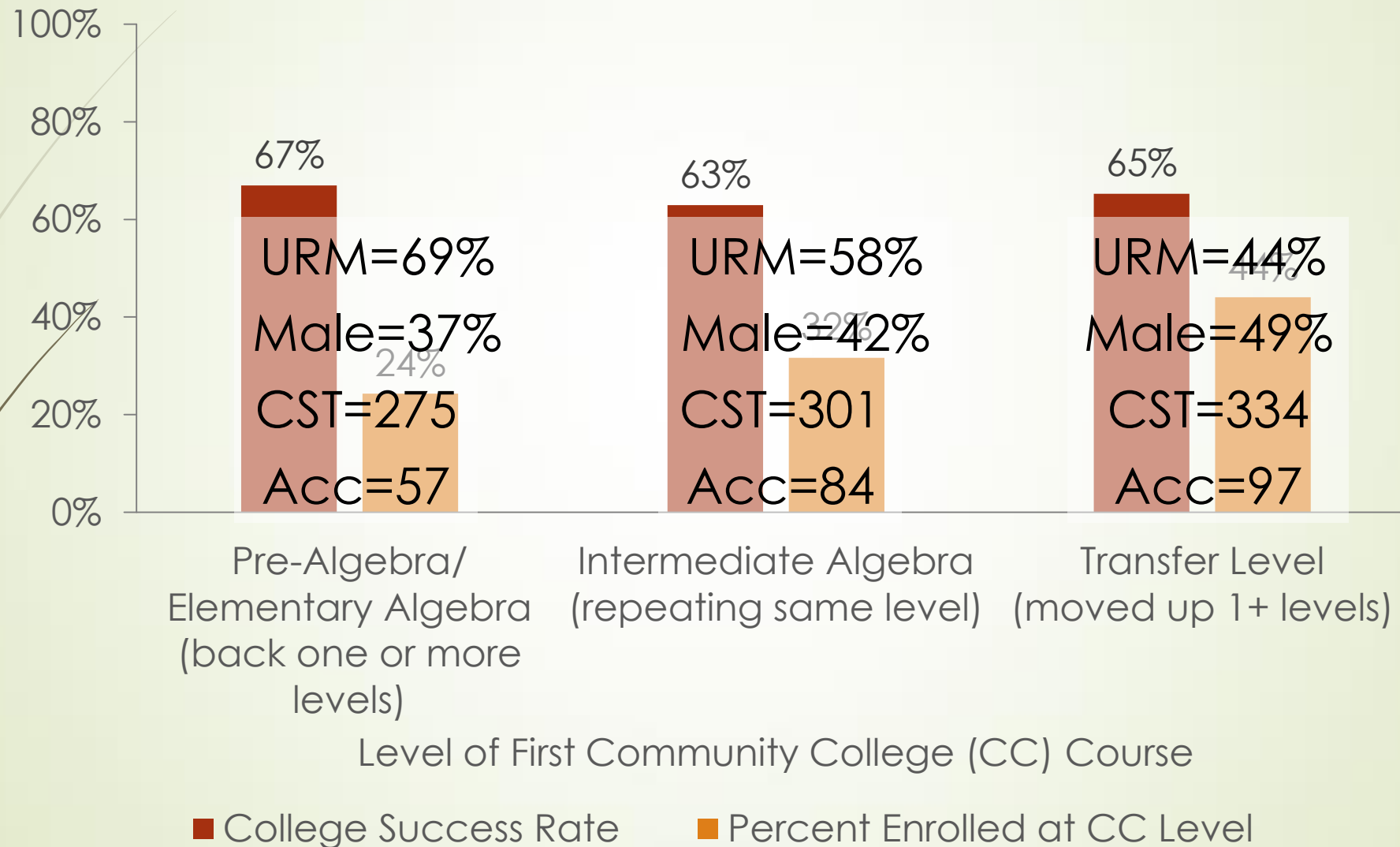
- ▶ High school coursework, grades, GPA, test scores
- ▶ Community college coursework, grades, GPAs
- ▶ English Accuplacer data on 137,000 students (about 35% of the cases)
- ▶ Math Accuplacer data on 109,000 students (about 29% of the cases)



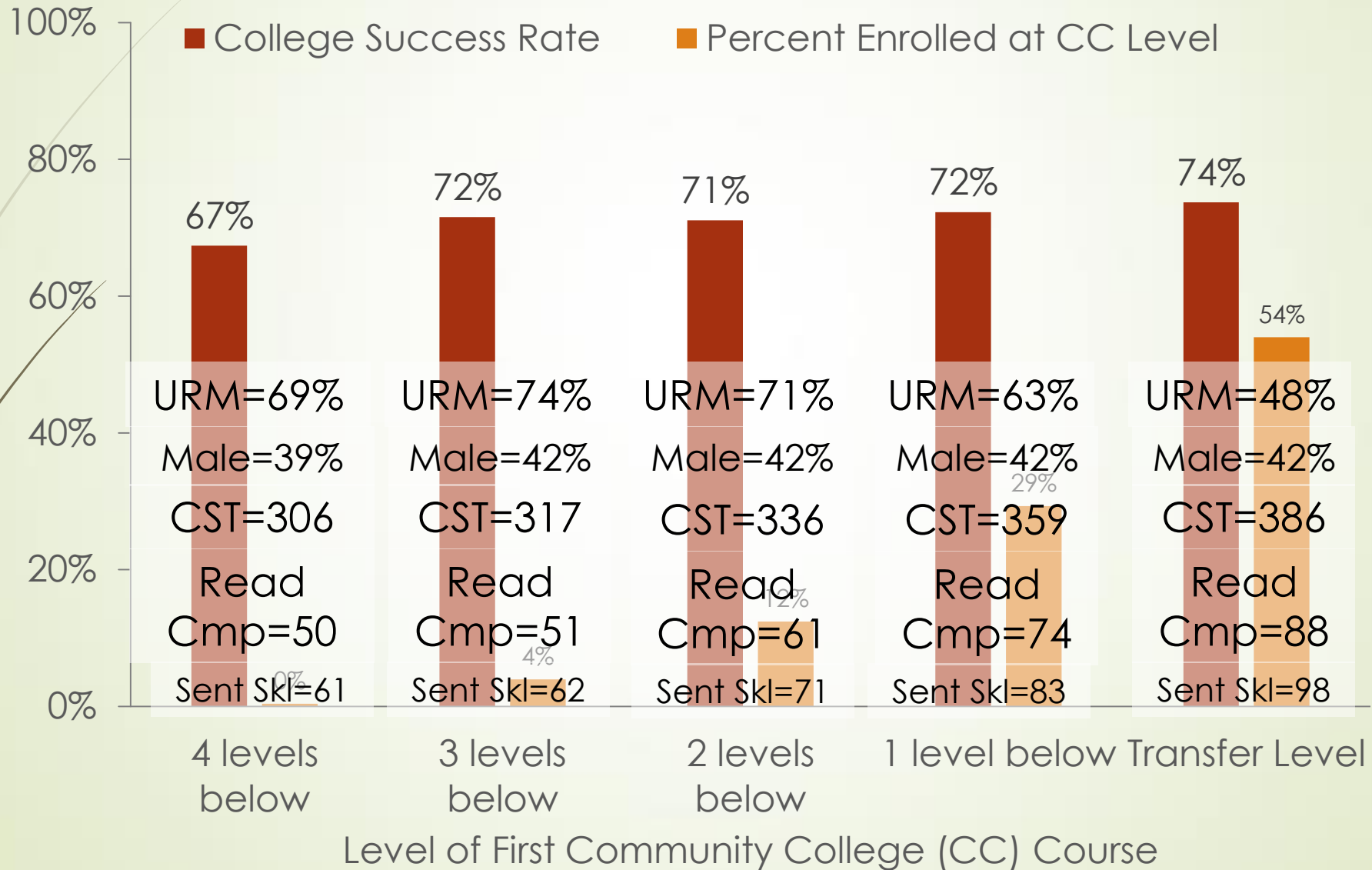
Data infrastructure

- ▶ Academic history as a multiple measure is predicated on a statewide infrastructure that extracts data from the California Pupil Longitudinal Achievement Data System (Cal-PADS) for use in modeling
 - ▶ Cal-PASS Plus key player in creating & maintaining the data infrastructure
 - ▶ Timing
 - ▶ Senior year data not uploaded to Cal-PADS until October after graduation
 - ▶ Can use data through 11th grade with self-reported information on Senior year
 - ▶ Local solutions: LBCC and College of the Canyons have systems for processing/handling transcript data that includes senior year data
 - ▶ Staffing – expanded roles and responsibilities re: transcripts handling
 - ▶ CAS interface can be used to gather data for NCVs, survey questions, and other indicators & predictors
 - ▶ Robust data warehouse backend to provide unified data source for management, research and reporting

Level of and Success in First College Math for Students whose Last High School Course was Algebra 2 with Grade of B or Better (n=35,806)



Level of and Success in First College English for Students whose Last High School Course was 12th Grade Standard English with Grade of B or Better (n=75,830)

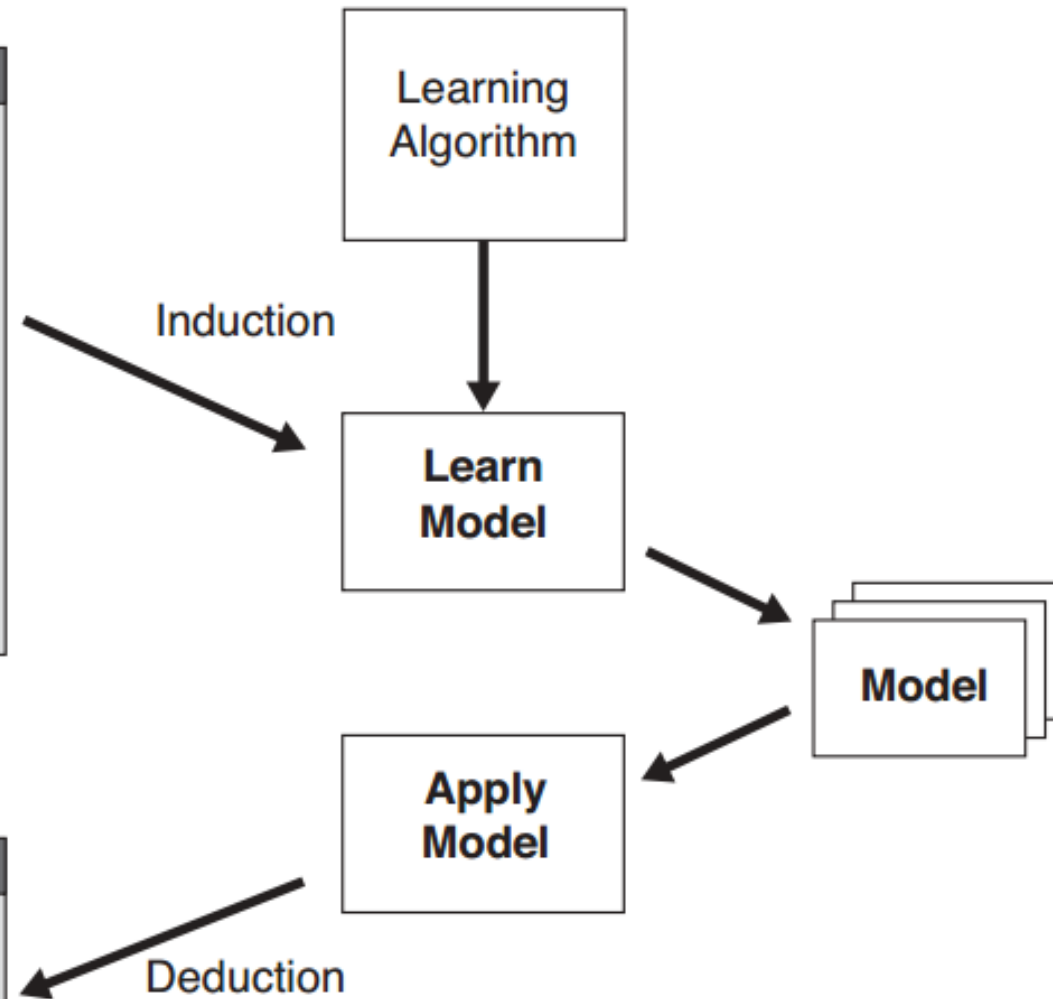


Training Set

Tid	Attrib1	Attrib2	Attrib3	Class
1	Yes	Large	125K	No
2	No	Medium	100K	No
3	No	Small	70K	No
4	Yes	Medium	120K	No
5	No	Large	95K	Yes
6	No	Medium	60K	No
7	Yes	Large	220K	No
8	No	Small	85K	Yes
9	No	Medium	75K	No
10	No	Small	90K	Yes

Test Set

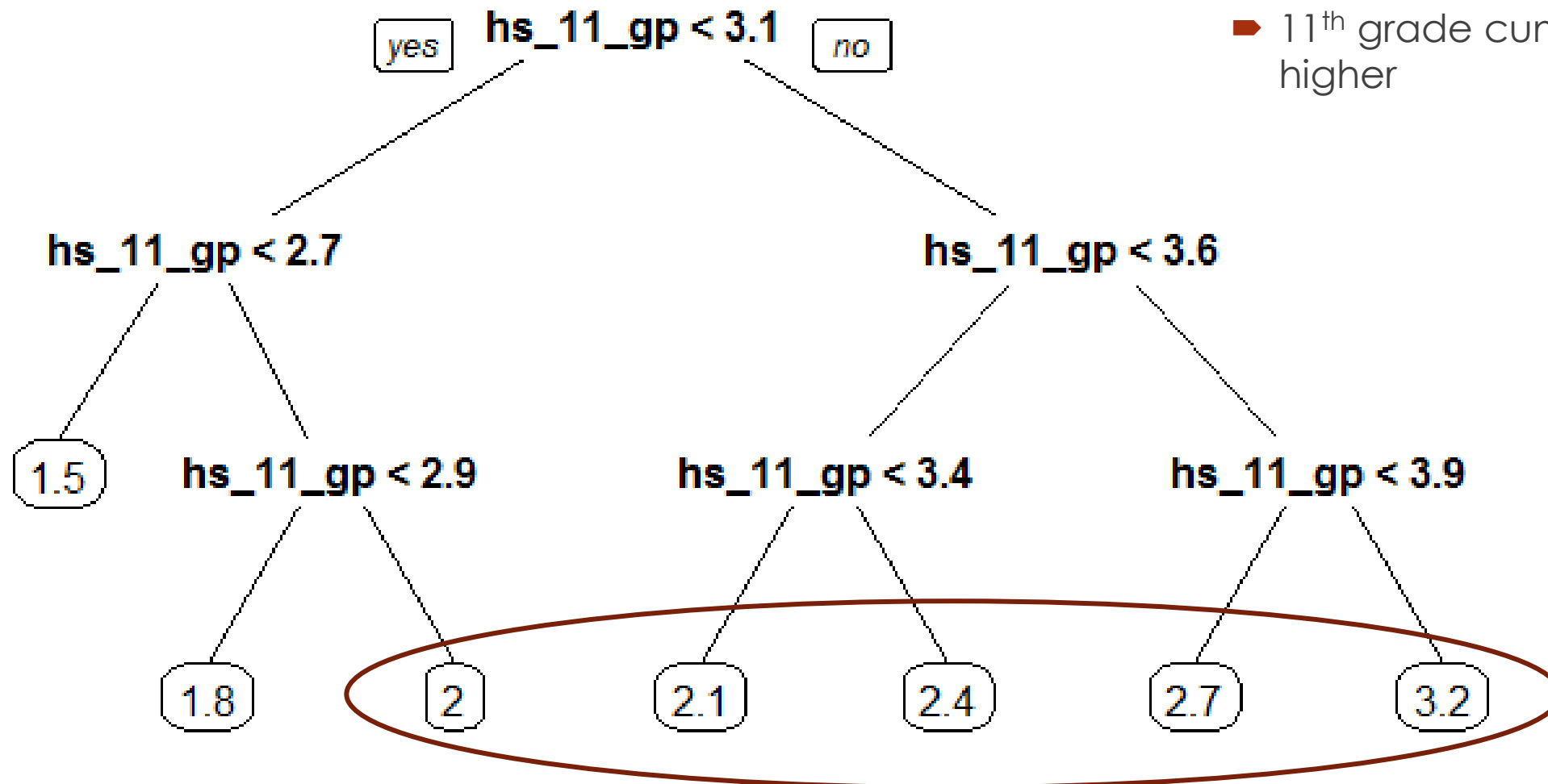
Tid	Attrib1	Attrib2	Attrib3	Class
11	No	Small	55K	?
12	Yes	Medium	80K	?
13	Yes	Large	110K	?
14	No	Small	95K	?
15	No	Large	67K	?



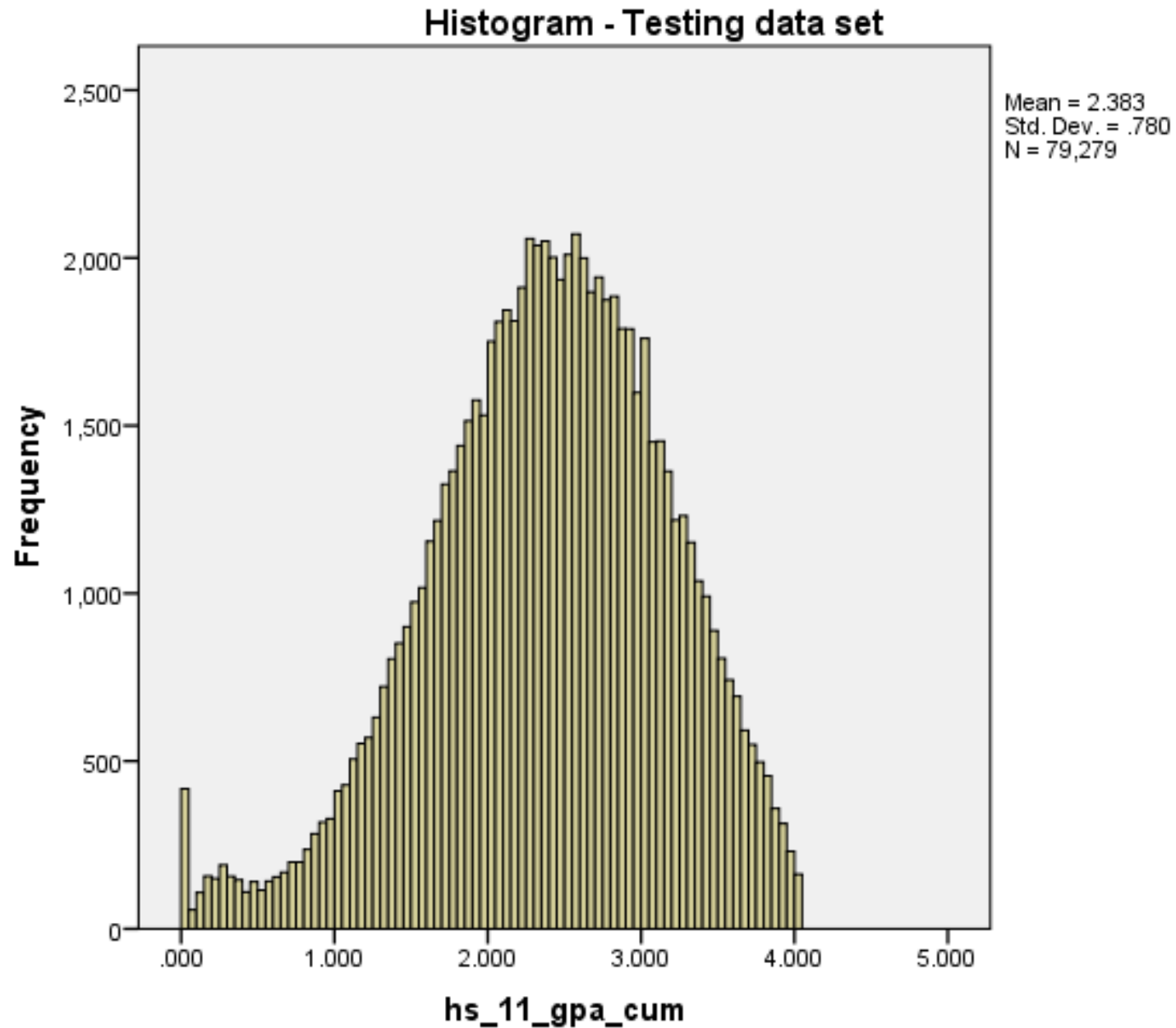
General approach for building a classification model.

Transfer-level math MM decision tree

- Place into transfer level math if:
 - 11th grade cum GPA is 2.9 or higher



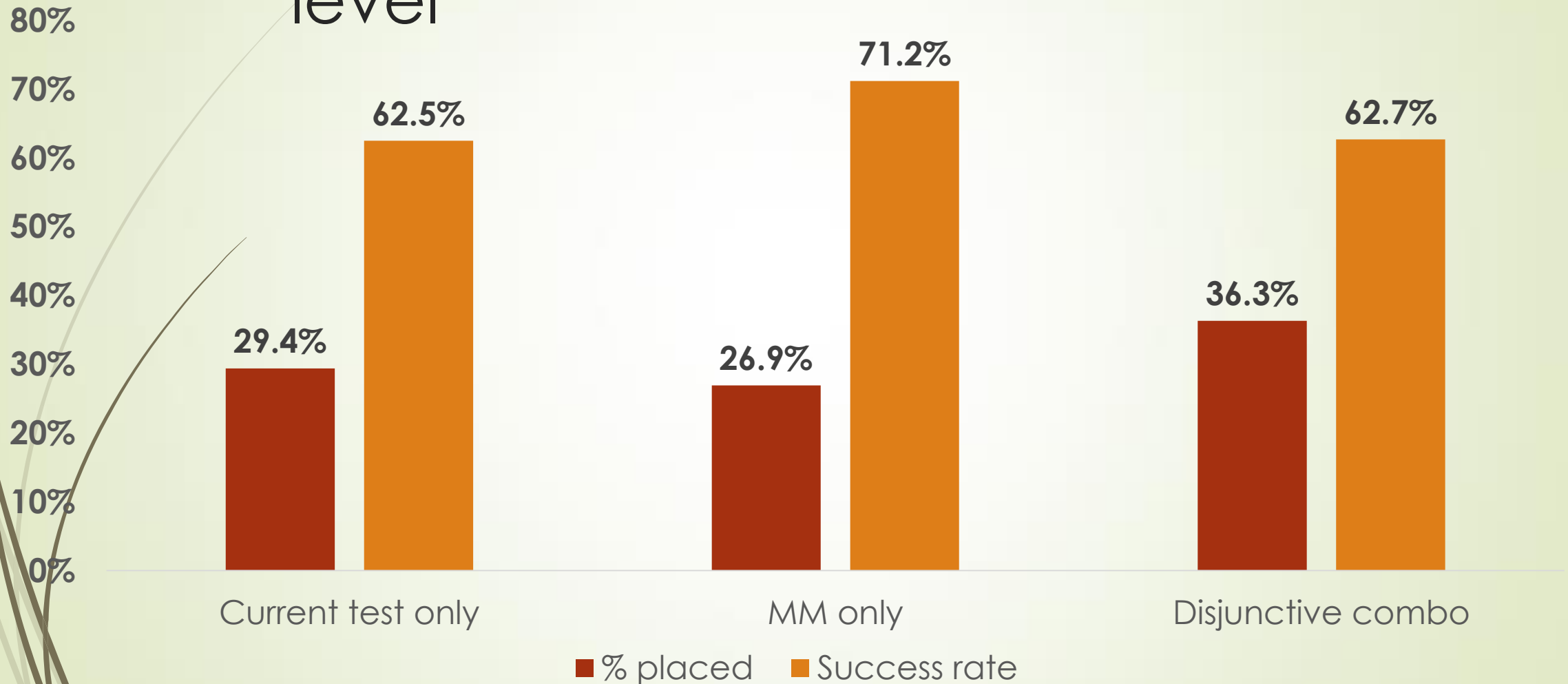
Impact of proposed MM rule set



Meta-model thinking

- ▶ How do we best make use of all of the test, academic history and other multiple measure data that is available?
 - ▶ Disjunctive (“either or”)
 - ▶ Example: Test score OR “good” grade in high school
 - ▶ Conjunctive (“both and”)
 - ▶ Example: Minimum score on reading and writing for placement into Freshman Comp
 - ▶ Compensatory (“weighted and blended”)
 - ▶ Example: Average of Reading Comprehension and Writing Scores; regression
 - ▶ Mix and match?

Math placement models for transfer-level



NB: MM rule derived from 250,000 cases in training data set, performance data from application of MM to 130,000 cases of students transitioning to a CCC in 2011-2012 or 2012-2013 (Data source: Cal-PASS+).



Thank you.

Questions & discussion



Additional resources

The slides that follow are provided as additional resources for the MMAP pilot colleges. For questions, please contact Terrence Willett (twillett@rpgroup.org) or Craig Hayward (chayward@rpgroup.org).



Additional transition data

Increasing alignment between high school and college curriculum can reduce remediation and course repetition

Last high school math, B or better		Level of First Community College (CC) Course					Total Percent	Total Count
		4 levels below	3 levels below	2 levels below	1 level below	Transfer Level		
Basic Math	College Success Rate	47%	54%	47%	52%	63%	100%	14,703
	Percent Enrolled at CC Level	8%	18%	30%	24%	19%		
Pre- Algebra	College Success Rate	54%	48%	44%	47%	54%	100%	884
	Percent Enrolled at CC Level	8%	27%	32%	20%	13%		
Algebra 1	College Success Rate	53%	56%	51%	52%	60%	100%	23,016
	Percent Enrolled at CC Level	8%	19%	30%	28%	15%		
Geometry	College Success Rate	56%	61%	55%	57%	64%	100%	26,318
	Percent Enrolled at CC Level	5%	13%	26%	29%	27%		
Algebra 2	College Success Rate	66%	70%	66%	63%	65%	100%	35,406
	Percent Enrolled at CC Level	2%	6%	17%	32%	44%		
Statistics	College Success Rate	62%	66%	67%	69%	74%	100%	9,697
	Percent Enrolled at CC Level	2%	5%	12%	23%	58%		
Pre- Calculus	College Success Rate	66%	76%	72%	74%	70%	100%	22,415
	Percent Enrolled at CC Level	1%	2%	8%	22%	67%		
Calculus	College Success Rate	70%	72%	74%	81%	78%	100%	8,476
	Percent Enrolled at CC Level	0%	1%	2%	8%	88%		
Linear Algebra	College Success Rate	100%	100%	67%	68%	60%	100%	101
	Percent Enrolled at CC Level	1%	16%	21%	28%	35%		

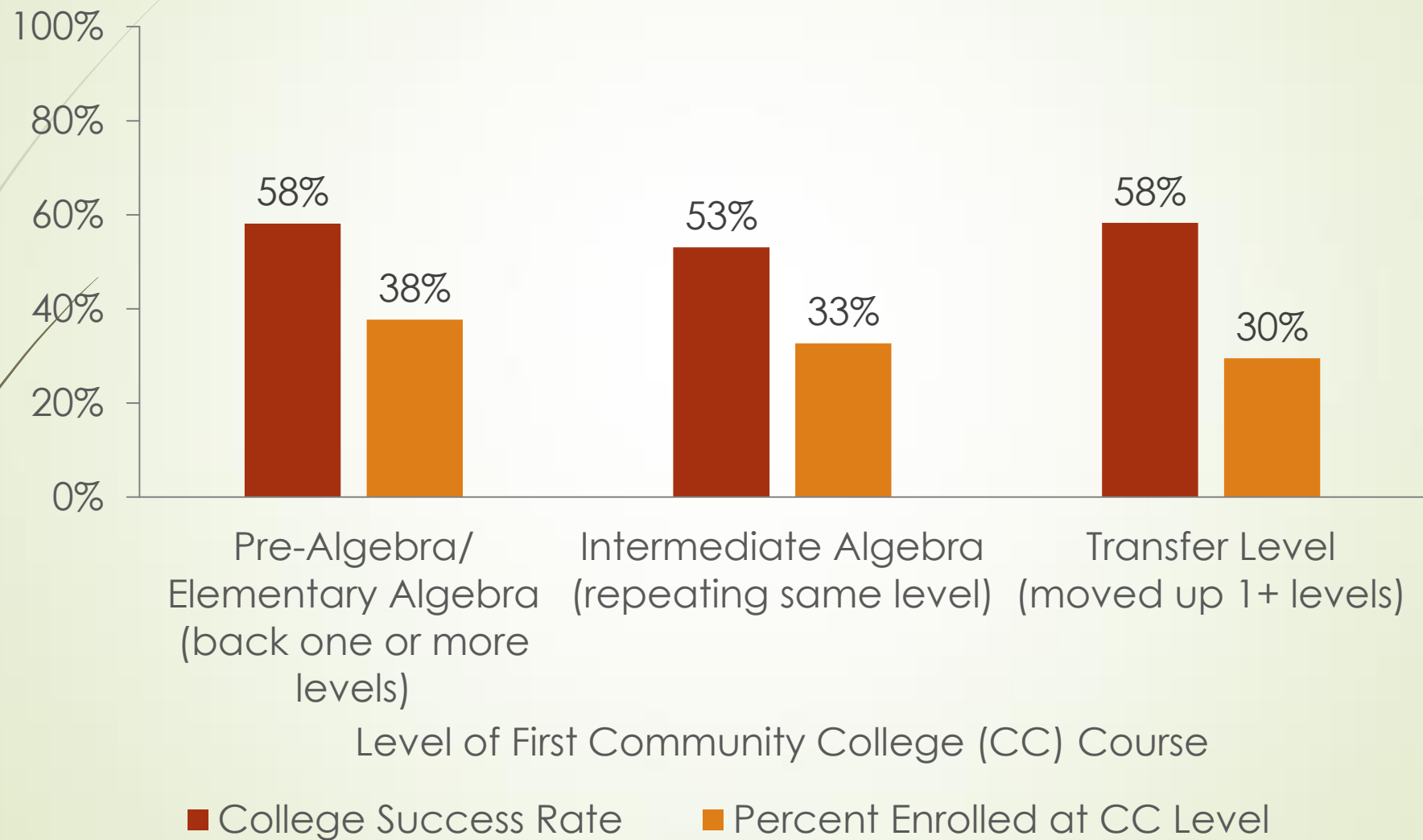
Red = transitioned **down** one or more levels from high school to college

Yellow = repeated **similar** level in college already completed in high school

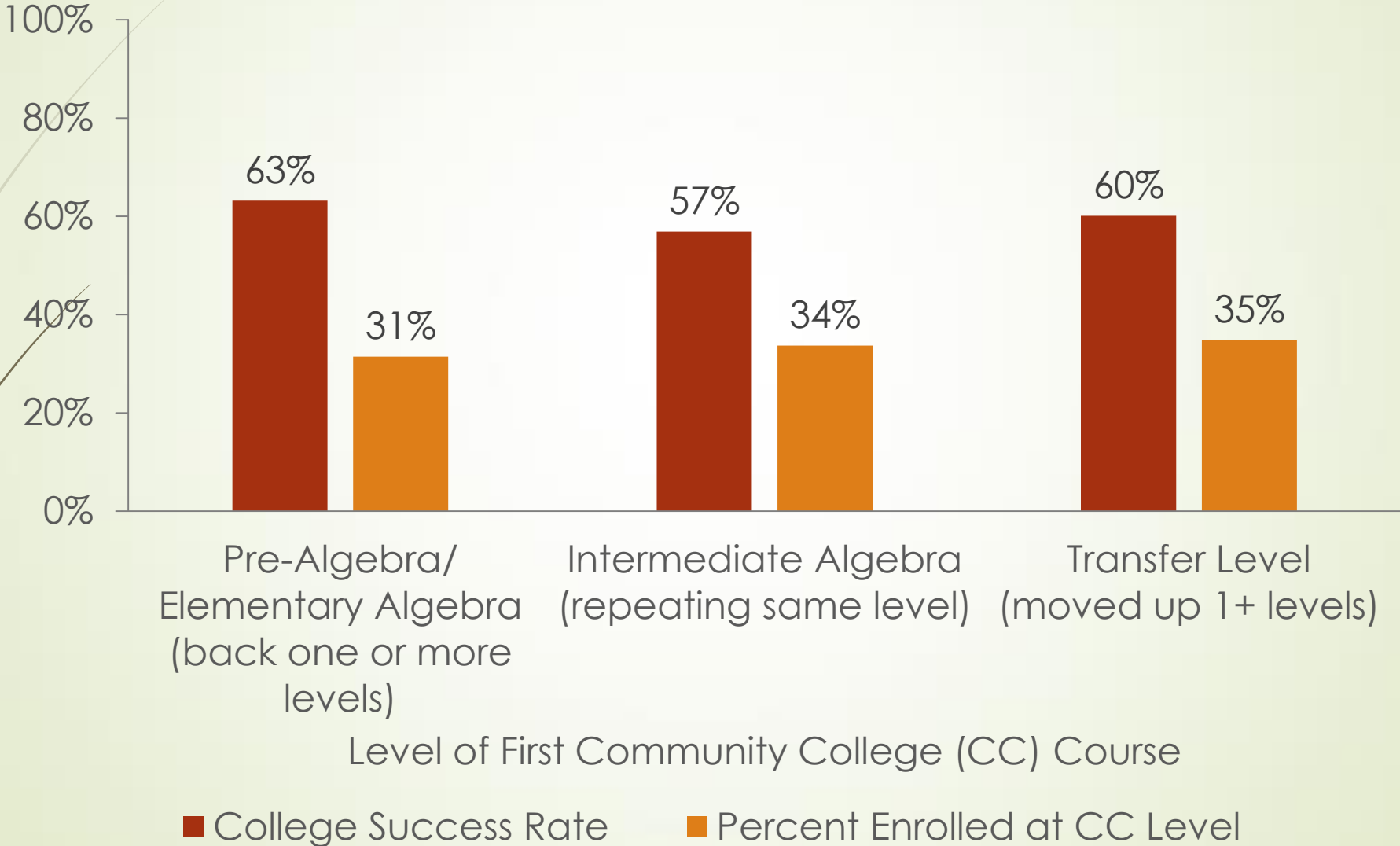
Green = transitioned **up** one or more levels from high school to college

Last high school English		Grade		Level of First Community College (CC) Course					Total Percent	Total Count
				4 levels below	3 levels below	2 levels below	1 level below	Transfer Level		
12th Grade Standard English	C	College Success Rate	60%	62%	60%	59%	60%	100%	28,283	
		Percent Enrolled at CC Level	1%	6%	18%	34%	42%			
	B	College Success Rate	68%	70%	69%	69%	70%	100%	43,960	
		Percent Enrolled at CC Level	0%	4%	14%	31%	50%			
	A	College Success Rate	66%	74%	74%	77%	78%	100%	31,870	
		Percent Enrolled at CC Level	0%	3%	10%	27%	59%			
12th Grade Advanced Placement English	C	College Success Rate	59%	76%	69%	72%	69%	100%	6,167	
		Percent Enrolled at CC Level	1%	1%	8%	21%	69%			
	B	College Success Rate	77%	85%	78%	77%	80%	100%	9,801	
		Percent Enrolled at CC Level	0%	1%	5%	16%	78%			
	A	College Success Rate	75%	88%	77%	81%	86%	100%	6,156	
		Percent Enrolled at CC Level	0%	1%	4%	15%	81%			

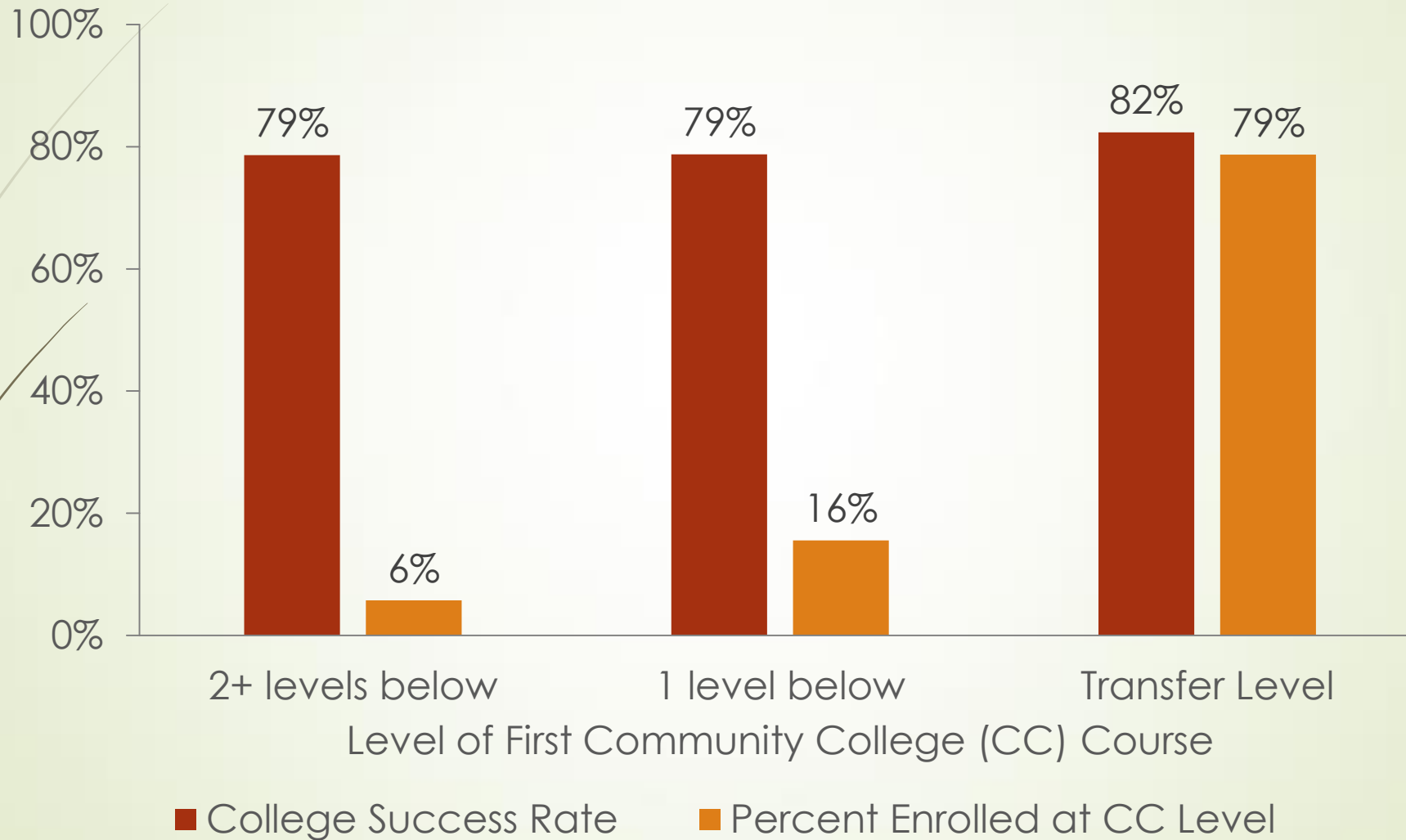
Level of and Success in First College Math for Students whose Last High School Course was Algebra 2 (n=113,217)



Level of and Success in First College Math for Students whose Last High School Course was Algebra 2 with Grade of C- or Better (n=80,883)



Level of and Success in First College English for Students whose Last High School Course was 12th Grade Advanced Placement English with Grade of B or Better (n=15,957)



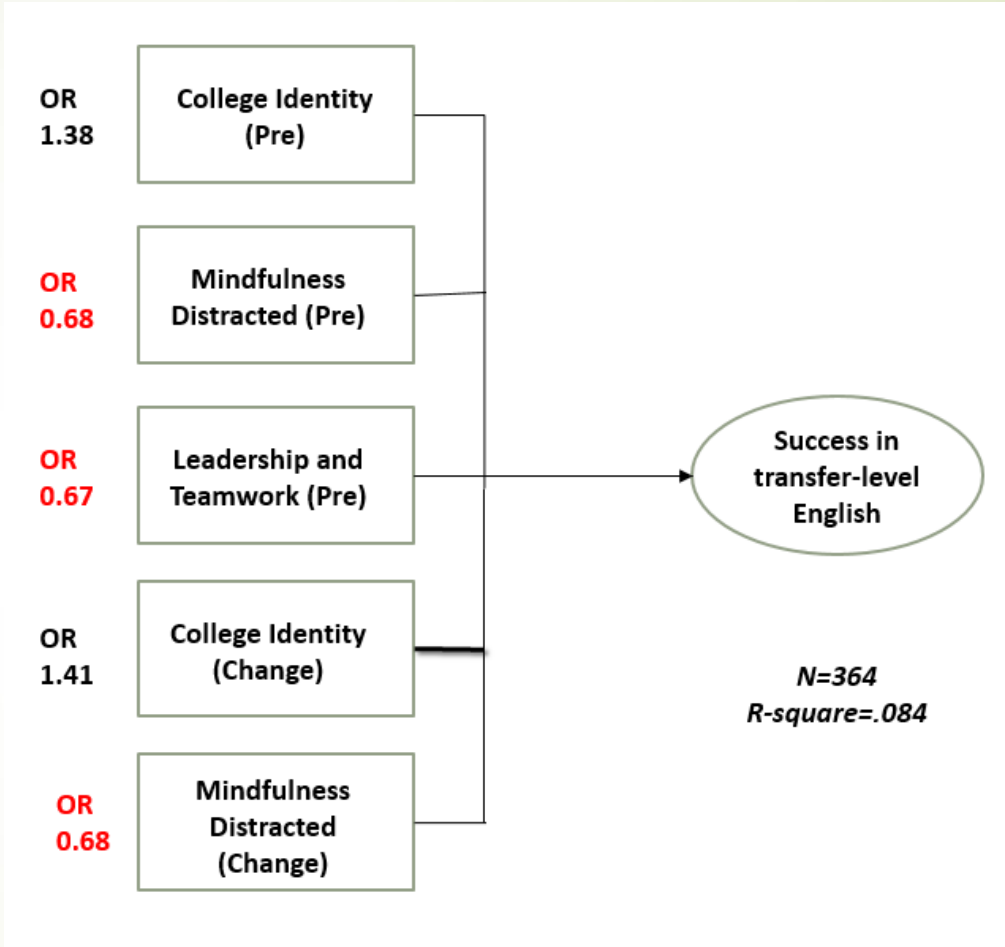
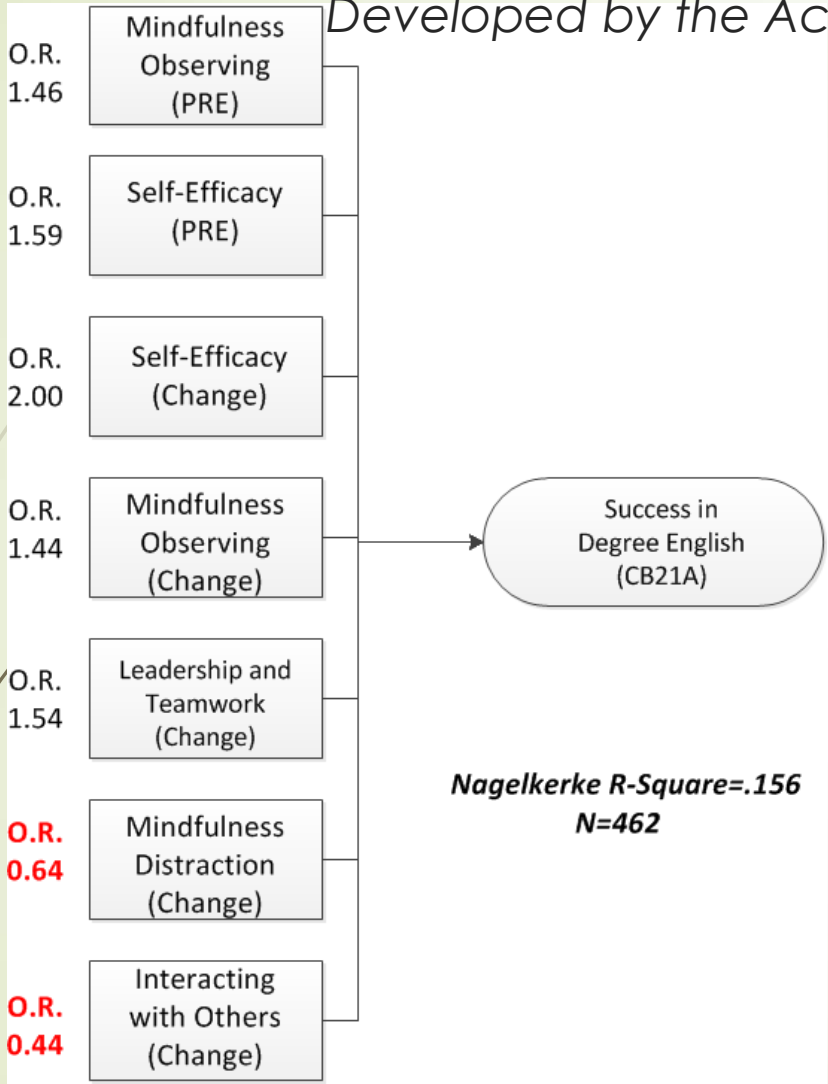


Psychometric data

Cabrillo College & Chaffey College pilot the predictive utility of psychometrics/NCVs

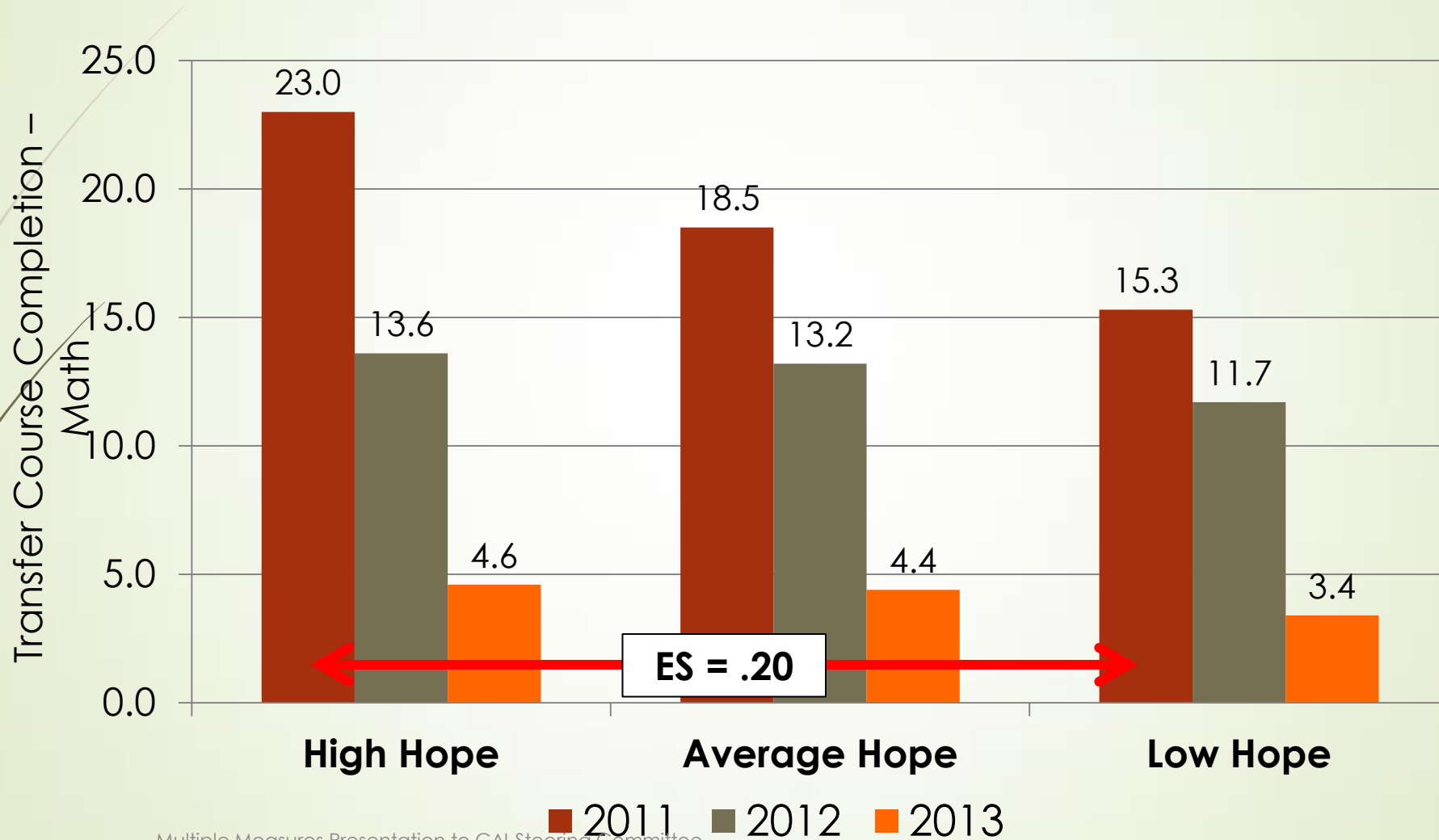
CSSAS

Developed by the Academy for College Excellence



Transfer Course Completion - Math

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Evaluating placement accuracy

Metrics for assessing classification accuracy of placement models



Fit Statistics: Evaluating classifications

- ▶ **Misclassification rate** - the number of incorrect predictions divided by the total number of classifications.
- ▶ **Sensitivity** - the percentage of cases that actually experienced the outcome (e.g., "success") that were correctly predicted by the model (i.e., true positives).
- ▶ **Specificity** - the percentage of cases that did not experience the outcome (e.g., "unsuccessful") that were correctly predicted by the model (i.e., true negatives).
- ▶ **Positive predictive value** - the percentage of correctly predicted successful cases relative to the total number of cases predicted as being successful.
- ▶ **Negative predictive value** - the percentage of correctly predicted unsuccessful cases relative to the total number of cases predicted as being unsuccessful.



Validity of self-report

How valid is self-reported academic data?

Self Reported Senior Year Coursework vs. Transcript

- ▶ Transcript
 - ▶ Accurate
 - ▶ Lags due to timing of data collection & transmission
 - ▶ Potential issues with out-of-state or returning students
- ▶ Self-Report
 - ▶ Logistically easy
 - ▶ Can be collected from all students
 - ▶ Is it a reliable / valid reflection?

Transcript vs. Self-Report: 12th Grade Math

- ▶ Senior Math Class
 - ▶ Few self-report higher, some report lower (possibly because they assessed in 11th grade)
 - ▶ Chi-square results: $\chi^2(20)=835.86, p<0.001$
 - ▶ Spearman Rho = 0.826
 - ▶ 29% misclassification rate

Passing grade (A, B, or C)

- Strong agreement
- Chi-square results: $\chi^2(1)=135.37, p<0.001$
- Spearman Rho = 0.433
- Only an 18% misclassification rate (593 match out of 723)