Developmental Education Reform to Improve Student Outcomes: Findings from Four Evaluations

Organizer: James Benson

National Center for Education Research

Discussant: Christopher M. Mullin

Education Commission of the States

ies INSTITUTE OF EDUCATION SCIENCES

Purpose and Sequence for the Session

- Build rigorous research evidence on promising forms of developmental education reform
  - Address rapidly-changing policies and practices
  - Address 3 stages in the pipeline: placement, remediation, attainment
  - Examine reforms that vary in scope
- Sequence of reform topics
  1. Placing students into (and out of) developmental education
  2. DCMP: a college- and system-level research-informed reform strategy
  3. Co-requisite remediation (Texas): state-level, policy-driven reform
  4. Developmental education reform (Florida): state-level, policy-driven reform

Agenda and Timeline

- Paper #1: Evaluation of a Multiple Measures Placement System Using Data Analytics: Early Impact Findings (15 minutes)
- Paper #2: Evaluation of the Dana Center Math Pathways (15 minutes)
- Paper #3: The Causal Impact of Corequisite Remediation on Student Outcomes (15 minutes)
- Paper #4: Accelerating Success: The Impact of Florida's Developmental Education Reform on First Year Credit Accumulation (15 minutes)
- Discussant Comments (10 minutes)
- Questions/Answers/Comments (15 minutes)

Acknowledgements

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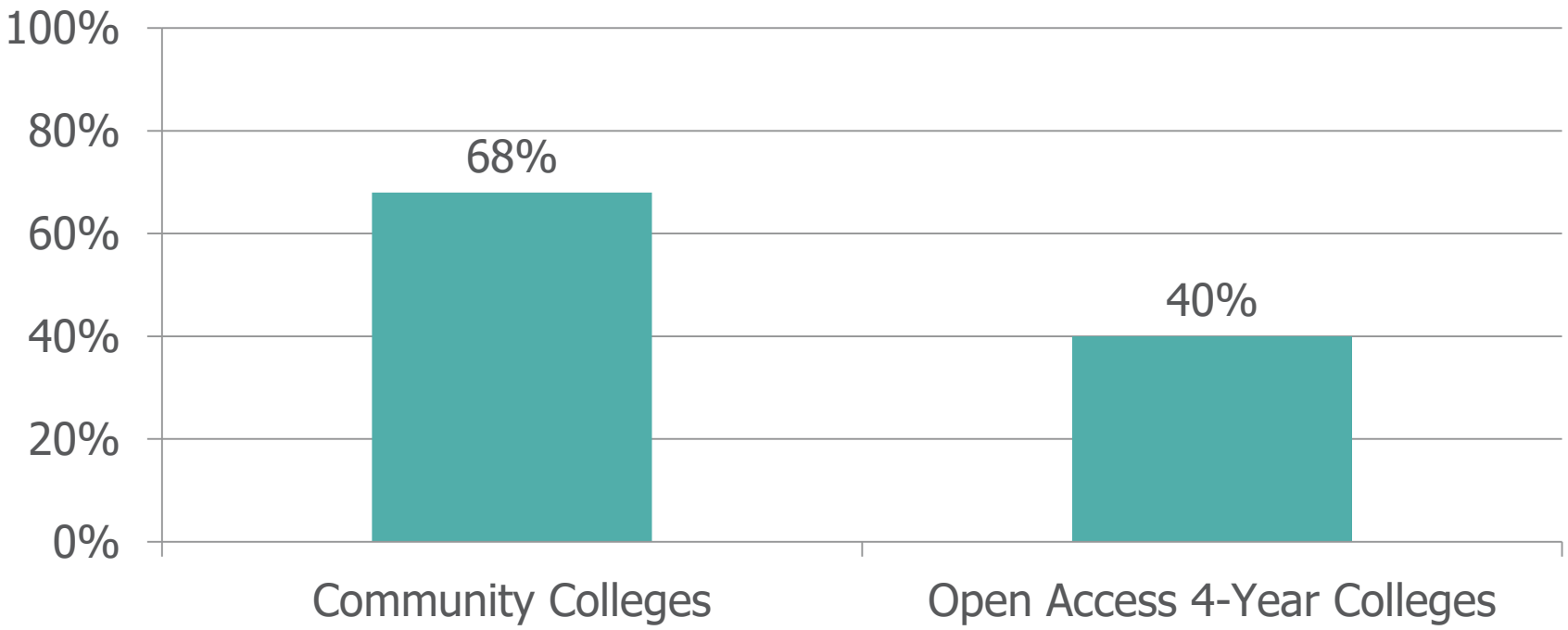
Evaluation of a Multiple Measures Placement System Using Data Analytics: Early Impact Findings

Elisabeth Barnett, Senior Research Scholar

Community College Research Center, Teachers College

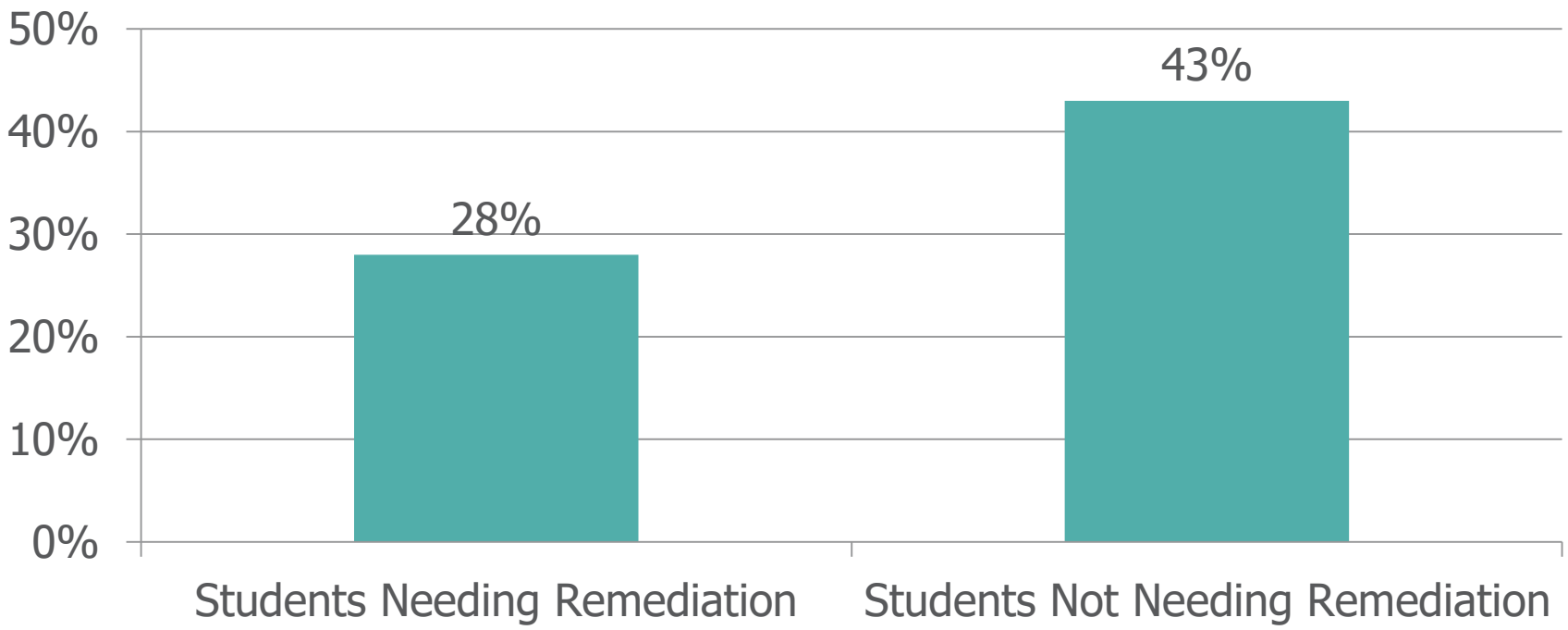
Multiple Measures Assessment

Students needing 1+ developmental education course (NCES, 2013)



Community college 8-year graduation rates

(Attewell, Lavin, Domina, and Levey, 2006)



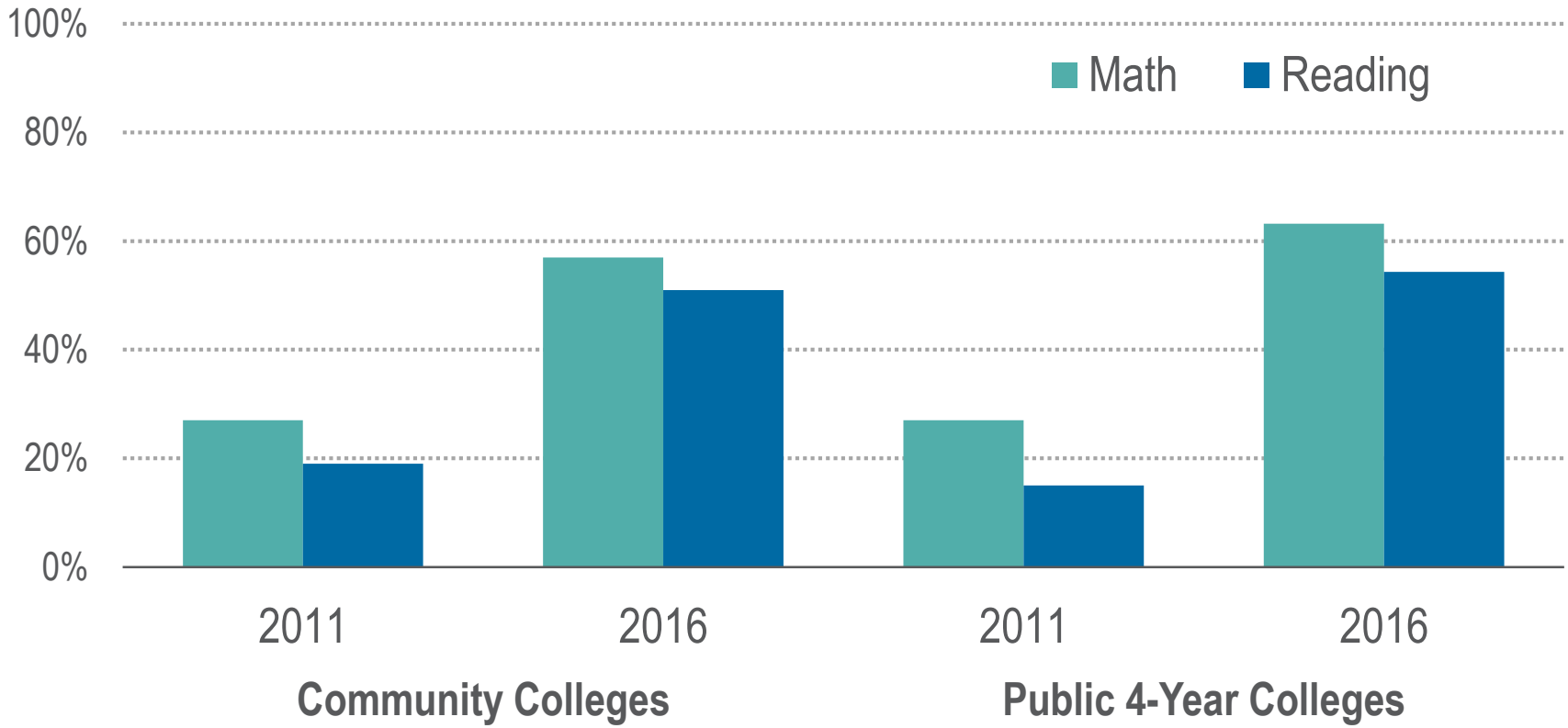
Under-placement and Over-placement

		Placement According to Exam	
		Developmental	College Level
Student Ability	Developmental	✓	***Over-placed*** *(English – 5%)* *(Math – 6%)*
	College Level	***Under-placed*** *(English – 29%)* *(Math – 18%)*	✓

Why Use Multiple Measures

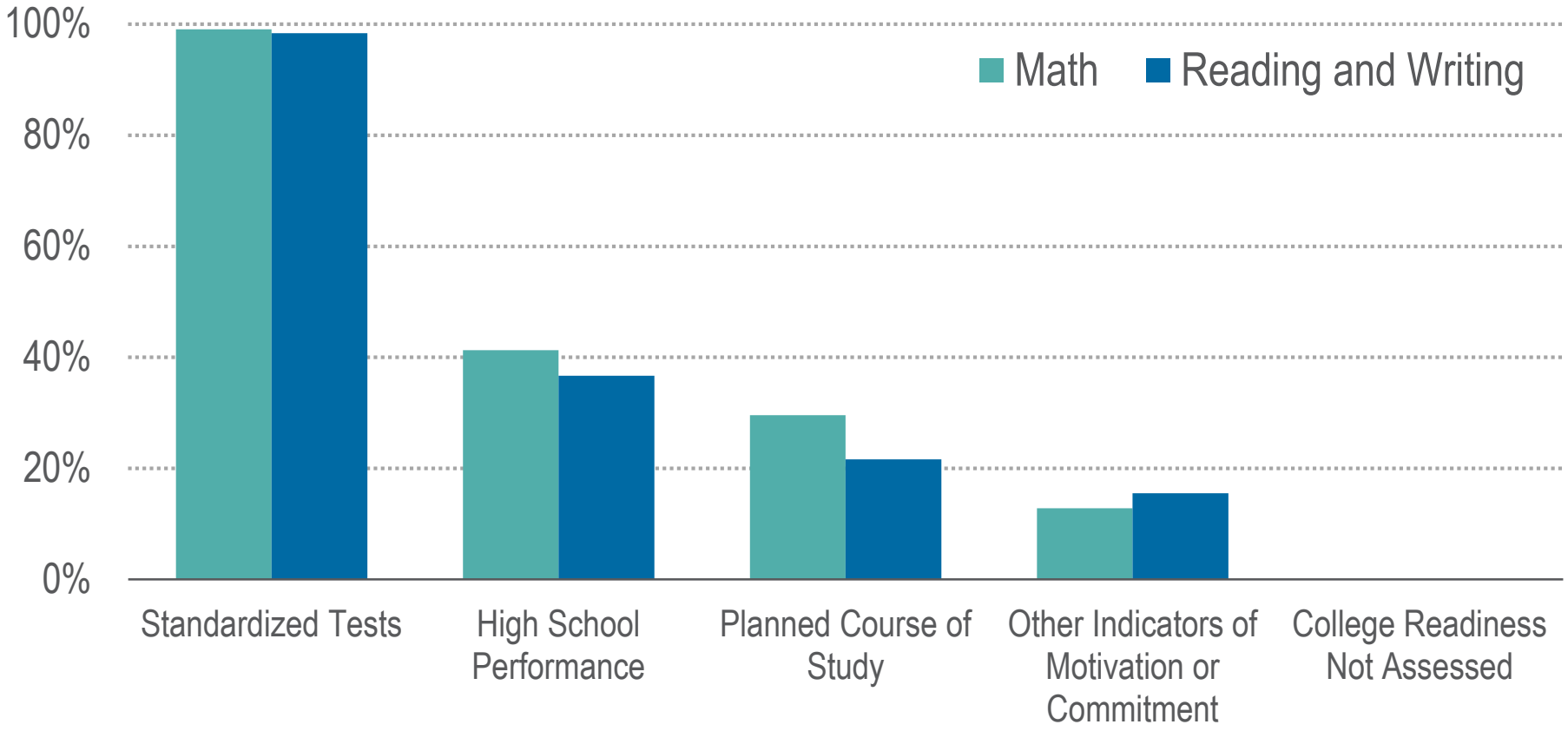
- Existing placement tests are not good predictors of success in college courses. High School Grade Point Average (GPA) does a better job.
- More information improves most predictions.
- Different measures may be needed to best place specific student groups.

Percent of Colleges Using Measures Other than Standardized Tests for Assessment



SOURCES: 2011 data from Fields and Parsad (2012); 2016 data from the CAPR's institutional survey.
NOTE: The Fields and Parsad (2012) reading statistics are for reading placement only, whereas the CAPR survey data are for both reading and writing.

Processes Used to Determine College Readiness in Community Colleges



SOURCE: Data from CAPR's institutional survey.
NOTE: Categories are not mutually exclusive.

The Center for the Analysis of Postsecondary Readiness (CAPR) Assessment Study

Research on Alternative Placement Systems

- 5-6 year project
- 7 State University of New York community colleges
- Evaluation of the use of predictive analytics in student placement decisions
- Research includes Randomized Control Trial (RCT), implementation study, and cost study
- Current status: completed preliminary report

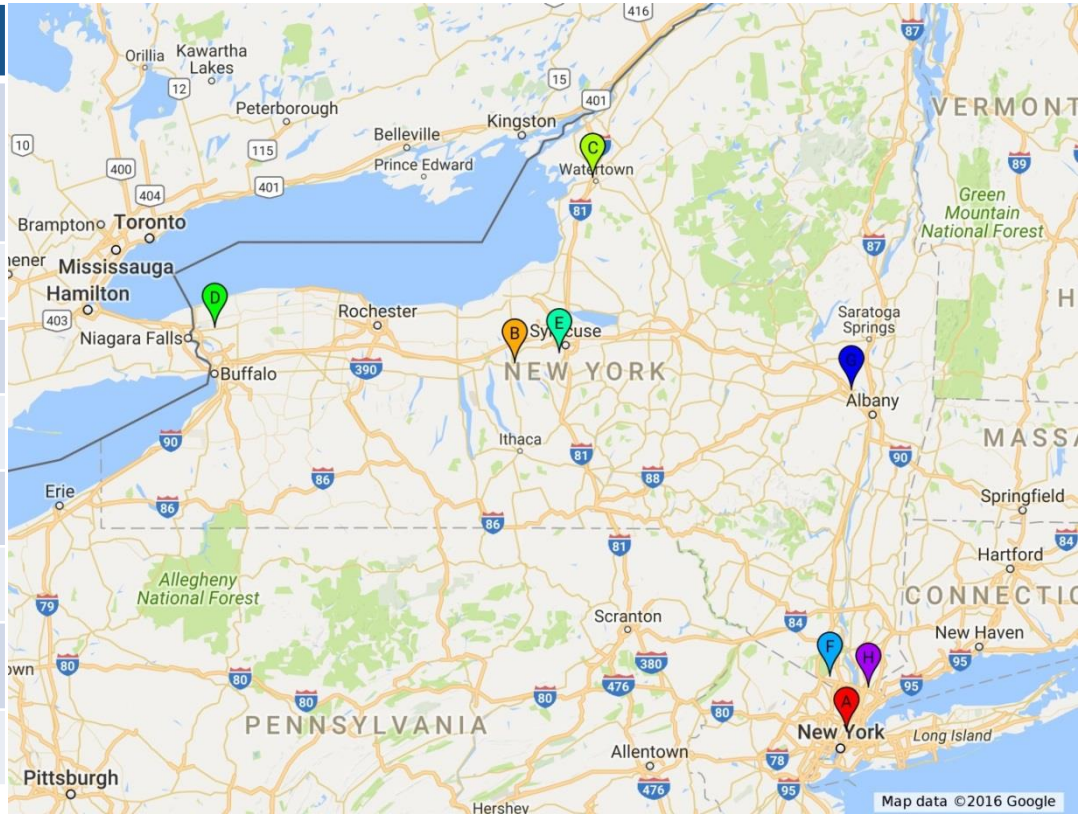
Research Questions (Summary)

1. Do students' outcomes improve when they are placed using predictive analytics?

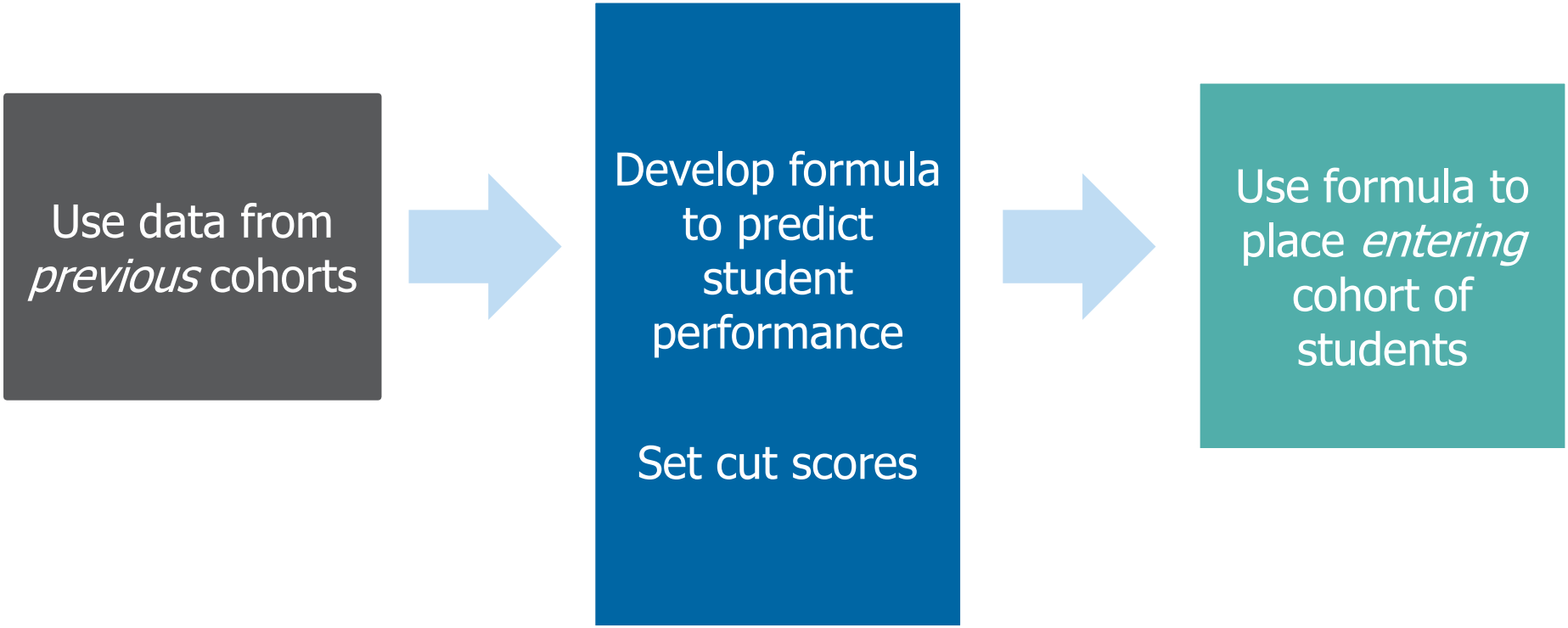
2. How does each college adopt/adapt and implement such a system?

The State University of New York Sites

LOCATION
A – The Center for the Analysis of Postsecondary Readiness, Community College Research Center, MDRC
B – Cayuga Community College
C – Jefferson Community College
D – Niagara County Community College
E – Onondaga Community College
F – Rockland Community College
G – Schenectady County Community College
H – Westchester Community College



How Does the Predictive Analytics Placement Work?



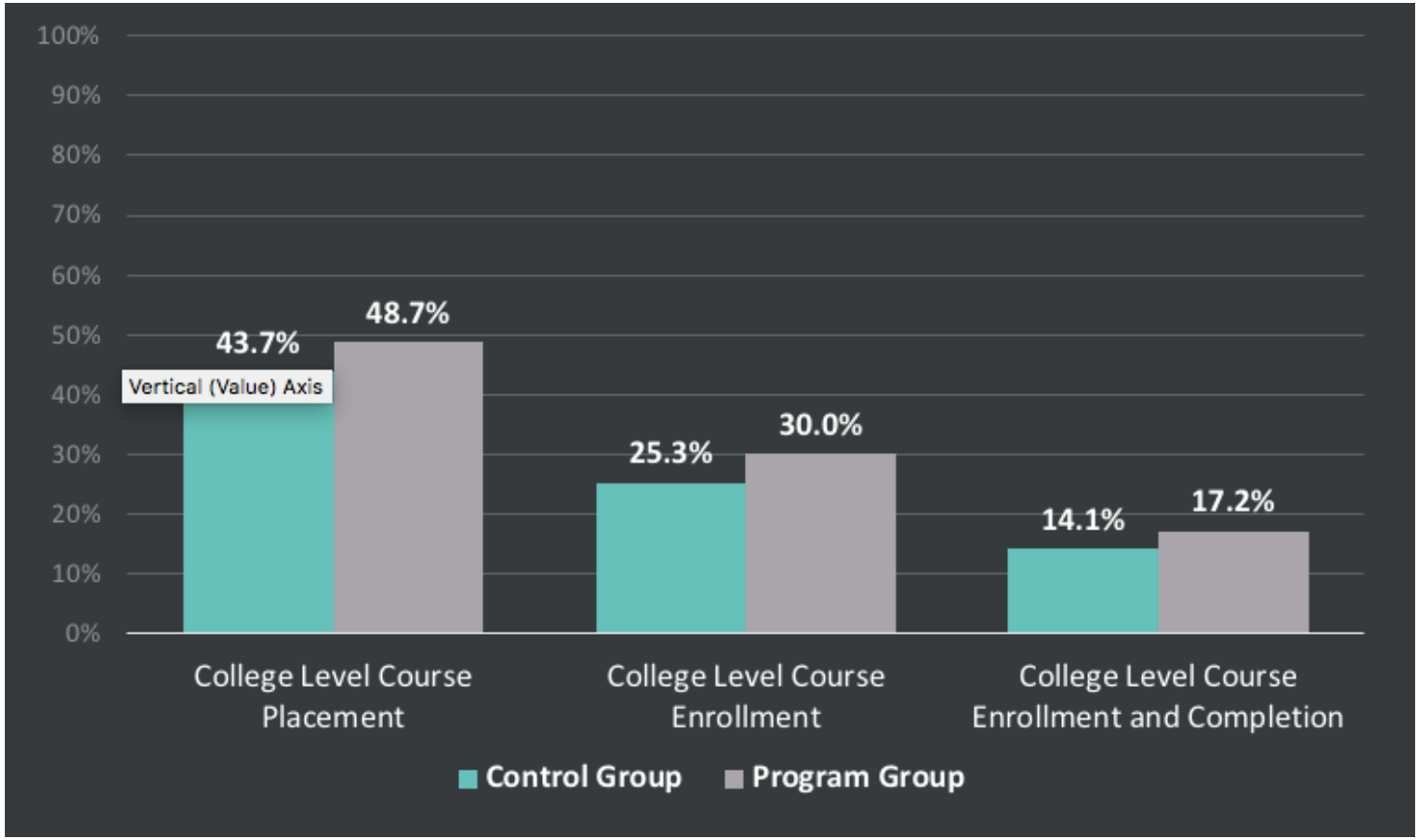
First Cohort - First Semester (Fall 2016)

Sample = 4,729 first year students across 5 colleges

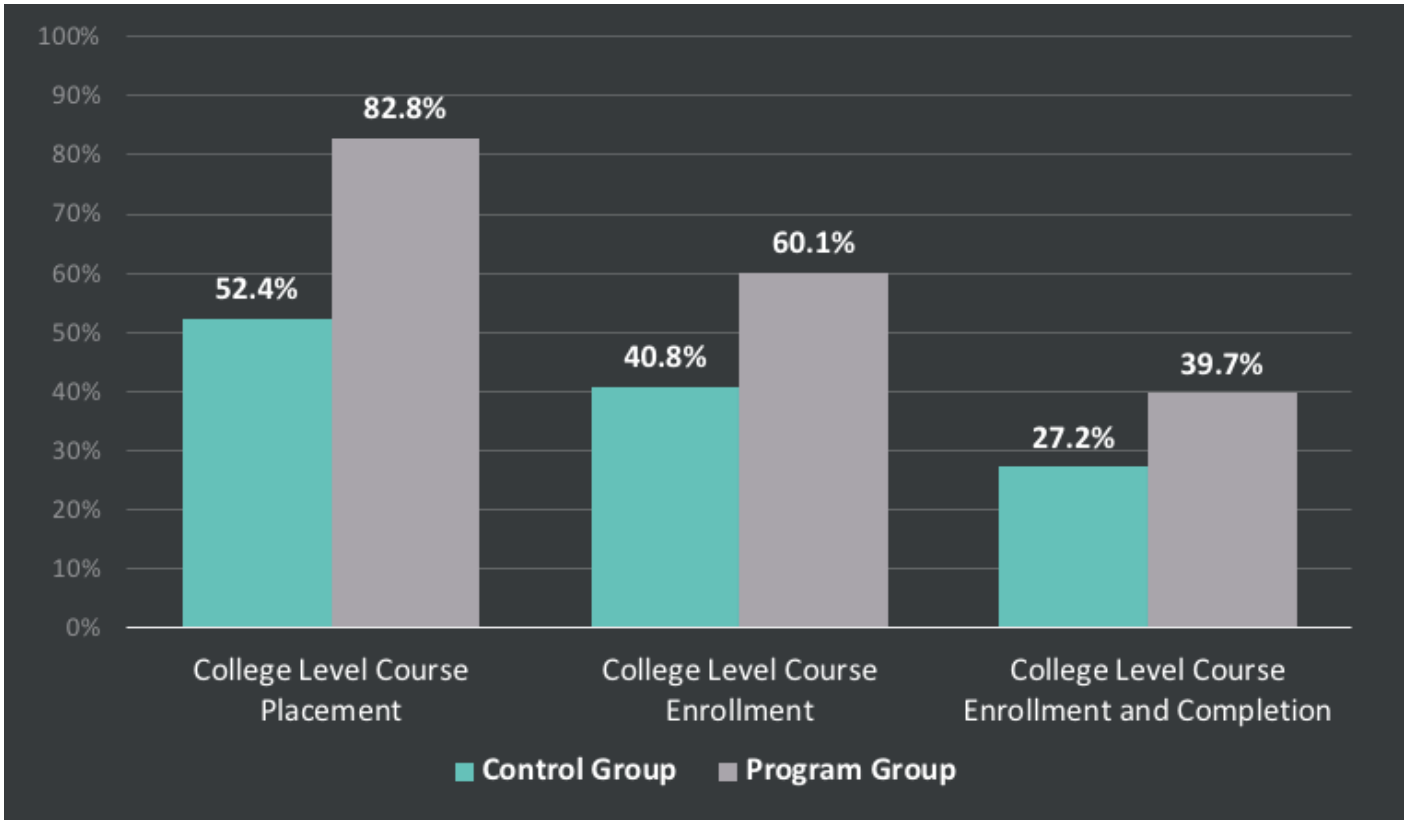
- 48% students assigned to business-as-usual (n=2,274)
- 52% students assigned to treatment group (n=2,455)
- 82% enrolled into at least one course in 2016 (n=3,865)

All of the findings shown here are statistically significant (p<.05)

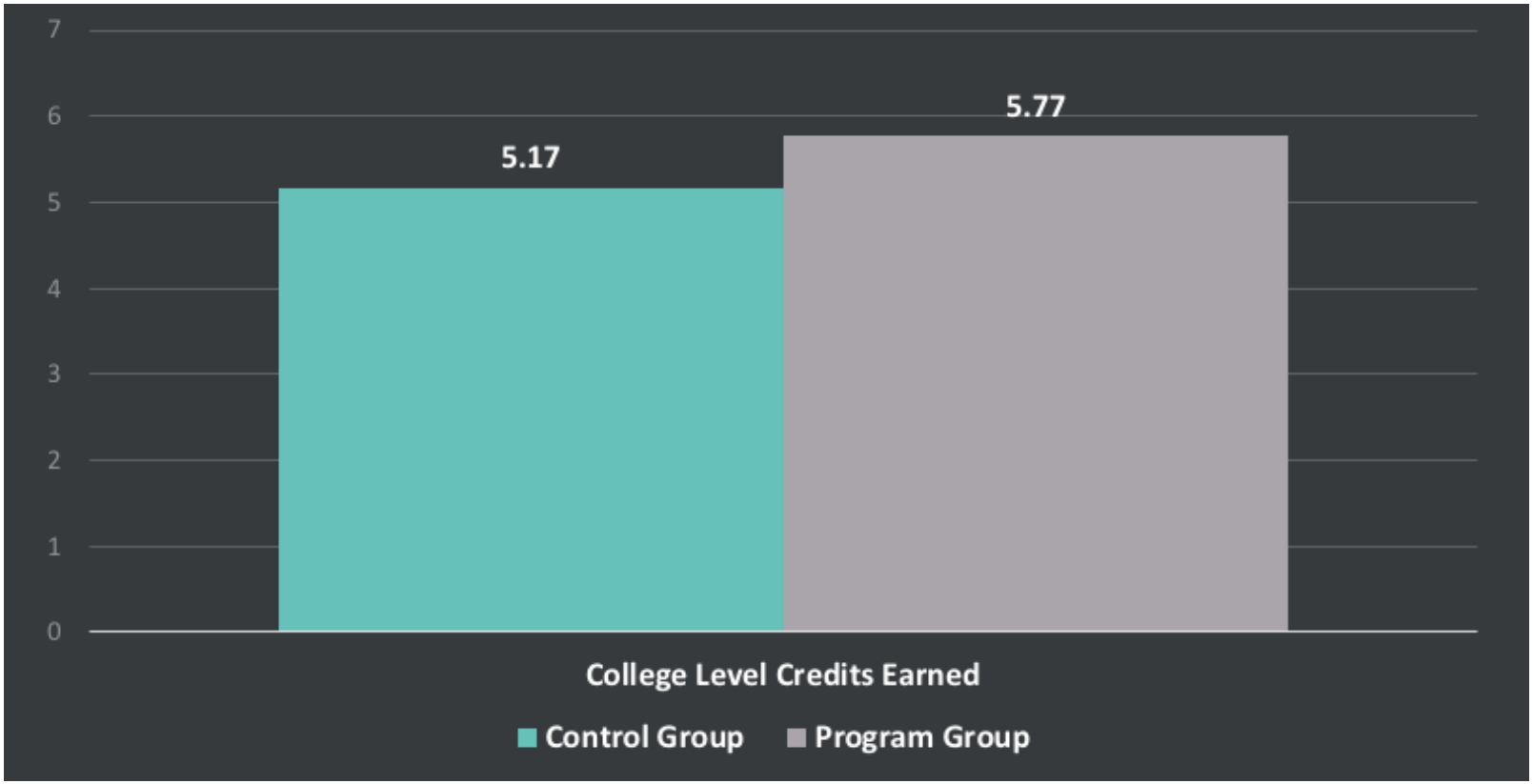
Treatment Effects: Math



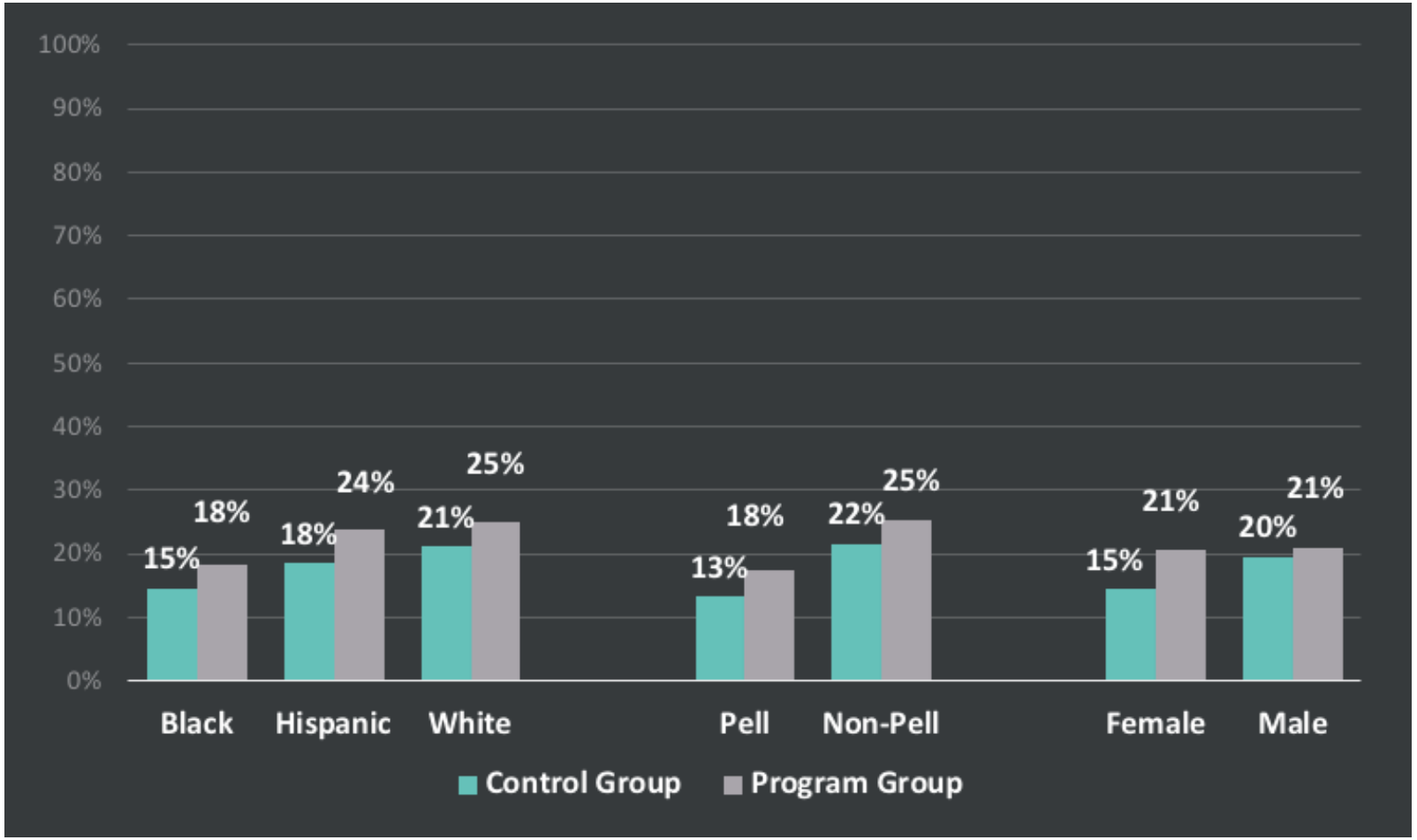
Treatment Effects: English



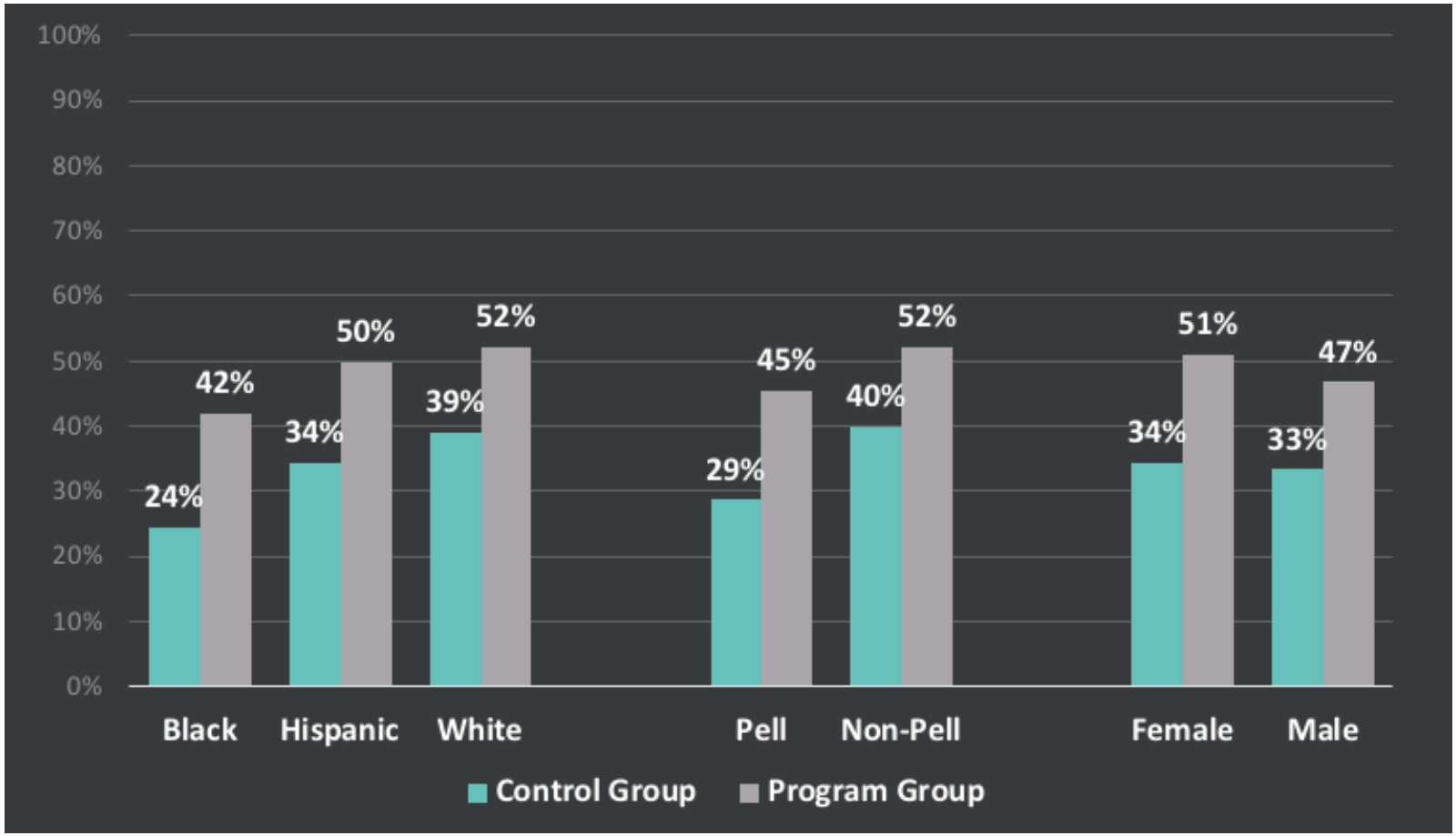
Treatment Effects: Total College Level Credits Earned



Treatment Effects: College Level Math Completion



Treatment Effects: College Level English Completion



Implementation Challenges

- The range of departments affected by the change
- Lack of historical data for analysis due to multiple reforms
- Concerns about the use of the high school GPA
- Access to the high school GPA
- Communications within colleges

Costs

- First fall-term costs were roughly $110 per student above status quo (Range: $70-$320)

- Subsequent fall-term costs were roughly $40 per student above status quo (Range: $10-$170)

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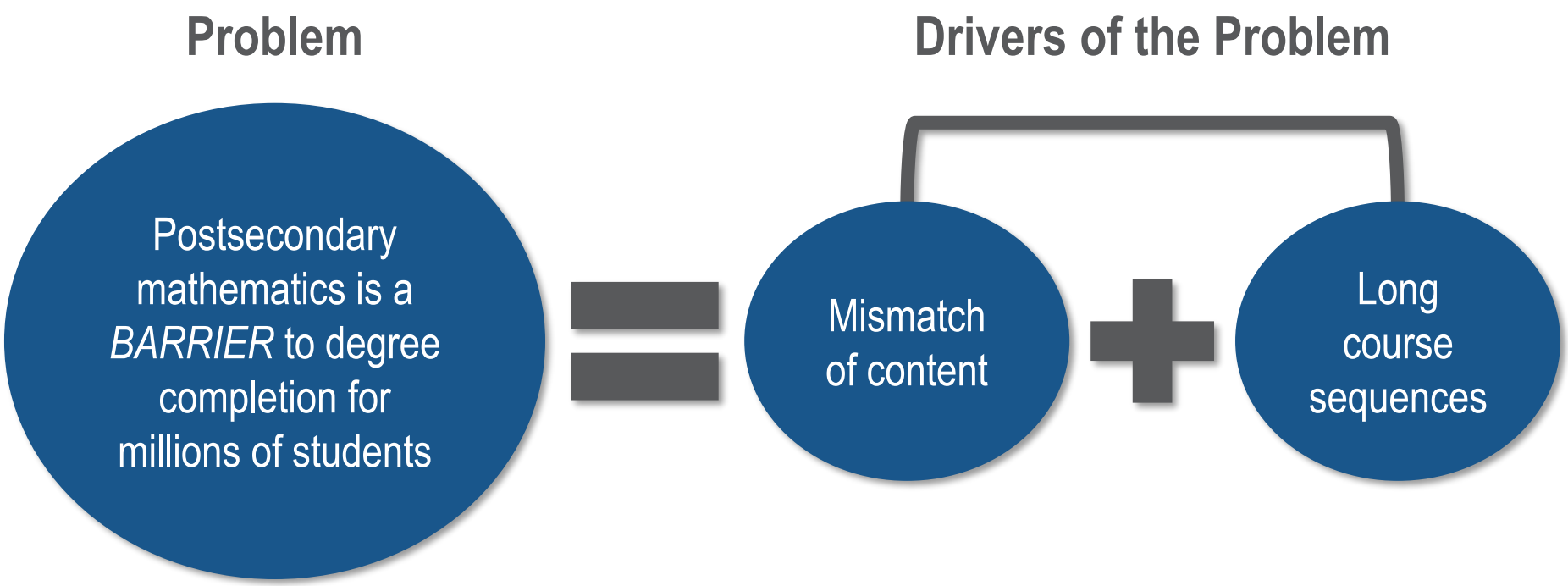
Evaluation of the Dana Center Math Pathways

Elizabeth Zachry Rutschow

MDRC

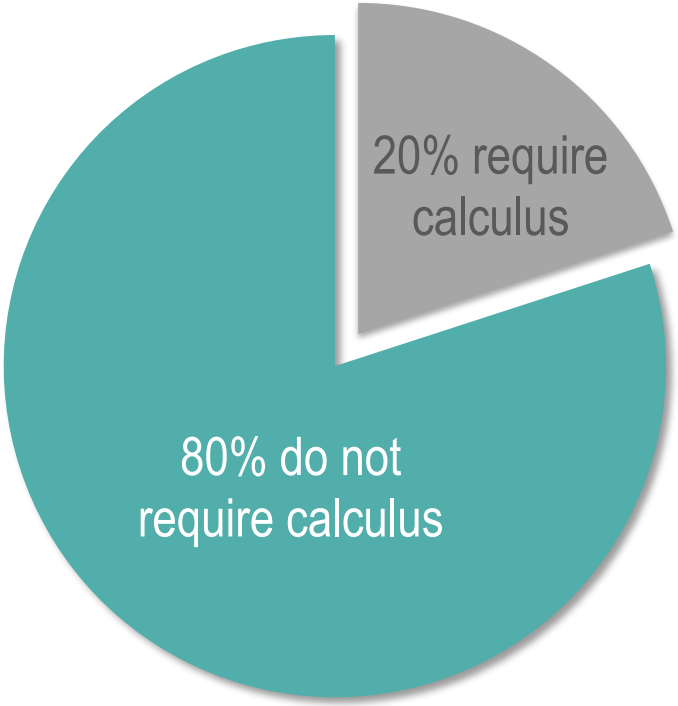
Drivers that Create Barriers for Students



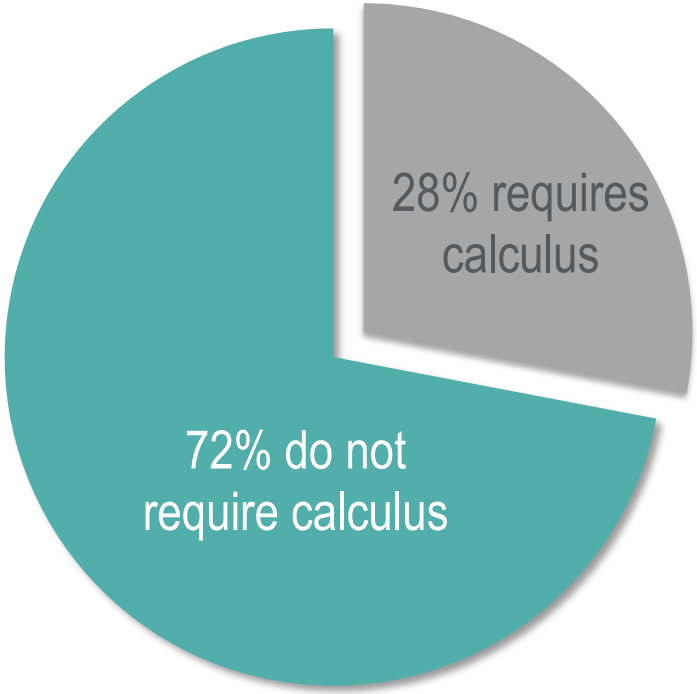
From *The Case for Mathematics Pathways* (Dana Center, 2016)

What Math Do Students Need?

Two-Year College Student Enrollment Into Programs of Study

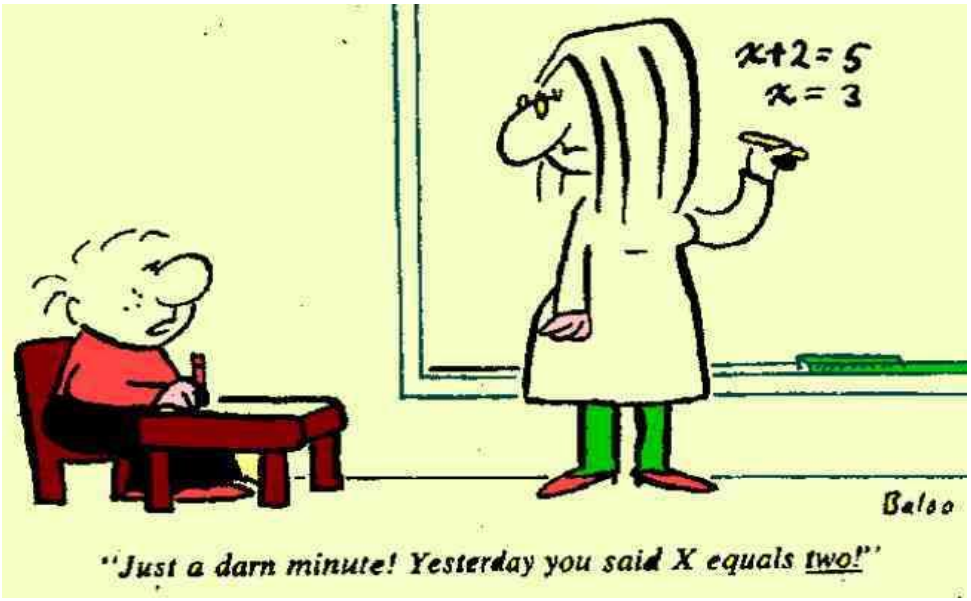


Four-Year College Student Enrollment Into Programs of Study



Burdman, P. (2015). Degrees of freedom: Diversifying math requirements for college readiness and graduation. Oakland, CA: Learning Works and Policy Analysis for California Education.

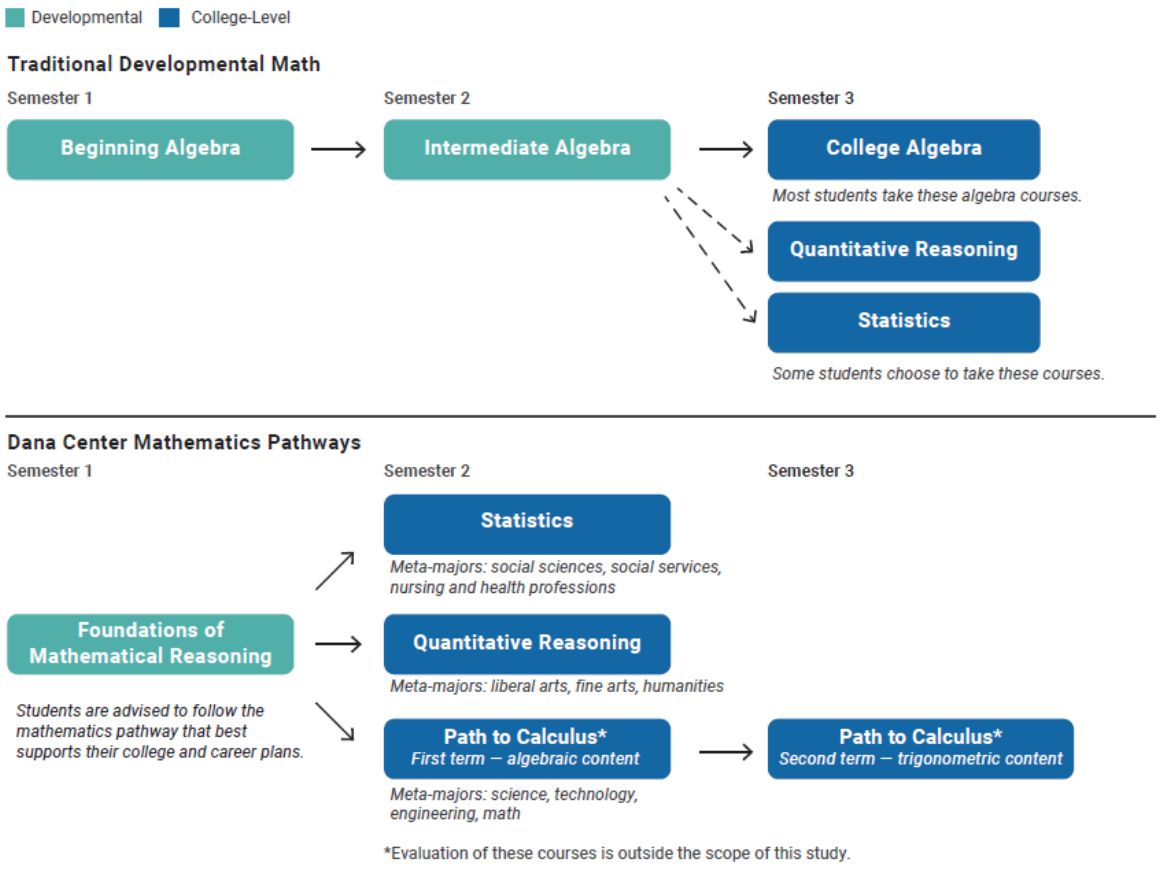
Traditional Math Instruction Tends to Focus on…



- Teacher-directed lecture
- Formulas and equations
- Rote memorization
- Few real-world applications

The Dana Center Mathematics Pathways (DCMP)

The DCMP Model: Revisions to Math Content



A Comparison of Mathematics Offerings for Students with Two Levels of Developmental Need

The DCMP Model: Instructional Changes

Teacher-directed lecture

Formulas and equations

Rote memorization

Few real-world applications

Active Learning

Small group work, student interaction, presenting solution methods

Reading and Writing

Problem Solving

Multistep problems building on previously learned content or answers;
Multiple solution methods

Constructive Perseverance

Understanding the role struggle plays in learning

Contextualization

Problems contextualized in real-life situations

Sample DCMP Problem

Question: A research report estimates that individuals who smoke are 15 to 30 times more likely to develop lung cancer than individuals who never smoke. If the lifetime risk of developing lung cancer for nonsmokers is about 1.9 percent, what is the lower limit of the estimated risk for smokers according to the report?

Answer: The lower limit of the estimated risk for smokers according to this report is _____ percent.

The CAPR Evaluation of the DCMP

A Mixed-Methods Evaluation: Impact, Implementation, & Cost Study

Impact study

- RCT at four Texas colleges
  - 1,422 students
  - 4 cohorts (Fall 2015 - Spring 2017)
  - Outcomes tracked for 3+ semesters
- Key outcomes
  - Completion of Developmental Math
  - Completion College-Level Math Course
  - Overall Academic Progress

Implementation study

- Fidelity and treatment contrast
- Differences in content and pedagogy

Cost study

- Is DCMP cost effective relative to traditional services?

Early Implementation: Challenges & Changes

Which pathway should students take?

- Revise requirements for majors
- Revise advising
- But not all eligible students reached

Will four-year transfer colleges accept a non-algebra math course?

- Good progress made with alignment four-year colleges
- But some continuing challenges

Can math faculty move away from algebra?

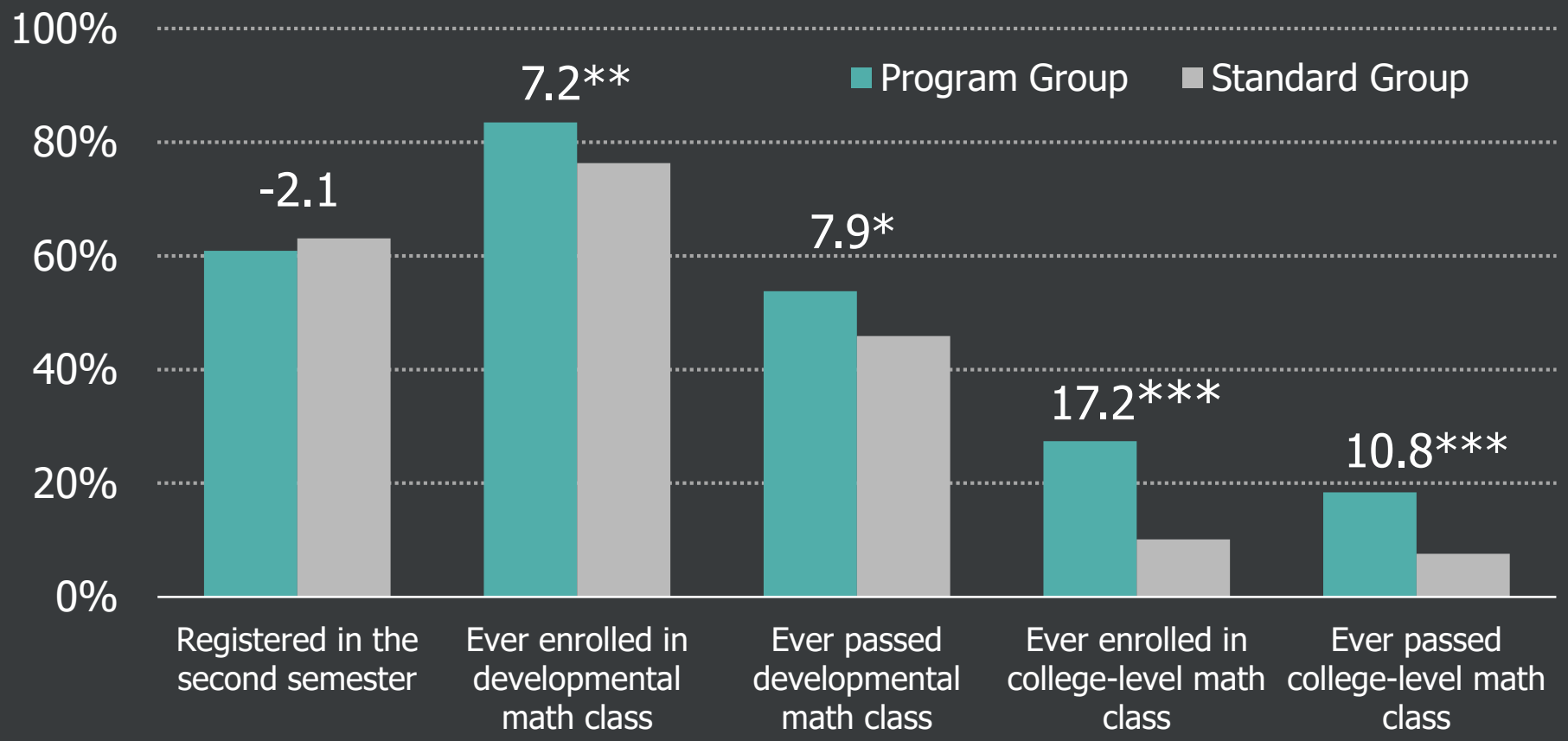
- Strong implementation
- Very different course content

Can faculty change pedagogy?

- Relatively strong implementation
- Contextualization & student centered approaches
- Qualitatively different classroom experience for students

Early Impacts on Student Success

(Fall 2015 and Spring 2016 Cohorts, through 2 Semesters)



Statistical significance levels are indicated as follows: * = 10 percent; ** = 5 percent; *** = 1 percent.

The Final Report will include…

- Impact analysis, following all cohorts for at least three semesters
- Analysis of the institutional-level and classroom-level implementation of the DCMP
- Cost-effectiveness analysis of the DCMP
- Publication date: Fall 2019

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Experimental Evidence on the Impact of Corequisite Remediation in Texas

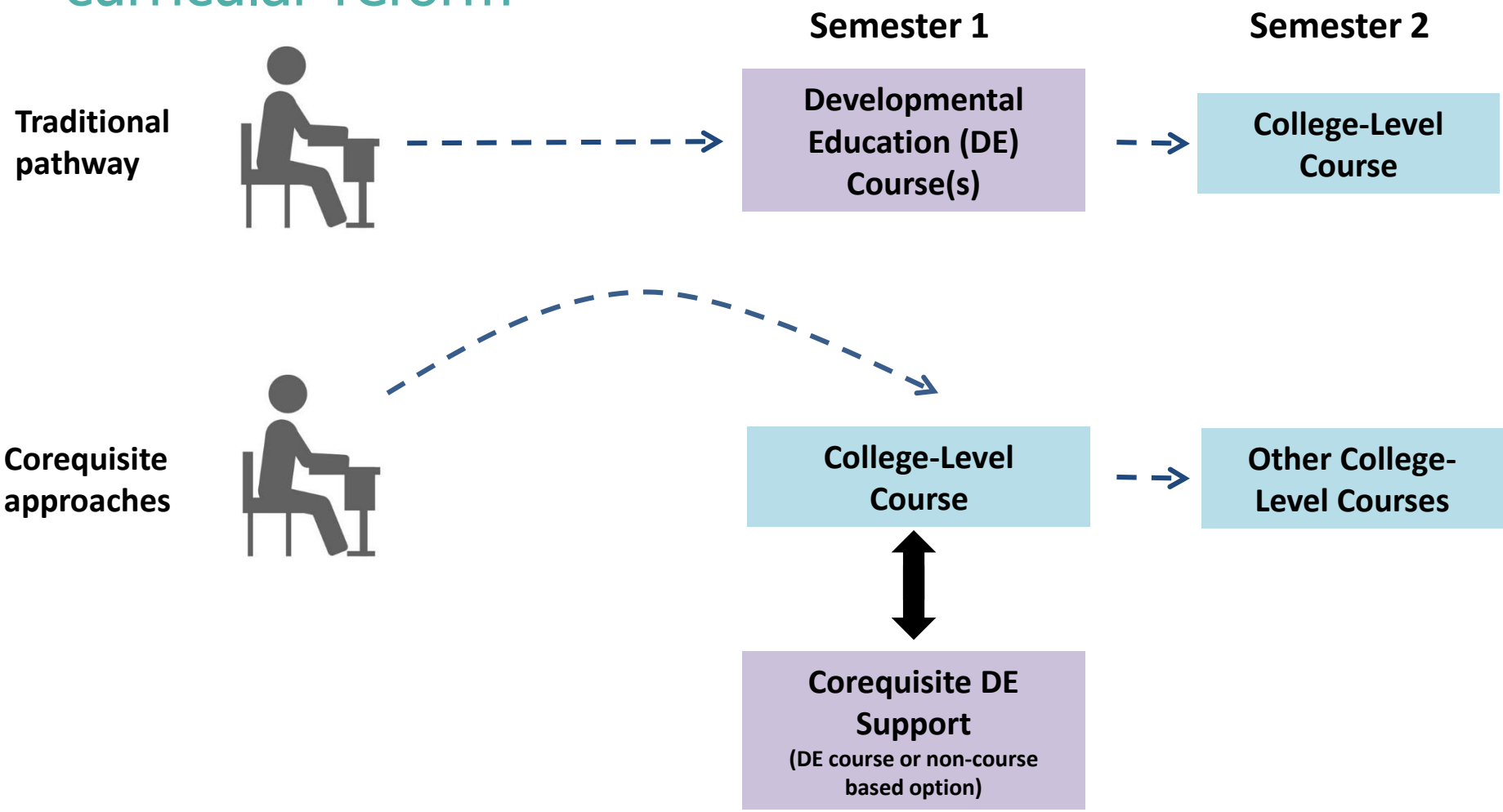
Paco Martorell, Associate Professor

University of California at Davis

Background

- 2011: Texas passed broad set of policies on developmental education reforms (e.g., accelerated models, multiple measures, change to assessment)
- 2013: IES-funded research-practice partnership between RAND and Texas Higher Education Coordinating Board (THECB) to study reforms, build research agenda
- 2015: RAND and THECB received IES funding to rigorously evaluate one of these reforms, corequisites

Corequisite remediation blends acceleration and curricular reform



Some evidence suggesting that corequisites improve student outcomes

CCBC | Community College of Baltimore County

Accelerated Learning Program (ALP)

Quasi-experimental study (Cho et al., 2012) found ~40 percentage point greater likelihood of passing gateway English within 3 years

CUNY THE CITY UNIVERSITY OF NEW YORK

Statistics+Workshop vs Algebra

Randomized control trial (Logue et al., 2016) found ~17 percentage point greater likelihood of passing gateway math within 1 year

Statewide Policy Mandating Scale-Up in Math and English

Descriptive evidence shows that first-semester pass rates of gateway English were 62%, compared to a 31% first-year pass rate historically.

The intervention is direct enrollment in a writing and reading corequisite

- Treatment: Immediate enrollment in a Composition I course with a concurrent Integrated Reading and Writing (IRW) support
  - Common features across study colleges: Student learning outcomes, credit hours for course and support (3 SCH for course, 1 SCH DE support), writing score range for sample
  - Varied corequisite models
- Control: Enrollment in a IRW course prior to Composition I enrollment
  - No opportunity to enroll in a college-level writing or reading intensive course in the first semester
  - Required to enroll in 2-3 additional SCHs of DE coursework overall
  - DE not as closely aligned with credit-bearing course (and other differences in content, structure, pedagogy)

The RCT examined three types of corequisite models

	Accelerated Learning Program	Extended Instructional Time	Required Support Service Use
Structure of support	Classroom instruction	Classroom instruction	Tutoring in office hours, writing center
Instructor for course/support	Same	Same	Same at one college, different at other
Student mix in college course	Mix of college-ready and DE	All DE	Mix of college-ready and DE
Student-to-faculty ratios in DE support	10:1	22:1	5:1, 10:1

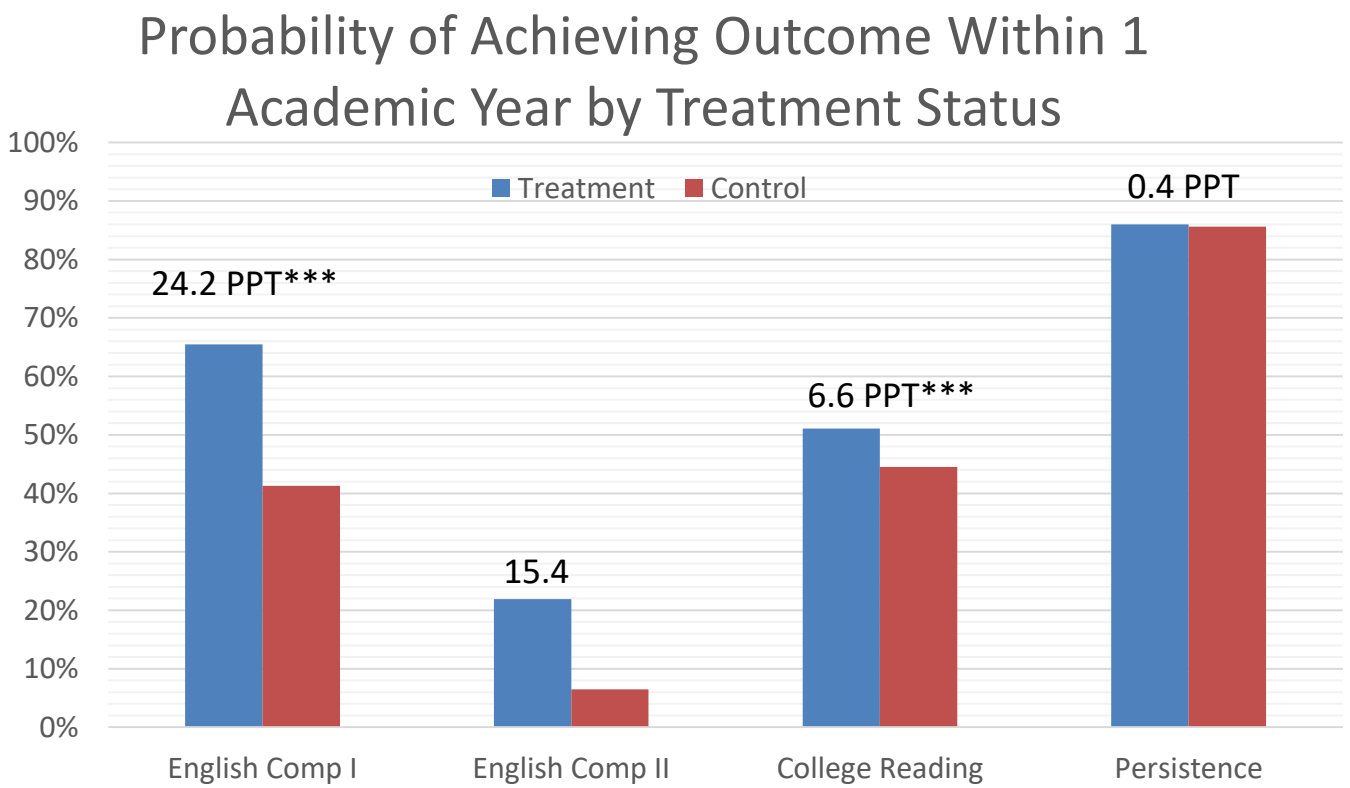
We conducted a randomized experiment in five Texas community colleges

- Setting: 5 colleges in large community college systems in urban/suburban regions; large populations of at-risk students
- Sample: First-time in college students scoring into the highest level IRW course placement range
  - N=2,157 randomized fall 2016-fall 2018
- Recruitment: Students recruited, surveyed, and randomized at time of course registration
- Randomization: 50% T/50% C for most; 67% T/33% for one college in fall 2017

We collected a range of data

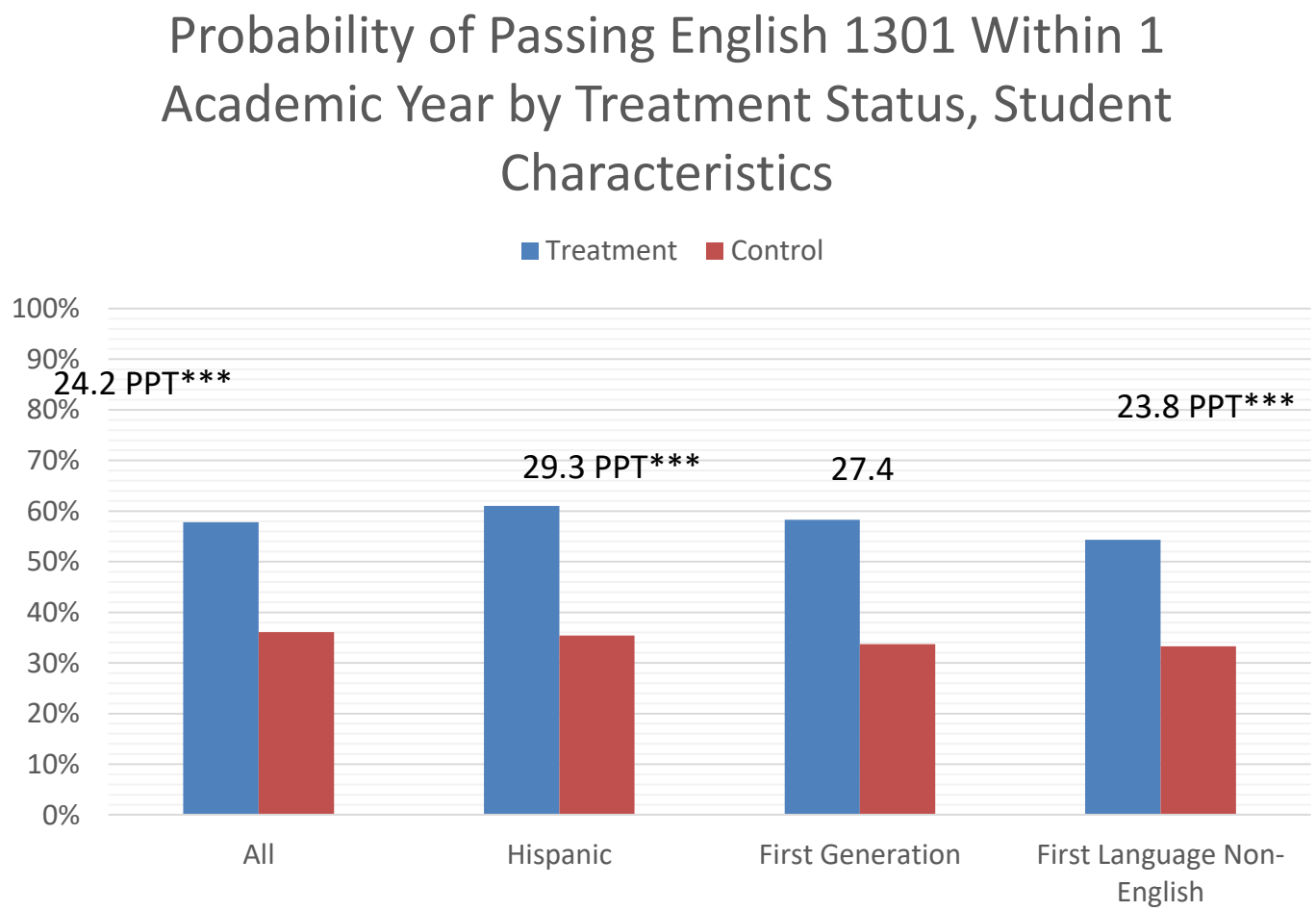
- Administrative data: Student and faculty characteristics, course enrollment, outcomes
- Student surveys
  - Baseline: Detailed student characteristics
  - Follow-up: First-semester experiences and early outcomes
- RCT implementation data: Faculty survey, student and faculty focus groups, administrator interviews, observations, course documents, cost data
- Statewide implementation data: Statewide institutional survey, interviews with administrators/faculty leads from 36 community colleges

Students assigned to control were significantly more likely to pass English Composition I and II within 1 academic year



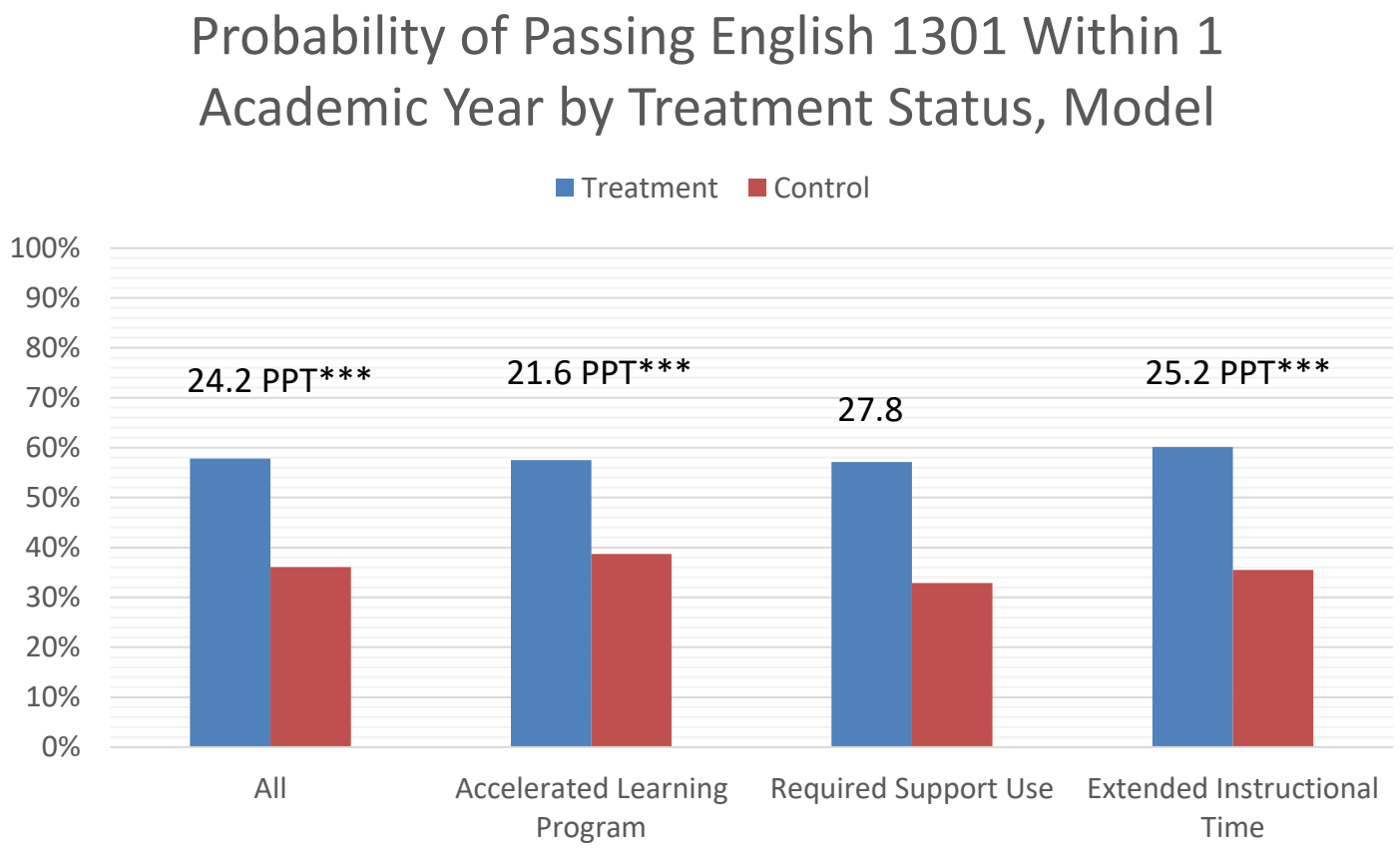
* = statistically significant at 0.1 level
** = statistically significant at 0.05 level
*** = statistically significant at 0.01 level

Effects were positive for key subgroups of interest



* = statistically significant at 0.1 level
** = statistically significant at 0.05 level
*** = statistically significant at 0.01 level

We found evidence of short-term effectiveness for all three models



* = statistically significant at 0.1 level
** = statistically significant at 0.05 level
*** = statistically significant at 0.01 level

We will continue to analyze impacts through 2021

- Additional cohorts of students
  - Including some scoring at lower levels
- Additional outcomes
- Longer-term impacts
- Explaining impacts
  - Statistical analysis examining variation in impacts, moderators and mediators
  - Implementation analysis examining treatment contrasts across nine areas of interest

Collaborating with THECB to ensure impact

- Embedded project within activities of companion IES-funded CIRE project focused on other areas of statewide developmental education reform
  - Embedded research staff
  - Weekly/biweekly/monthly meetings with THECB staff
- Statewide policy moving quickly, so we have had to be flexible
  - Early report on statewide implementation to inform roll-out of HB 2223
  - Turning early findings and evaluation frameworks into professional development sessions for institutions
  - Adjusting study to address curveballs from policy
- Critical national policy issue, so looking to disseminate more broadly to inform states who are further behind

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Accelerating Success: The Impact of Florida's Developmental Education Reform on First Year Credit Accumulation

Shouping Hu, Ph.D.
Christine Mokher, Ph.D.
Toby Park, Ph.D.

Society for Research on Educational Effectiveness
March 2019

The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305A160166 to Florida State University, and in part by a grant from the Bill & Melinda Gates Foundation. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education, or the Gates Foundation.

Introduction

- DE often taken as a sequence in multiple subject areas
- Can slow academic progress in 2 ways:
  - More exit points – many students don't return to take next course in the sequence
  - Completers have more course requirements

Florida's DE Reform

- Required several significant changes simultaneously
  - Most students exempt from placement testing & DE
  - Remaining DE courses taught using new instructional strategies
  - Colleges required to offer enhanced advising & support services

Research Questions

1. How have the number of college-level credits attempted and earned in the first and third years of enrollment changed?

2. Did the impact of the reform differ by race, FRL status, or high school academic preparation?

Hypotheses

- H1: ↑ credits taken in year 1
  - Opt out of DE or take accelerated modalities
- H2: ↑ credits earned in year 1
  - Enhanced advising and support services
- H2: ↑ credits taken & earned in year 3
  - Fewer exit points, improved course alignment, academic momentum resulting in self-efficacy

Methods

- Interrupted time series model

$$y_{ijt} = \beta_0 + \beta_1(2014)_t + \beta_2(S)_{ijt} + \beta_3(HS)_{ijt} + \xi_j + \lambda_t + \varepsilon_{ijt}$$

- Also included interactions of 2014 variable with race, FRL, and HS preparation

Data

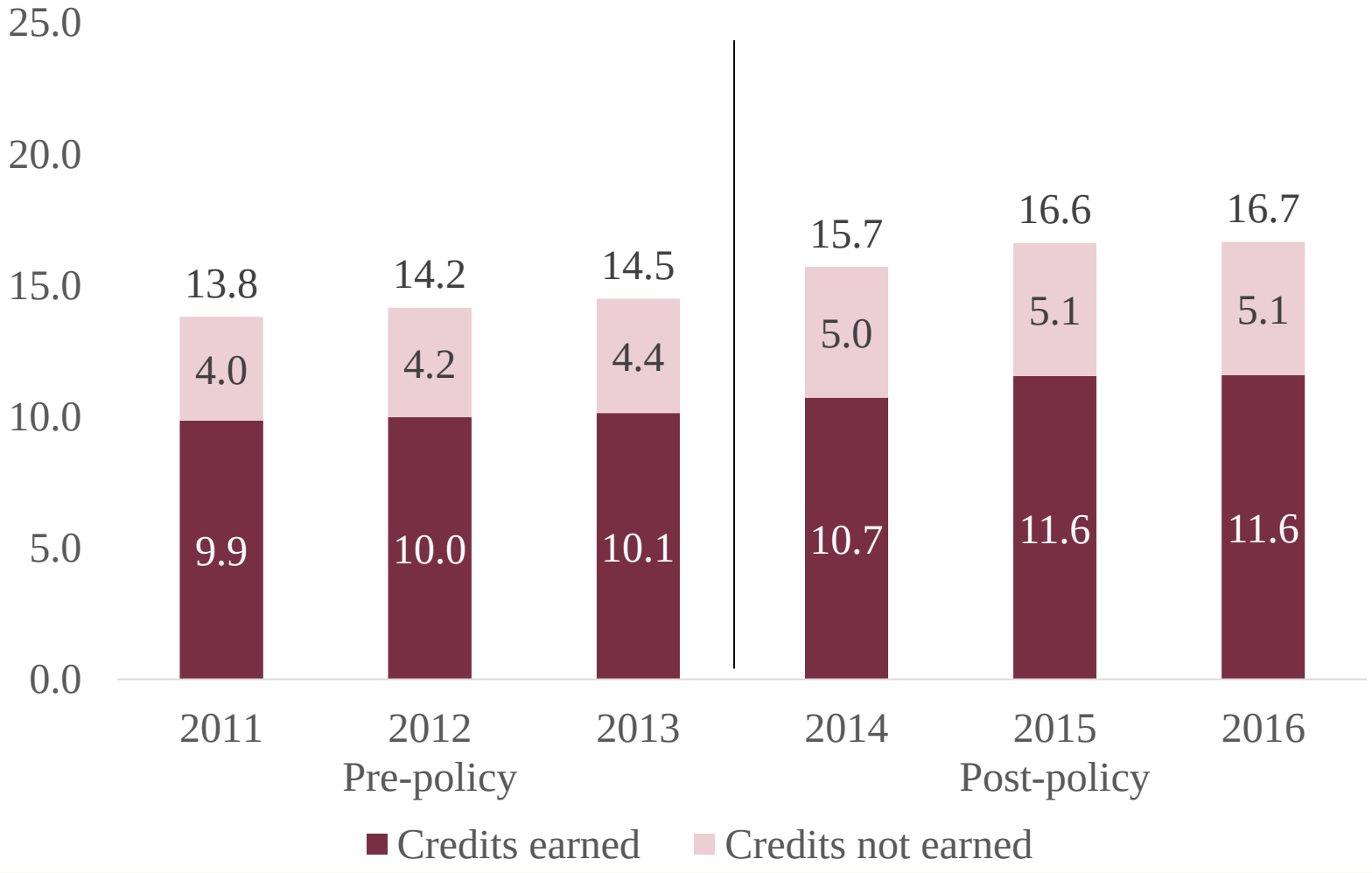
- Student records for population of FTIC
  - 28 public state colleges
  - 3 cohorts pre-reform and up to 3 post-reform

- Outcomes – measured in years 1 & 3
  - Number of college-level credits attempted
  - Number of college-level credits earned

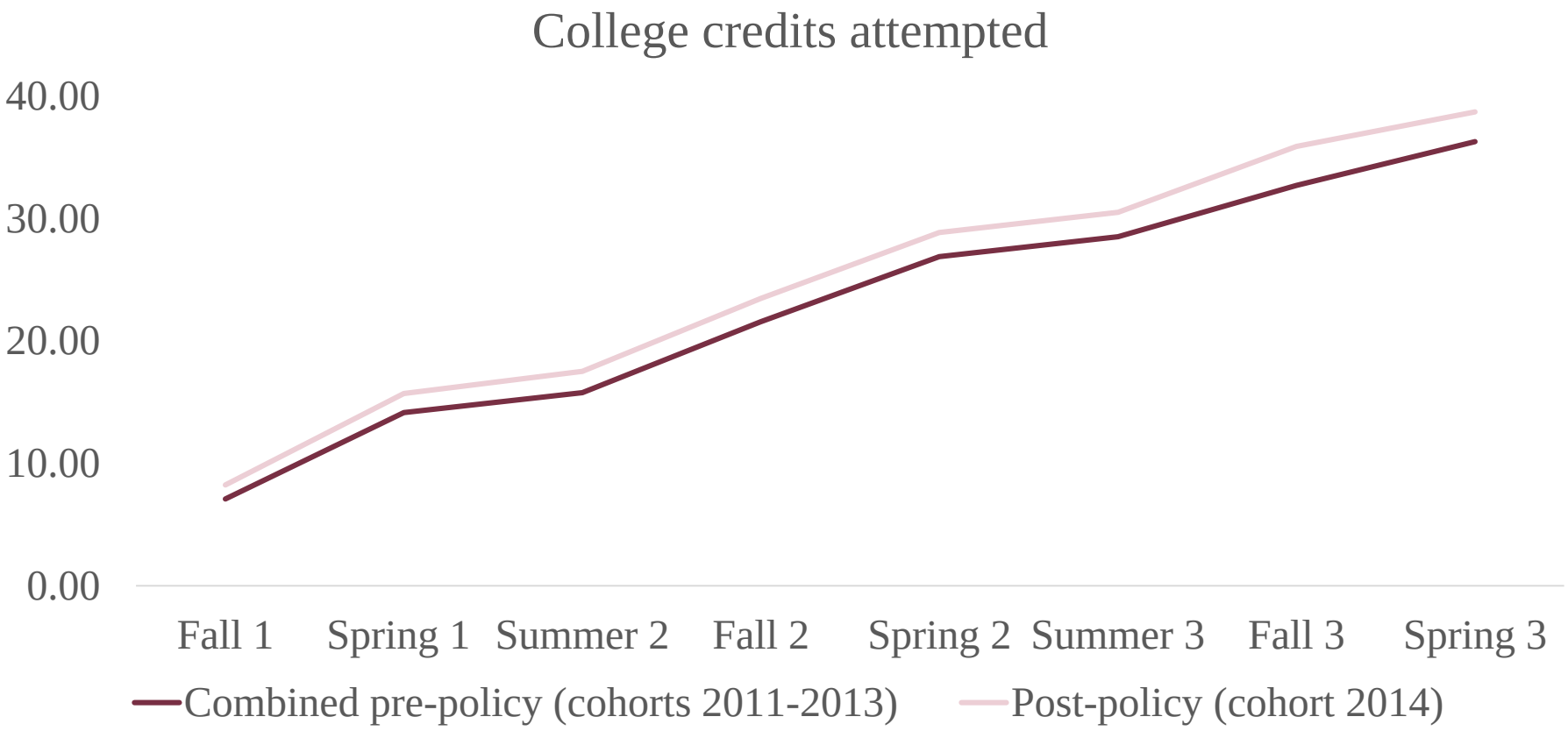
Data

- Control variables
  - Student characteristics – race, sex, FRL
  - HS preparation – basic, standard, or advanced track
  - Cohort – underlying time trend
  - Local unemployment rate
  - Institution fixed effects

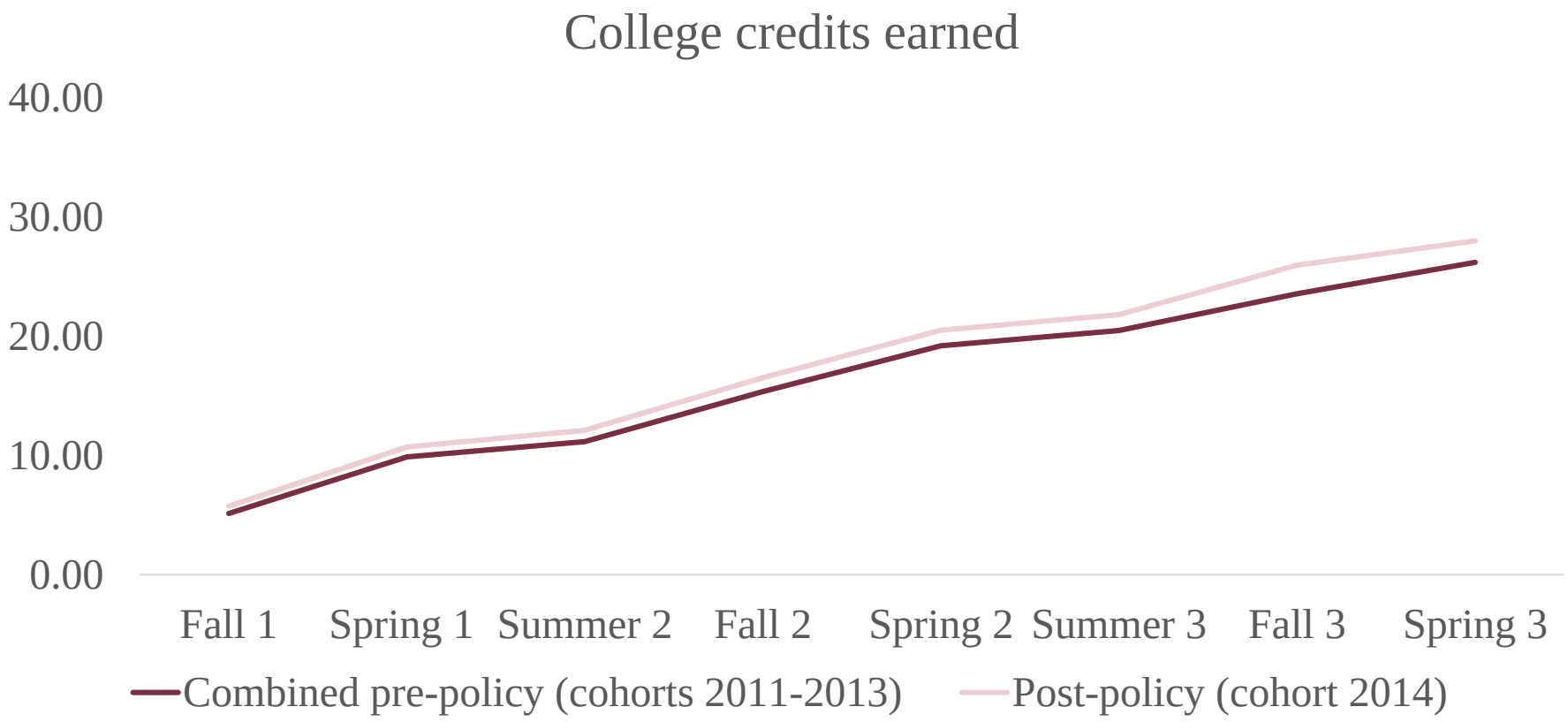
Results – Year 1



Results – Year 3



Results – Year 3



Results – By Subgroup

	Credits attempted, year 1	Credits earned, year 1	Credits attempted, year 3	Credits earned, year 3
Race				
Post*Black	1.587***	0.580***	0.961**	0.211
Post*Hispanic	0.632***	0.344***	0.607*	0.329
FRL				
Post*FRL	1.115***	0.348***	0.162	-0.369
HS Preparation				
Post*Basic	1.556***	0.411***	1.18***	0.237
Post*Advanced	-0.826***	-0.65***	-0.108	-0.096

***p<0.001, **p<0.01, *p<0.05

Summary

- Positive effects on all outcomes, but small in magnitude – noteworthy given cost effectiveness
- Reduced achievement gaps for Black, Hispanic, low-income and underprepared students (particularly in year 1)
- Important to continue to track long-term outcomes

Policy Implications

- Think about how to create synergy among complementary reform activities

- Reform as an ongoing learning process informed by the expertise of those responsible for implementation, rather than inflexible mandates.

For More Information

- Center for Postsecondary Success
  - centerforpostsecondarysuccess.org
  - Shouping Hu, Director (shu@fsu.edu)