



REL WEBINAR SERIES

College & Career
Readiness

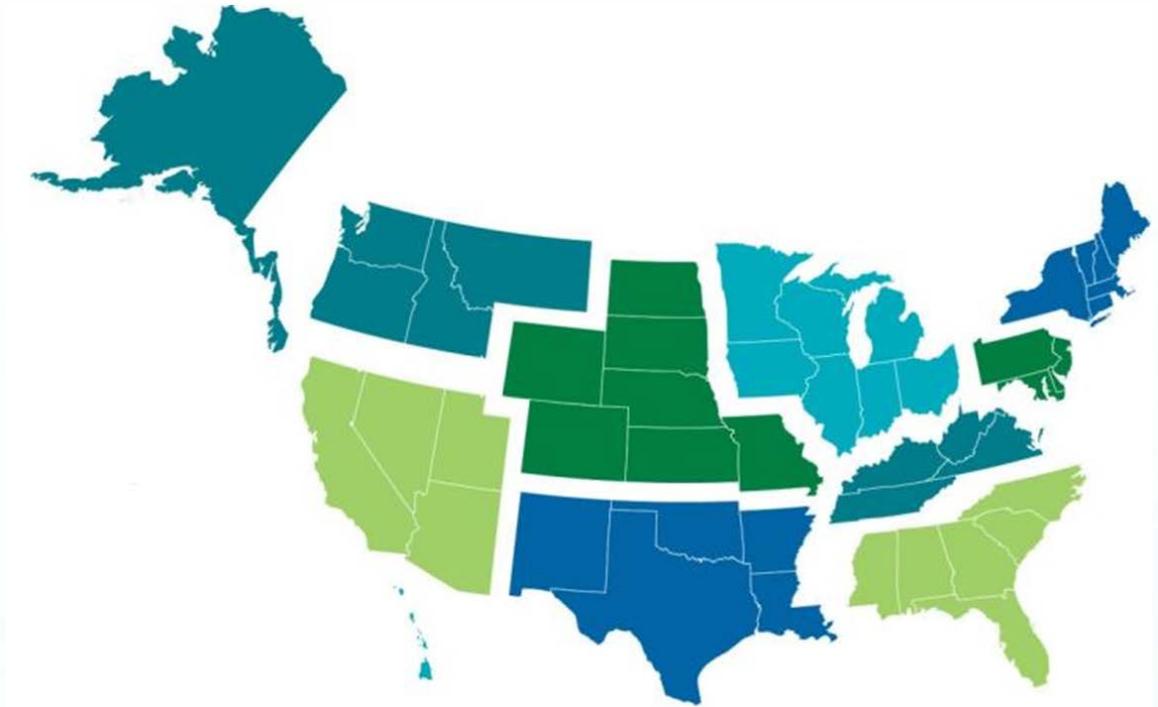


Predictors and Indicators of College Readiness and Success

Presented by the national
Regional Educational Laboratory (REL) College and
Career Readiness (CCR) Workgroup

The Regional Educational Laboratory (REL) Program

- 10 Regions
- Bridging research, policy, and practice



Goals of the Webinar

- Learn about indicators identifiable throughout a student's high school and early college years that predict enrollment, persistence, and success in college courses.
- Understand methodologies used to identify and validate predictors of college and career readiness across the studies presented.

Agenda

- Screening students for **college readiness**
- Using **high school data** to understand college readiness in the Pacific
- Exploring the foundations of the **future Science, Technology, Engineering, and Mathematics (STEM) workforce**: K-12 indicators of postsecondary STEM success
- Indicators of **early college success**
- Audience Questions and Answer

Presenters



John Hughes, REL Southeast



Daisy Carreon, REL Pacific



Trisha Borman, REL Southwest



Elisabeth (Lyzz) Davis, REL Midwest

A guide to developing and evaluating a college readiness screener



Tools

John Hughes
Yaacov Petscher
Florida State University

A college readiness screener can help colleges and school districts better identify students who are not ready for college credit courses. This guide describes the steps for developing a college readiness screener. For colleges that already have a screener, this guide discusses several issues to consider in evaluating its accuracy.

Why this guide?

Half of all undergraduates take one or more developmental education courses (sometimes called remedial courses), at an average annual cost of \$7 billion nationally (Scott-Clayton, Coates, & Balfield, 2014). The high rate of students taking developmental education courses suggests that many students graduate from high school unready to meet college expectations. Many colleges, particularly two-year institutions, use placement test scores to determine whether a student requires a developmental education course (Hughes & Scott-Clayton, 2011). However, placement tests have been criticized, especially when they serve as the primary or only placement criterion (see, for example, Hodan, Jaggars, & Karp, 2012; Scott-Clayton et al., 2014). To improve placement accuracy, colleges that currently rely solely on placement test scores may wish to consider a broader screening tool that incorporates other student information.

This guide describes core ideas for colleges to consider when developing a screener for estimating college readiness. A key focal point is a discussion of ways to improve how well a screener identifies individuals who need developmental education, along with key considerations for a user or developer of such a tool. Specifically, the guide includes seven steps:

1. Creating a definition of college readiness.
2. Selecting a measure of readiness.



Screening students for college readiness

- John Hughes, Deputy Director, REL Southeast

Seven Steps for Developing a College Readiness Screener

1. Creating a definition of readiness
2. Selecting a measure
3. Identifying potential predictors
4. Prioritizing types of error
5. Collecting and organizing the data
6. Developing predictive models
7. Evaluating and selecting a final model

Seven Steps for Developing a College Readiness Screener (Steps 1 and 2)

1. **Creating a definition of readiness**
2. **Selecting a measure**
3. Identifying potential predictors
4. Prioritizing types of error
5. Collecting and organizing the data
6. Developing predictive models
7. Evaluating and selecting a final model

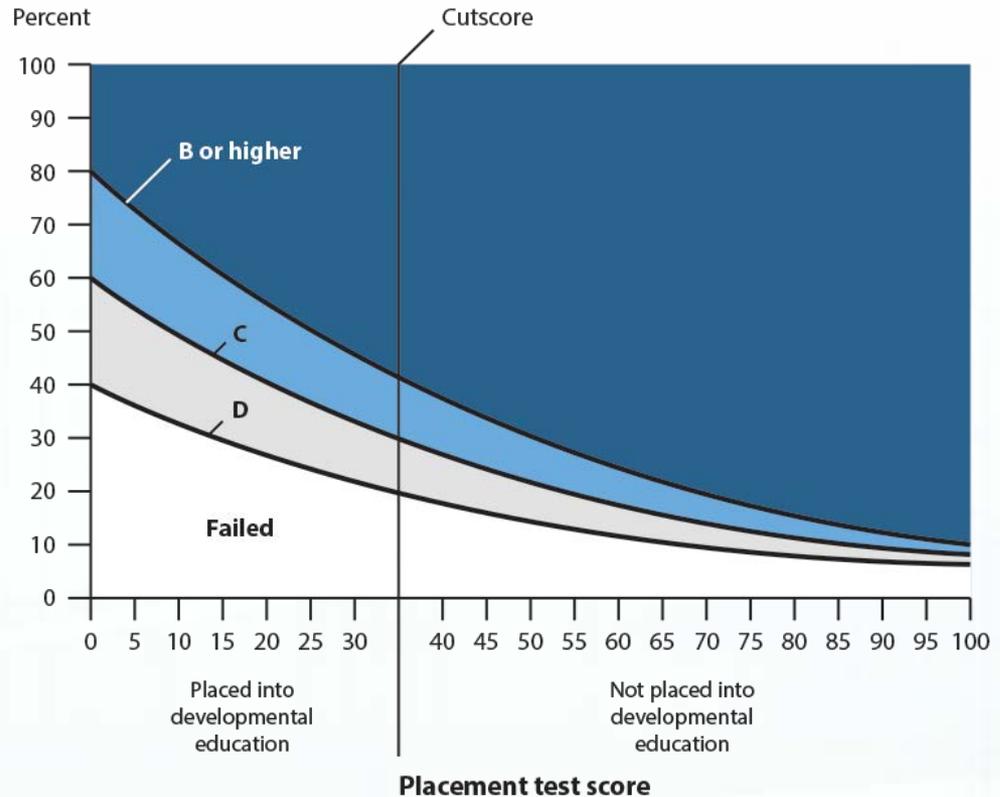
A College Readiness Definition

A student is college and career ready when he or she has attained the knowledge, skills, and disposition needed to succeed in credit-bearing (non-remedial) postsecondary coursework or a workforce training program in order to earn the credentials necessary to qualify for a meaningful career aligned to his or her goals and offering a competitive salary

(National Forum on Education Statistics)

Operational College Readiness

- Readiness is often defined as a target grade in a gateway course
- But the grade targeted changes the likelihood of success and will impact error rates



Seven Steps for Developing a College Readiness Screener (Step 3)

1. Creating a definition of readiness
2. Selecting a measure
- 3. Identifying potential predictors**
4. Prioritizing types of error
5. Collecting and organizing the data
6. Developing predictive models
7. Evaluating and selecting a final model

Most Colleges Use Placement Tests

Advantages

- Readily available
- Require little additional support
- Easily interpretable

Disadvantages

- Students may not understand their importance
- Format may artificially lower scores
- Excludes other academic factors
- May not be designed for the target population
- Risk is higher when a single indicator is used

Research Suggests Other Options

- High school grades, cumulative or in specific classes
- High school assessments
- Grades in key courses such as Algebra I
- Credit accumulation

(Hughes & Scott-Clayton, 2011; Scott-Clayton Crosta, & Belfield, 2014)

Seven Steps for Developing a College Readiness Screener (Step 4)

1. Creating a definition of readiness
2. Selecting a measure
3. Identifying potential predictors
- 4. Prioritizing types of error**
5. Collecting and organizing the data
6. Developing predictive models
7. Evaluating and selecting a final model

Managing Error

- Errors are inevitable
- But not all errors are equal
- The goal is minimizing specific kinds of errors

Two Types of Placement Error

Over-Placement

- Students who are not college ready but placed into credit bearing courses
- Called over-placement because they are put in too “high” of a course
- Also a “false negative”

Under-Placement

- Students who are college ready but placed into remediation
- Called under-placement because they are put in too “low” of a course
- Also a “false positive”

(Schatschneider, Petscher, & Williams, 2008)

Policy Question – Weighing the relative costs

Over-placement

- Student takes a course they might not be ready for and potentially fails
- Interacts with the target grade
 - If the target is a D or higher, this risk is lower

Under-placement

- Student goes into remediation when not needed and wastes time and money and gets discouraged
- Interacts with the target grade
 - If the target is a B or higher, but the student could have earned a C, may unfairly penalize

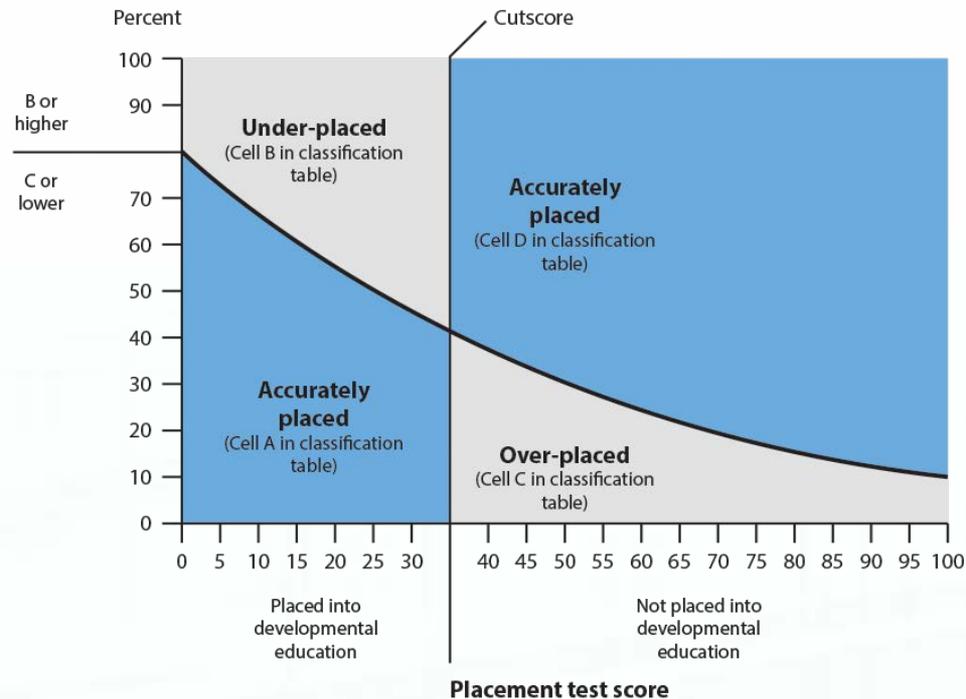
Example: Two-by-Two Classification Table

Screen	<i>Placed into remediation</i>
	<i>Not placed into remediation</i>

Actual Outcome	
<i>Not college ready</i>	<i>College ready</i>
A (true positive)	B (false positive)
C (false negative)	D (true negative)

(Schatschneider, Petscher, & Williams, 2008).

Interaction of target grade and placement accuracy



- There is a trade-off between over- and under-placement
- Moving a cut-score left or right will increase one and decrease the other
- Same with selecting a different target grade

Seven Steps for Developing a College Readiness Screener (Step 5)

1. Creating a definition of readiness
2. Selecting a measure
3. Identifying potential predictors
4. Prioritizing types of error
- 5. Collecting and organizing the data**
6. Developing predictive models
7. Evaluating and selecting a final model

Collecting and Organizing Data

- Grades for each selected course
- Student predictors
 - What data are available?
 - When are data available?
- Organized around one record per student per outcome

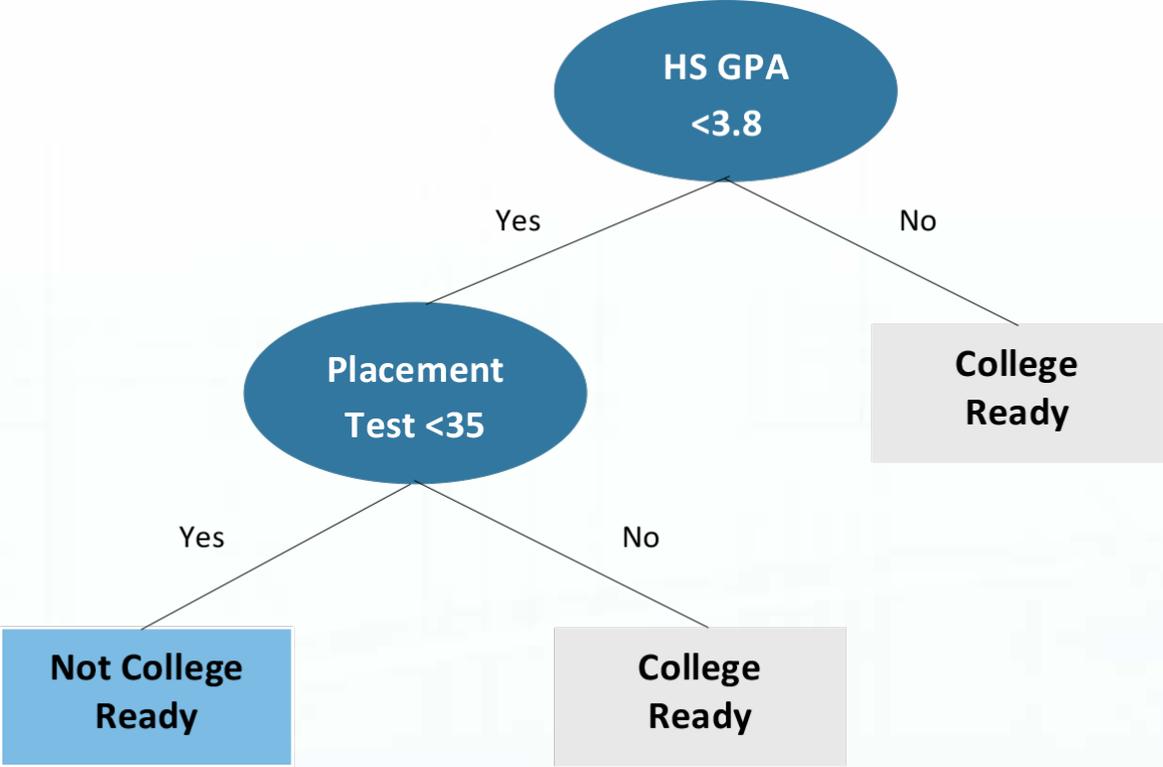
Seven Steps for Developing a College Readiness Screener (Step 6)

1. Creating a definition of readiness
2. Selecting a measure
3. Identifying potential predictors
4. Prioritizing types of error
5. Collecting and organizing the data
- 6. Developing predictive models**
7. Evaluating and selecting a final model

Two Types of Models

- Logistic Regression
- Classification and Regression Tree (CART)

CART Example



Seven Steps for Developing a College Readiness Screener (Step 7)

1. Creating a definition of readiness
2. Selecting a measure
3. Identifying potential predictors
4. Prioritizing types of error
5. Collecting and organizing the data
6. Developing predictive models
- 7. Evaluating and selecting a final model**

Measuring Diagnostic Accuracy

Screen	<i>Placed into remediation</i>
	<i>Not placed into remediation</i>

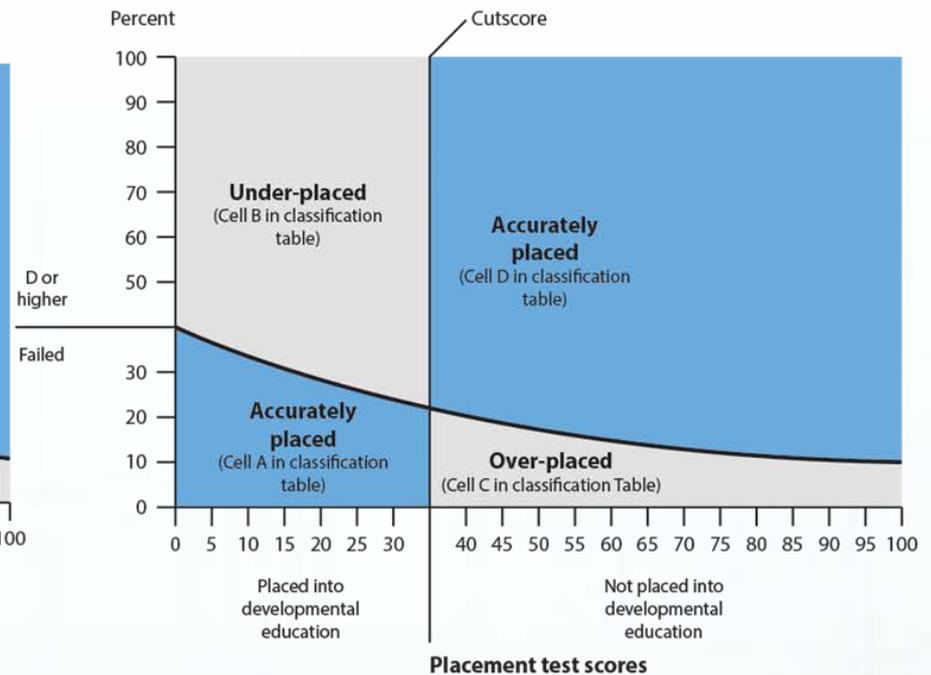
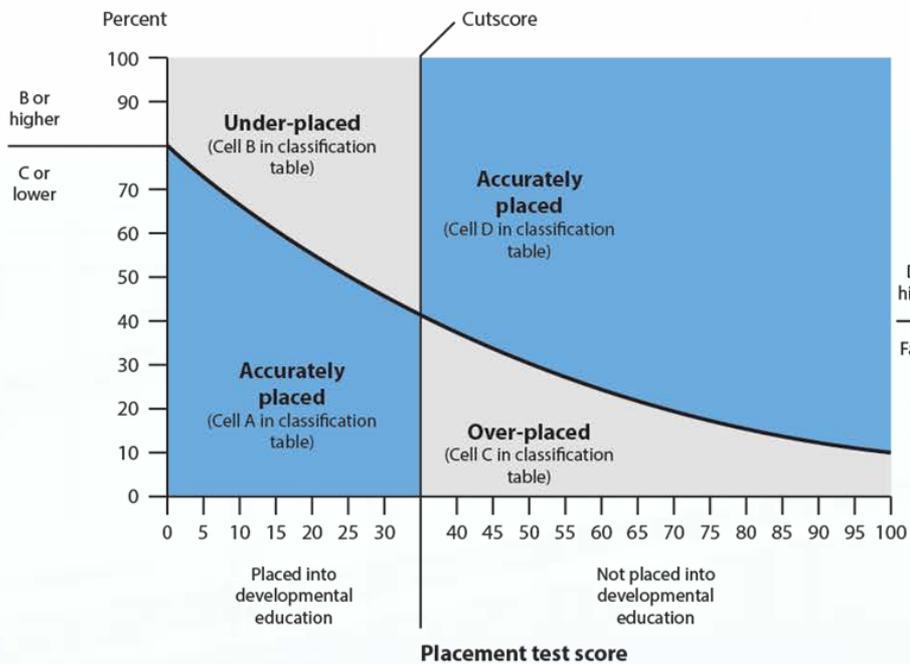
Actual Outcome	
<i>Not college ready</i>	<i>College ready</i>
A (true positive)	B (false positive)
C (false negative)	D (true negative)

(Schatschneider, Petscher, & Williams, 2008).

Interaction of target grade and placement accuracy

- There is a trade-off between over- and under-placement
- Raising or lowering a cut-score will increase one and decrease the other
- Same with selecting a different target grade

Interaction of target grade and placement accuracy



Using high school data to understand college readiness in the Pacific

- Daisy Carreon, Researcher, REL Pacific



Helping more students
prepare for and succeed in
college and careers in the
Northern Mariana Islands
and American Samoa

Daisy Carreon

REL Pacific serves a geographically and culturally diverse region



Alliances for College and Career Readiness and Success



A comprehensive approach to college and career readiness

- Technical assistance support: workshops and small-group coaching sessions
- Co-designed research studies, which use both high school and college data

Some achievements of the technical assistance support

- Developed a local definition of CCR for the Northern Mariana Islands
- Learned about the value of CCR indicators in school improvement
- Increased awareness of CCR data available within different organizations
- Learned about approaches being used nationally to address CCR
- Learned about some principles and tools of improvement science
- Identified alignment between K-12 and college, and K-12 and careers as a critical improvement strategy

Three research studies conducted in collaboration with alliances

1. *Academic Outcomes of Students in Developmental Versus Credit-bearing English or Math Courses at Northern Marianas College*
2. *College and Career Readiness Profiles of High School Graduates in American Samoa and the Northern Mariana Islands*
3. *Using High School Data to Understand College Readiness in the Northern Mariana Islands*

Relevance of studies for the Pacific context

These are the first studies to examine college and career readiness in Northern Mariana Islands and American Samoa that:

- Used data from K-12 and college for longitudinal analysis of college readiness
- Documented the academic outcomes of students who enroll in developmental and credit-bearing courses
- Compiled comprehensive profile of college readiness of recent high school graduates

Using high school data to understand college readiness in the Northern Mariana Islands

- College ready = First English or math courses were credit-bearing courses
- Also, examined different levels of credit-bearing English and math courses
 - In math, students placed into one of three developmental courses
 - In English, students placed into one of three levels of developmental reading and one of three levels of developmental writing

Using high school data to understand college readiness in the Northern Mariana Islands *(continued)*

Variables used in the study included:

- *Academic preparation* = course-taking and achievement
 - Enrolled in Advanced Placement English or math courses
 - Cumulative grade point average
 - Highest math course taken
 - SAT-10 performance
- *Demographic characteristics*

Aligning K-12 and college

- Using high school and college data reinforced the notion that this is shared problem of practice
- There are promising steps for K-12 and college collaboration on these islands:
 - Preparation/planning to teach joint transition courses
 - A commitment to making longitudinal analyses of college and career readiness easier, which involves having a shared unique student identification

Exploring the foundations of the future STEM workforce: K-12 indicators of postsecondary STEM success

- Trisha Borman, Researcher, REL Southwest

Project Context

- REL Southwest
- Texas Hispanic STEM Research Alliance
- Goal: Improve STEM academic and career outcomes for Hispanic students in Texas
 - Identify factors affecting Hispanic students' preparation for, and achievement in, K-12 STEM subjects



Project Context *(continued)*

- Alliance Concerns:
 - Low numbers of Hispanic students enrolling and persisting in advanced STEM courses at the K-12 level
 - Low numbers of Hispanic students pursuing and completing STEM postsecondary degrees
 - What are the factors that predict positive postsecondary STEM outcomes, specifically for Hispanic students?

Research Questions

- What K-12 factors are predictive of:
 - Declaring a STEM major
 - Persisting in a STEM major
 - Earning a STEM degree
- What is known about how relationships between predictors and outcomes might differ for Hispanic students, specifically?

Literature Review

- Review studies that explored relationships between K-12 factors postsecondary STEM outcomes
- Disseminate information that can inform decision making and policy
- Inform follow-up studies that examine K-12 factors in Texas public schools.



Literature Review Methods

1. Determine which studies to review (specify inclusion criteria)
2. Scan academic databases and identify articles that meet the inclusion criteria
3. Read, code, and summarize each article
4. Synthesize summaries across articles

Literature Review Methods *(continued, part 2)*

1. Determine which studies to review (specify inclusion criteria)
2. **Scan academic databases and identify articles that meet the inclusion criteria**
 - Published in 2000 or later
 - US student population
 - Primary research only
 - Include at least one K-12 factor (e.g., SAT score, course-taking,) and at least one postsecondary STEM outcome (e.g., declaring a STEM major).
3. Read, code, and summarize each article
4. Synthesize summaries across articles

Literature Review Methods *(continued, part 3)*

1. Determine which studies to review (specify inclusion criteria)
2. **Scan academic databases and identify articles that meet the inclusion criteria**
 - 23 studies
3. Read, code, and summarize each article
4. Synthesize summaries across articles

Literature Review Methods *(continued, part 4)*

1. Determine which studies to review (specify inclusion criteria)
2. Scan academic databases and identify articles that meet the inclusion criteria
3. **Read, code, and summarize each article**
Code for:
 - Aspects of sample
 - Outcome of interest
 - K-12 indicator examined
 - Research design
 - Statistical analyses applied
 - Study limitations
 - Hispanic student sub-group analysis
4. Synthesize summaries across articles

Key Findings - Overview

- 22 of 23 studies were correlational in nature (cannot infer cause and effect)
- Only 4 studies examined a K-12 predictor of a postsecondary STEM outcome for Hispanic students specifically
- Overall, significant indicators included measures of:
 - Advanced course-taking
 - Measures of K-12 achievement
 - Interest in STEM

Measures of advanced course taking

- High school math and science course-taking: more courses, particularly more rigorous courses, associated with higher rates of enrolling in, persisting in, and pursuing a STEM major.
- **Important sub-finding:** Number of courses was a stronger predictor for White students than for Hispanic students only when rigor was not accounted for. When measured, rigor was similarly predictive for all student groups.

Measures of K-12 achievement

- Grade Point Average, class rank, SAT/ACT scores, high school math and science standardized achievement measures result in significantly related to postsecondary STEM achievement.
- **Important sub-finding:** Grades were less predictive of STEM outcomes for minority students.

Measures of interest in STEM

- Interest in STEM (as young as in middle school), enjoyment of math/science in high school, positive perceptions of math/science abilities are significantly related to postsecondary STEM pursuits
- **Important sub-finding:** Despite similarly positive dispositions towards math/science, women and Hispanic students persist in STEM at lower rates.

Implications

- Increase enrollment in high-level math and science courses
 - Ensure rigor/quality in those high-level courses
- Turn youth interest in STEM into college STEM majors
- Focus research on Hispanic students' STEM success

Indicators of early college success

- Lyzz Davis, Senior Researcher, REL Midwest

Overview

1. Who we are
2. Why this study
3. What we measured
4. What we found
5. What now

REL Midwest



- | | |
|--|--|
| ■ Appalachia | ■ NW |
| ■ Central | ■ Pacific* |
| ■ Mid-Atlantic | ■ SE |
| ■ Midwest | ■ SW |
| ■ NE & Islands | ■ West |

* The Pacific Region contains Hawaii, pictured on the map, and American Samoa, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia (Chuuk, Kosrae, Pohnpei, & Yap), Guam, the Republic of the Marshall Islands, & the Republic of Palau, not pictured on the map.

College and Career Success Research Alliance

Goal: To build capacity for evidence-based policies through research

Guiding questions:

1. What predicts being on track for success?
2. What interventions increase college success?





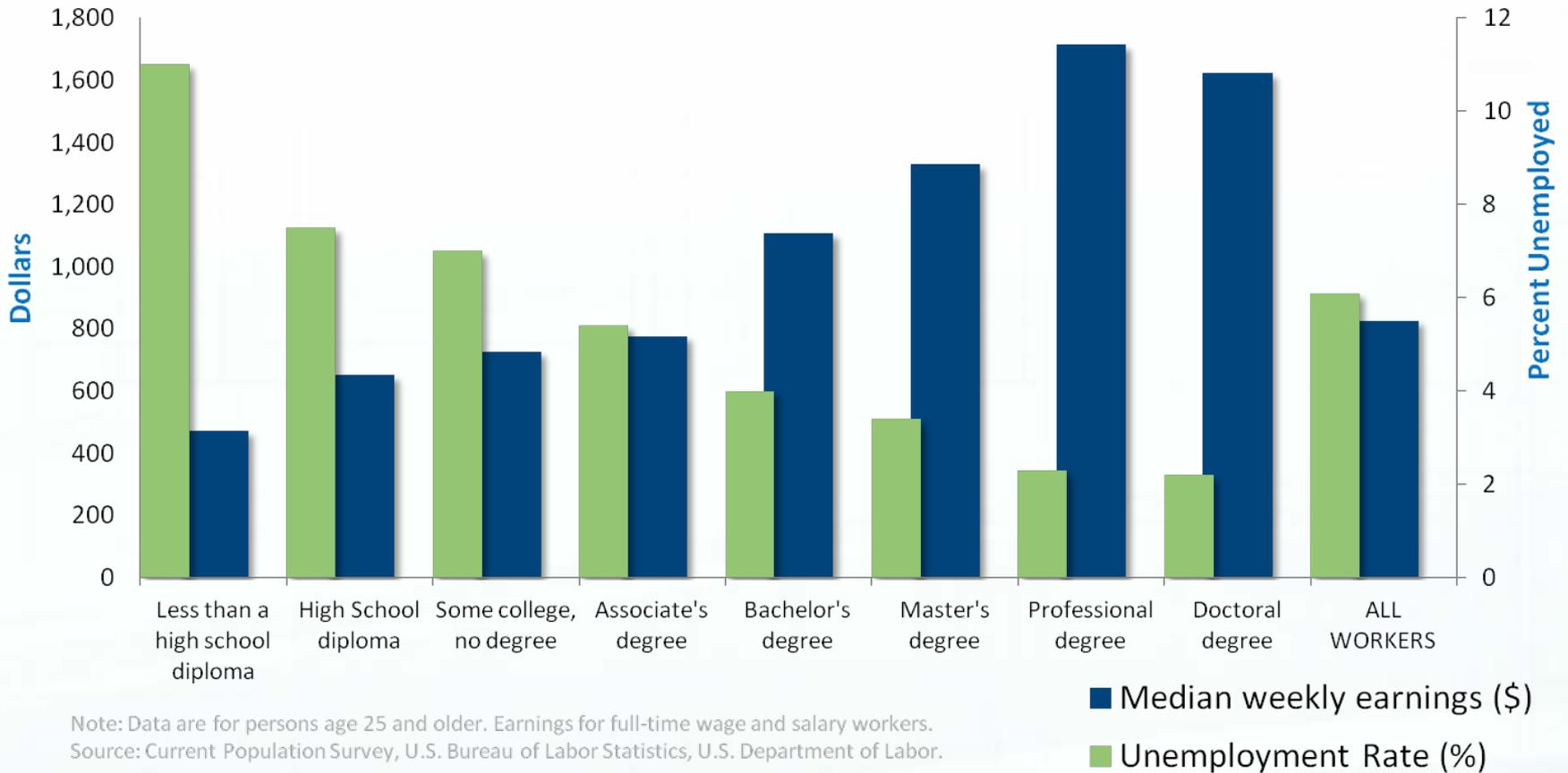
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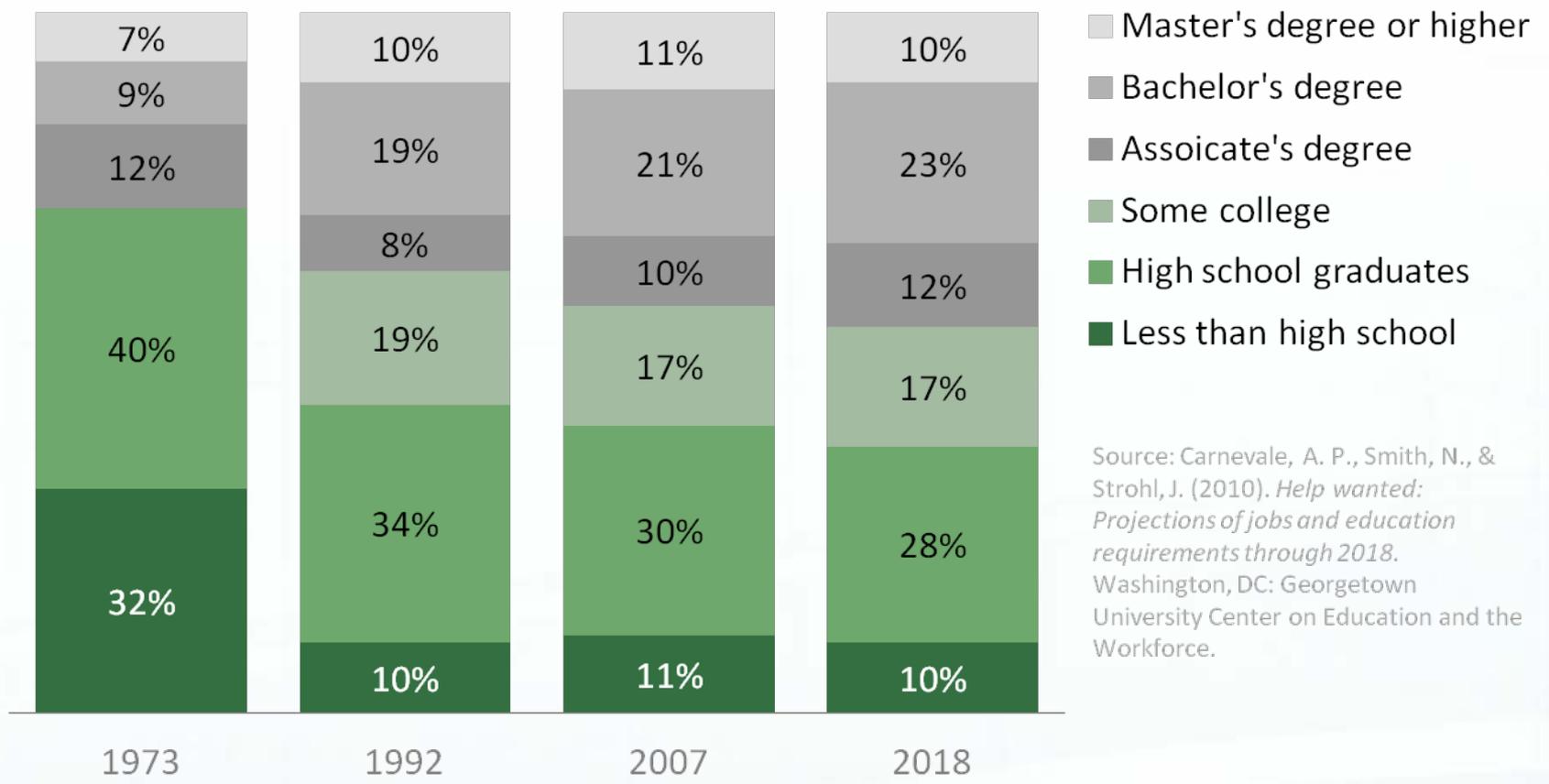
Why this study?

A bit of context

Education, income, and unemployment



Postsecondary education increasingly required by U.S. workforce



Postsecondary reform is a **priority.**

Indiana's efforts

- **College Preparation Curriculum Act (2006)**
- **Core 40 Graduation Requirements (2007)**
- **American Diploma Project**



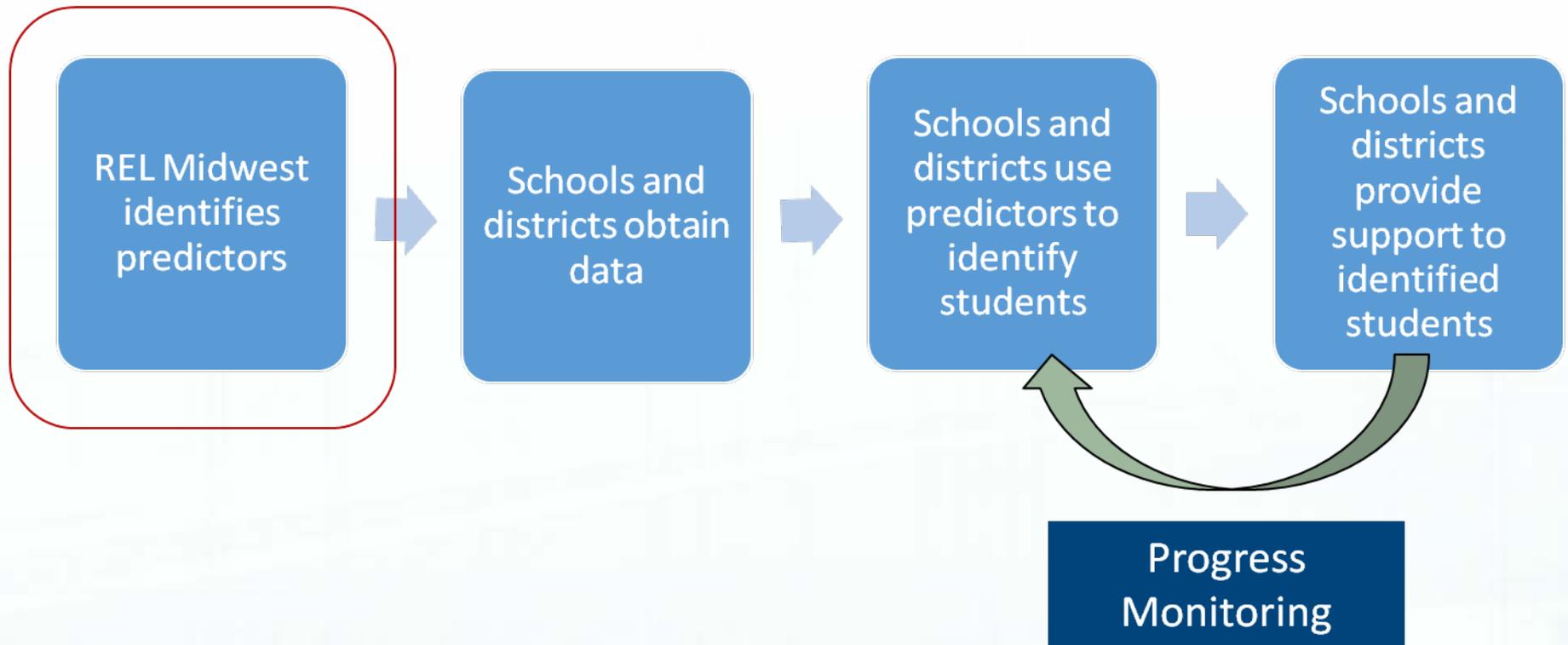
Indiana's efforts

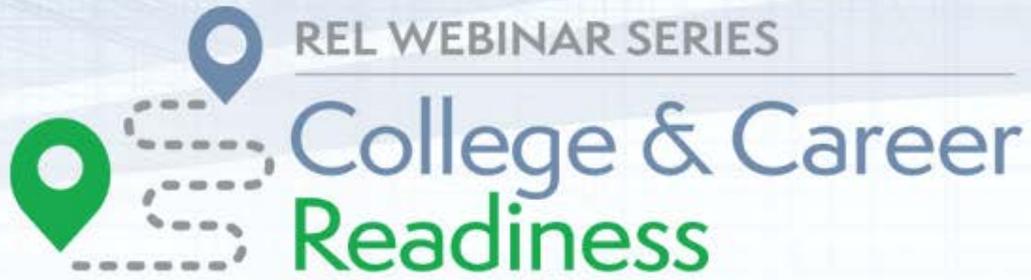
- Indiana Commission for Higher Education (ICHE): Intended to **better identify students** likely to succeed in college.
- High schools can **use available data** to identify students and provide support.



Logic model

Similar to a response to intervention model:





What we measured

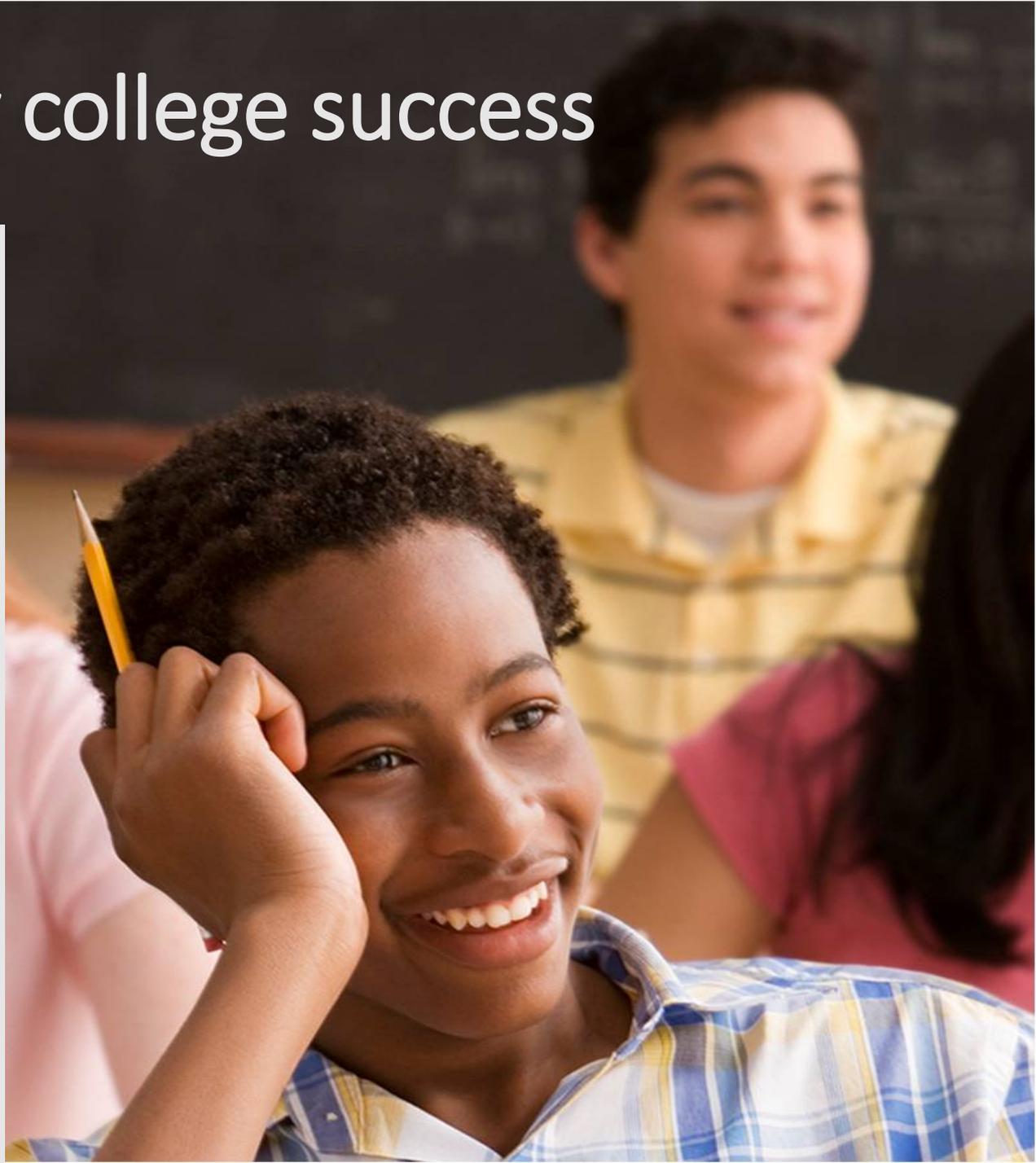
Technical aspects of the study

Defining early college success

Three separate indicators:

- Taking only non-remedial classes
- Earning all attempted credits
- Continuing to a second year

...and a composite.



Full analytic sample



33,000 students:

- Graduated in 2010
- Enrolled in Indiana public college fall 2010

Research questions

1. What percentage of enrollees arrived at college ready to succeed?
2. Do the percentages vary by student, high school, or college characteristics?
3. Do the percentages vary by indicator of success?

Data sources

- ✓ Indiana's **Student Information System**
- ✓ **Barron's** Profile of American Colleges
- ✓ National Center for Education Statistics
Elementary and Secondary Information System
(ELSi; formerly Common Core of Data)
- ✓ Publicly available data from **Indiana Department of Education**

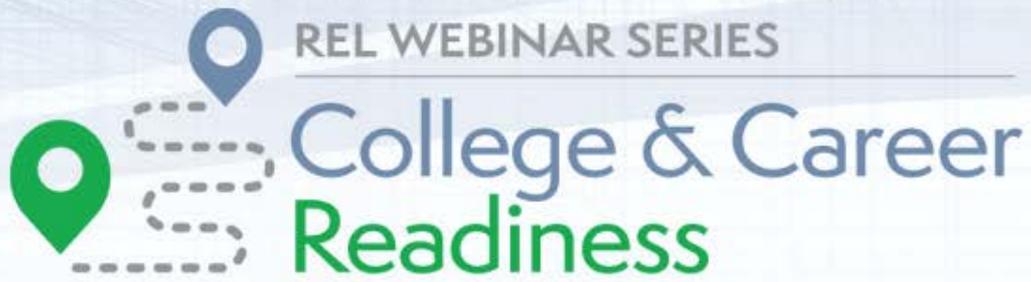
Analysis

Data included:

- **Student, high school, and college** characteristics
- Indicators for three measures of early **college success** and their composite

Descriptive statistics

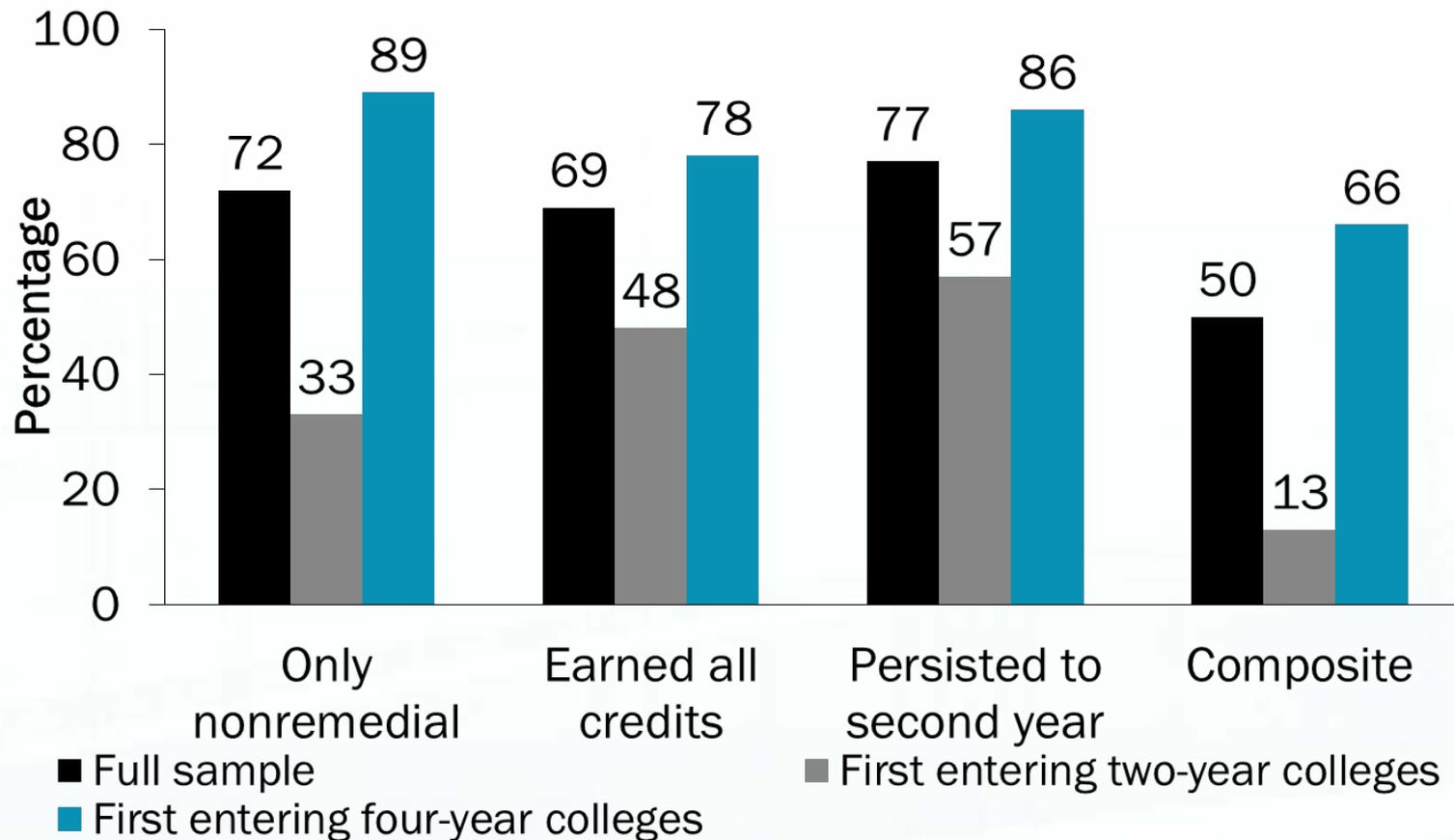
Cross-classified **Hierarchical Linear Modeling**



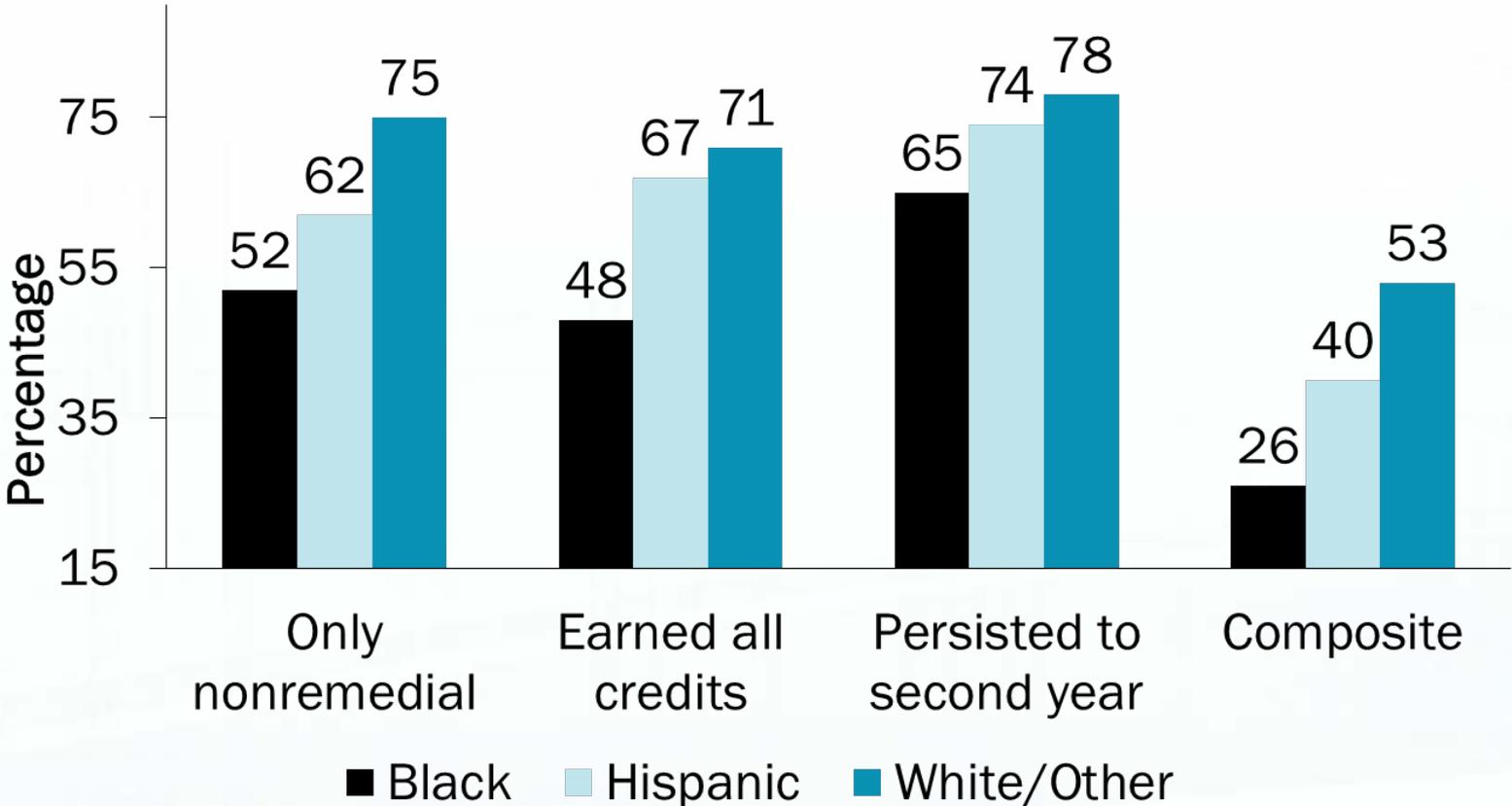
What we found

Study findings

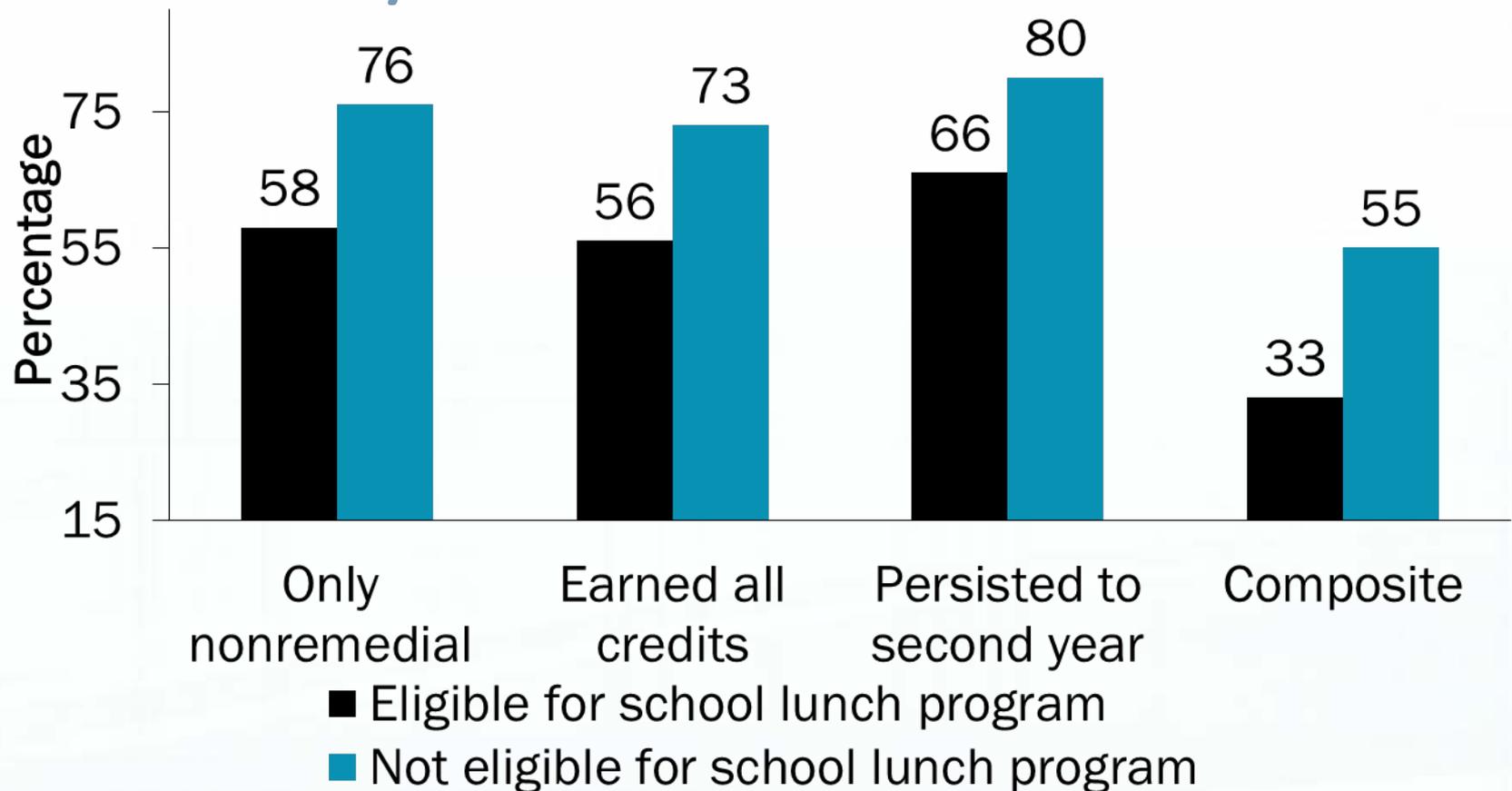
Half achieved success by all indicators, varied by type of college



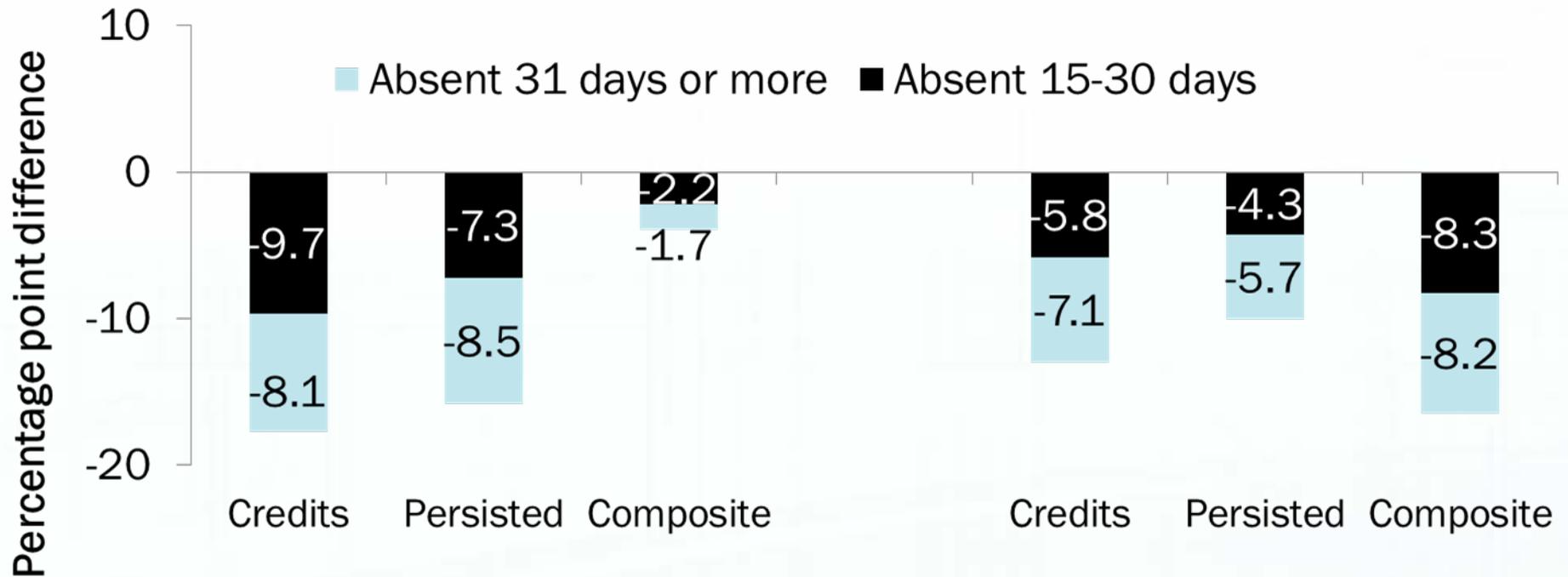
Double digit gaps in early college success by race/ethnicity...



...and double digit gaps in early college success by socioeconomic status



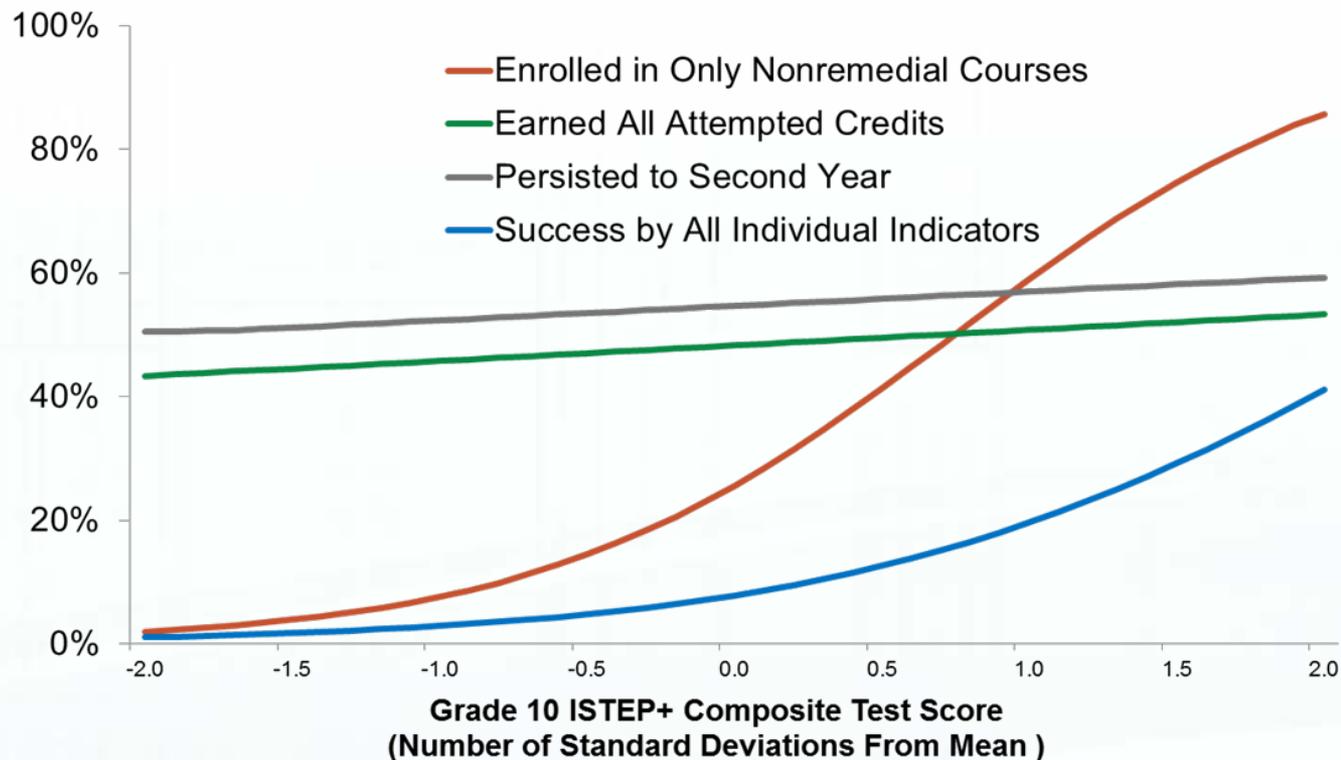
Attendance in high school predicts early college success



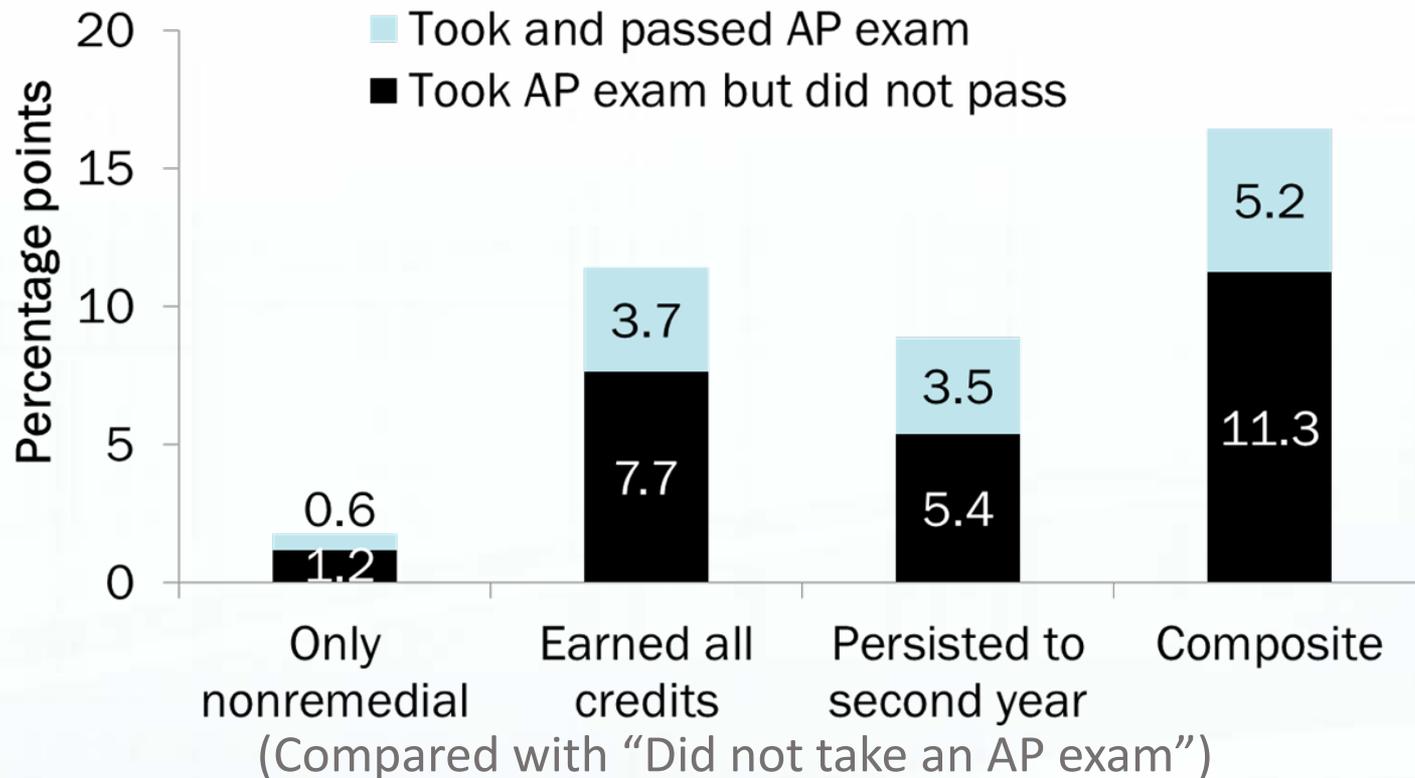
(Compared with absent less than 15 days)

Standardized test scores predict success

Among two-year college goers:

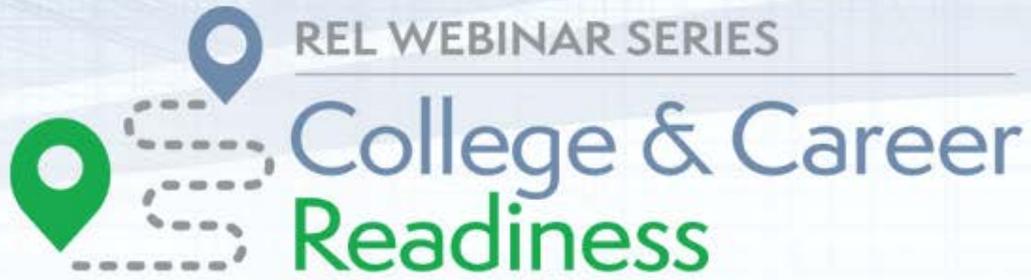


Taking an Advanced Placement (AP) class predicts success among students in four-year colleges



Predictors together explain little variance in the outcomes

Outcome	Percent Variance Explained
Students First Entering Two-Year Colleges	--
Enrolled in Only Nonremedial Courses	35%
Earned All Credits Attempted	7%
Persisted to Second Year	8%
College-ready by all individual indicators	31%
Students First Entering Four-Year Colleges	--
Enrolled in Only Nonremedial Courses	25%
Earned All Credits Attempted	19%
Persisted to Second Year	22%
College-ready by all individual indicators	26%



What now?

Three implications to note for predictors of early college success

1. Focus resources on supporting **low income** students and **racial/ethnic minorities**

2. Use multiple student, high school, and college characteristics to predict early college success

3. Use **caution** when interpreting predictors of early college success

Thank you!



Resources from the Regional Educational Laboratories (RELs)

- Ask A REL:
<http://ies.ed.gov/ncee/edlabs/askarel/index.asp>
- Follow us on Twitter!
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 - REL Midwest: [@RELMidwest](https://twitter.com/RELMidwest)
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