Astra Academy:

Measuring Success: Standardized Tests and Discrepant Achievement

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Presentation Overview

- Introduction (5 Minutes)
- *Measuring Success: Testing, Grades, and the Future of College Admissions* (10 Minutes)
- Standardized Tests and Discrepant Achievement (30 - 35 Minutes)
- Comments and Questions (10 -15 Minutes)

AD ASTRA
INFORMATION SYSTEMS

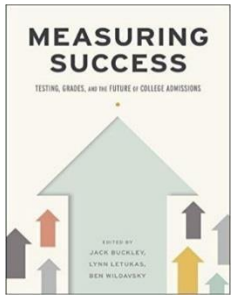
- Ad Astra is a course scheduling and enrollment management organization that partners with over 600 institutions annually to improve course scheduling efficiency and accessibility for students.

- Ad Astra offers unique solutions designed to graduate more students faster.

- Astra Academy is a webinar series that brings together diverse stakeholders across the higher education landscape to share with you how their work is helping to improve student outcomes with a focus on student retention, time-to-completion, or graduation.

New SAS Institute Initiative on Free Software and Educational Resources for Higher Education Faculty and Students

- SAS is an analytics software that is used by 96 of the top 100 *Fortune 500* companies and is the only statistical software approved for use in federal clinical trials.
- SAS provides University Edition for free to all faculty and students as well as free teaching and learning materials.
- Students who learn SAS earn about six percent more than other students.
- Please reach out to Lynn Letukas (lynn.letukas@sas.com) for additional information about ensuring your faculty have free access to software and teaching materials and resources.

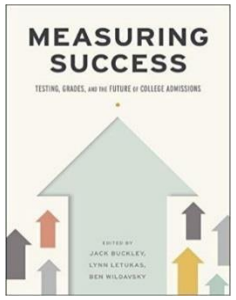


Measuring Success: Testing, Grades, and the Future of College Admissions

- My co-editors and I wanted to produce a volume that brings together the best empirical thinking around two questions:

1. To what extent should standardized tests play a role in college and university admissions?

2. How should an institution of higher education best assess prospective student talent in a manner that promotes fairness?

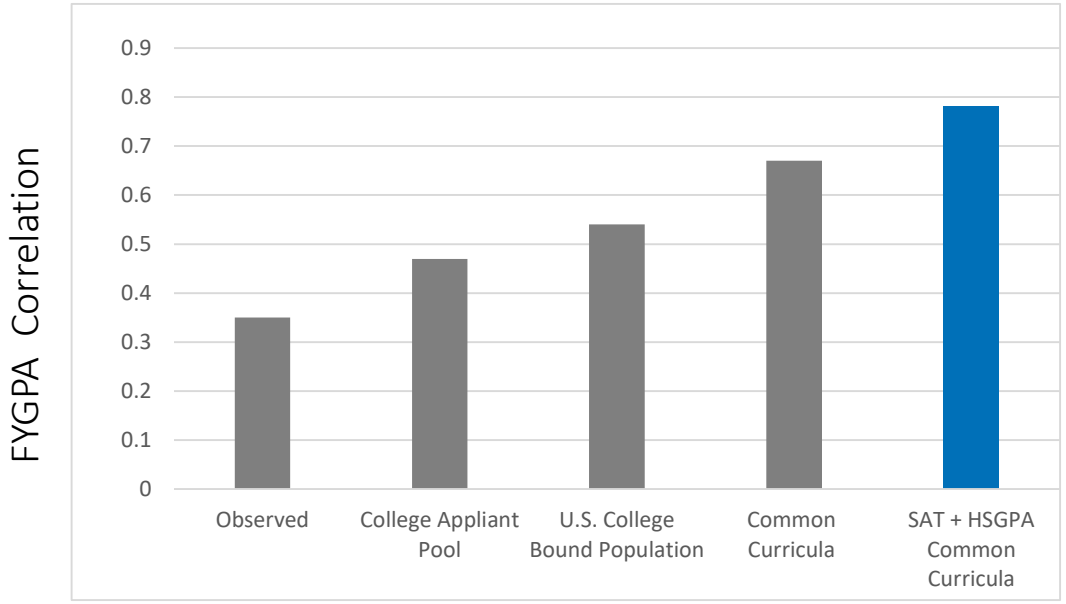


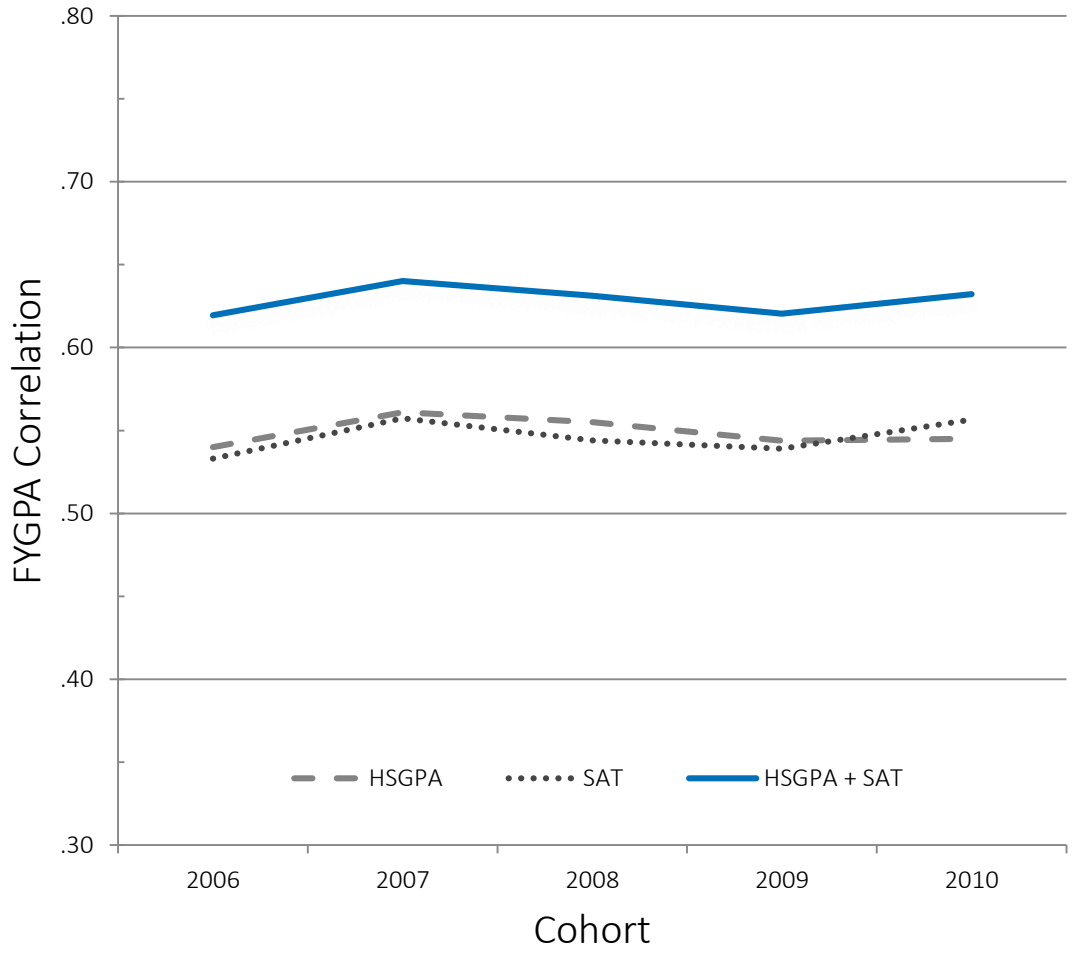
Measuring Success: Testing, Grades, and the Future of College Admissions

- Standardized tests predict college success.
- Standardized tests serve as a check against high school grade inflation.
- Test-optional policies do not increase college diversity.

Standardized Tests Predict College Success

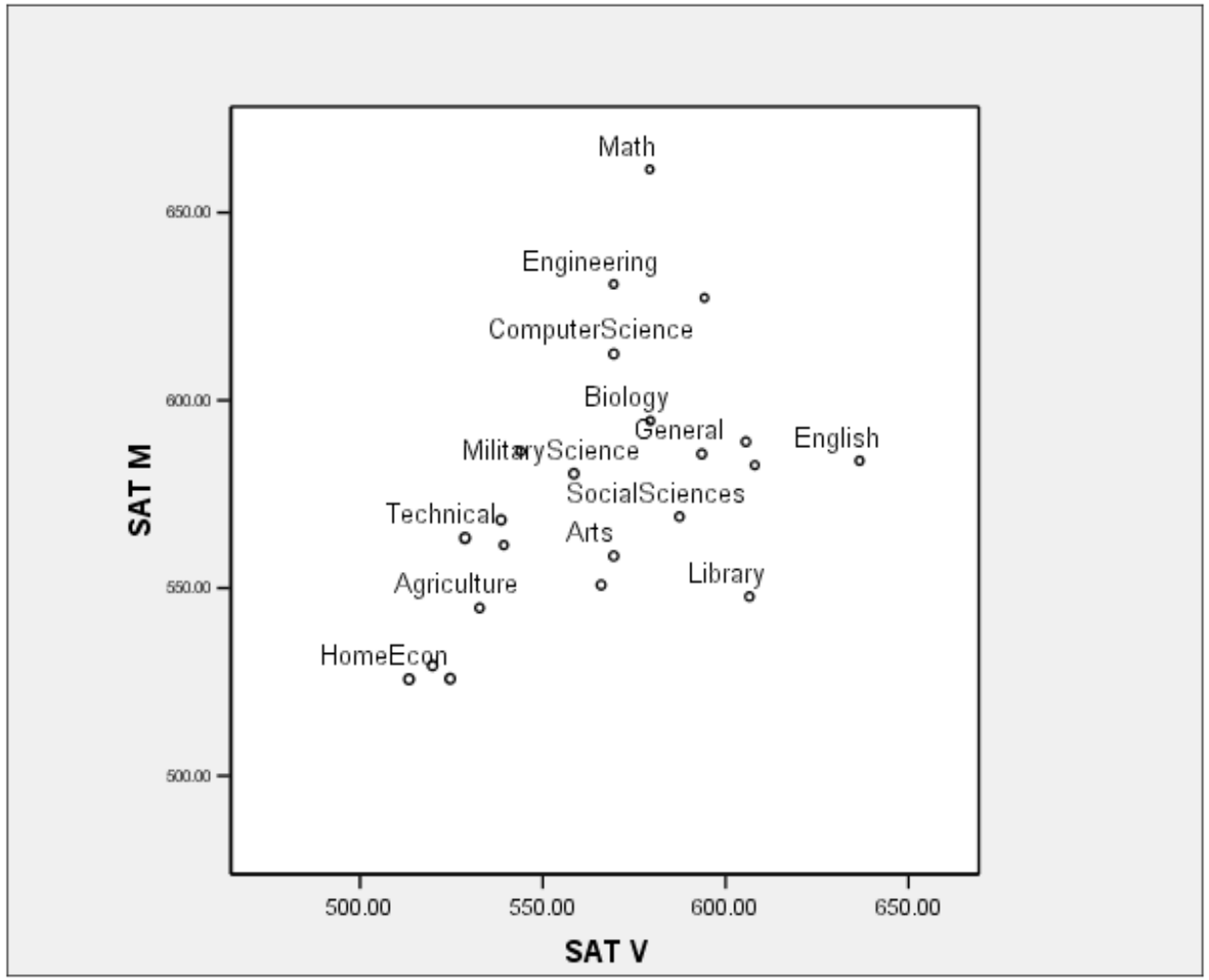
- Sackett and Kuncel found that the SAT, when combined with high school GPA (HSGPA), is the best predictor of first-year college GPA.





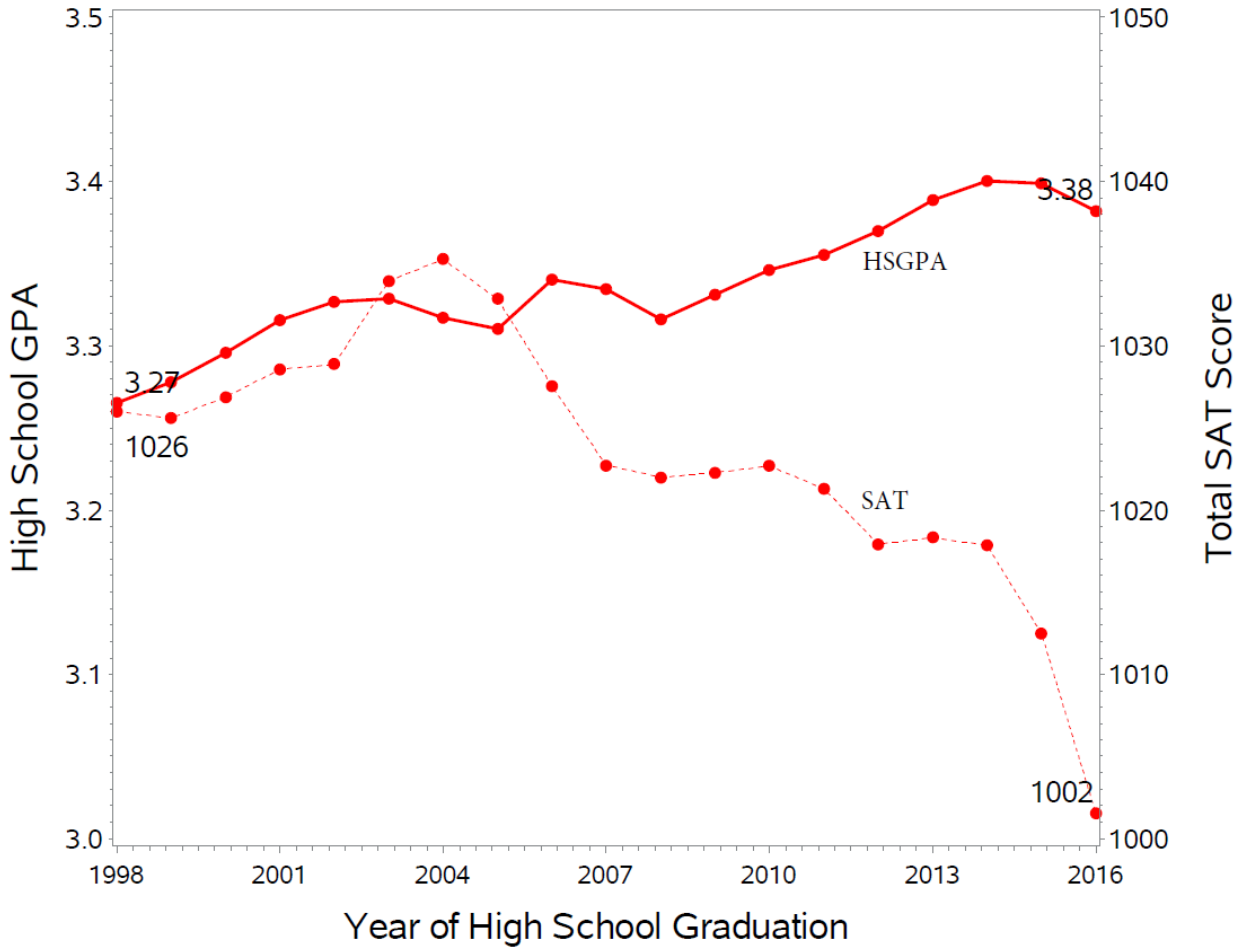
Standardized Tests Predict College Success

- Students who do well on SAT-M or SAT-V tend to select majors that require those skills.
- Students with strong test scores often end up pursuing more challenging majors, take more difficult courses, even when controlling for prior grades.
- Standardized tests, rigorous course-taking, challenging majors are later associated with job performance and salary.



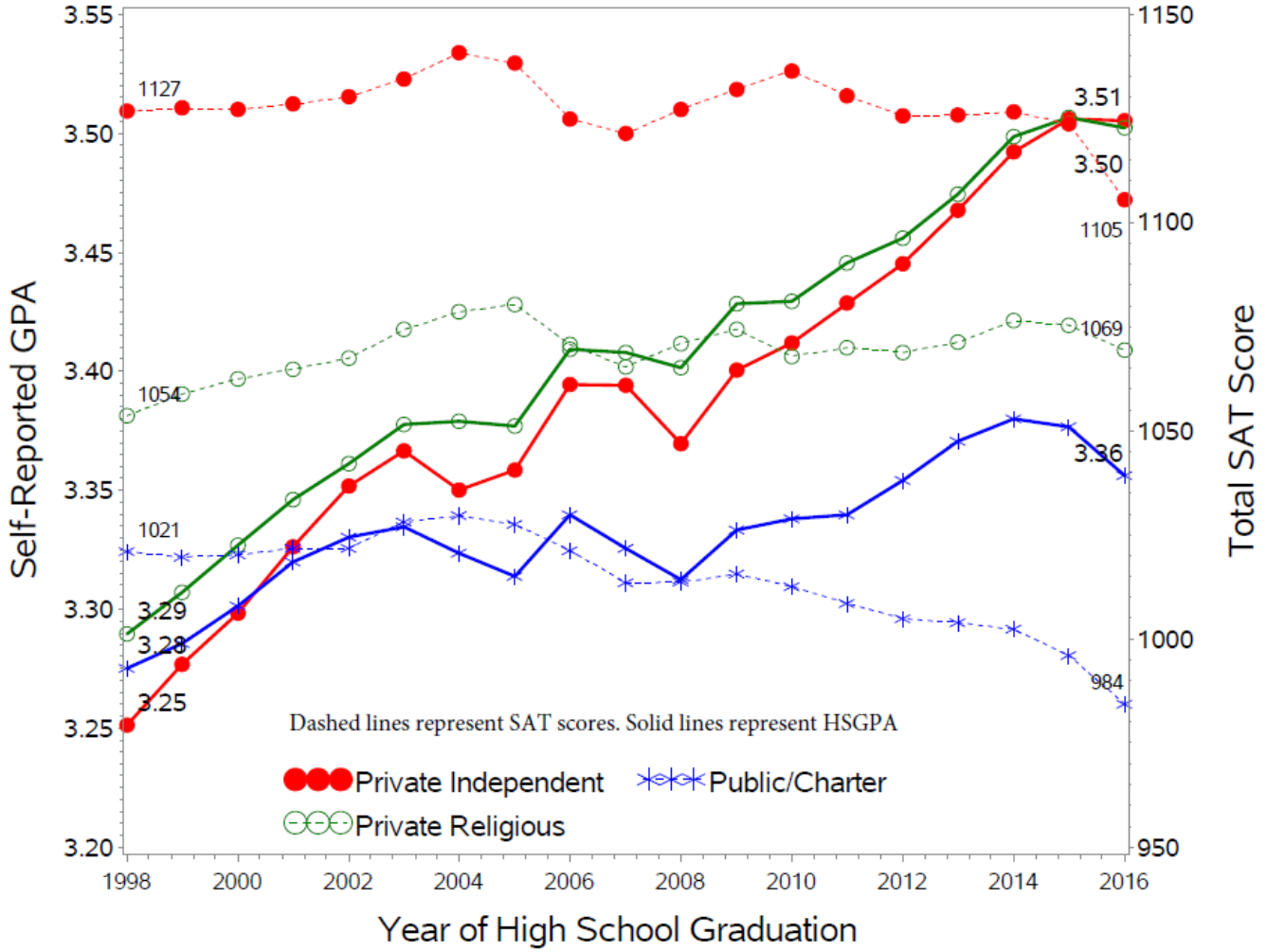
Standardized Tests Serve as a Check against High School Grade Inflation

- Hurwitz and Lee found that HSGPA increased from 3.27 to 3.38.
- If there was no grade inflation, we would expect average SAT scores to increase at nearly the same rate as HSGPA.
- From 1998 – 2016, the average cohort SAT scores declined from 1026 to 1002.



Standardized Tests Serve as a Check against High School Grade Inflation

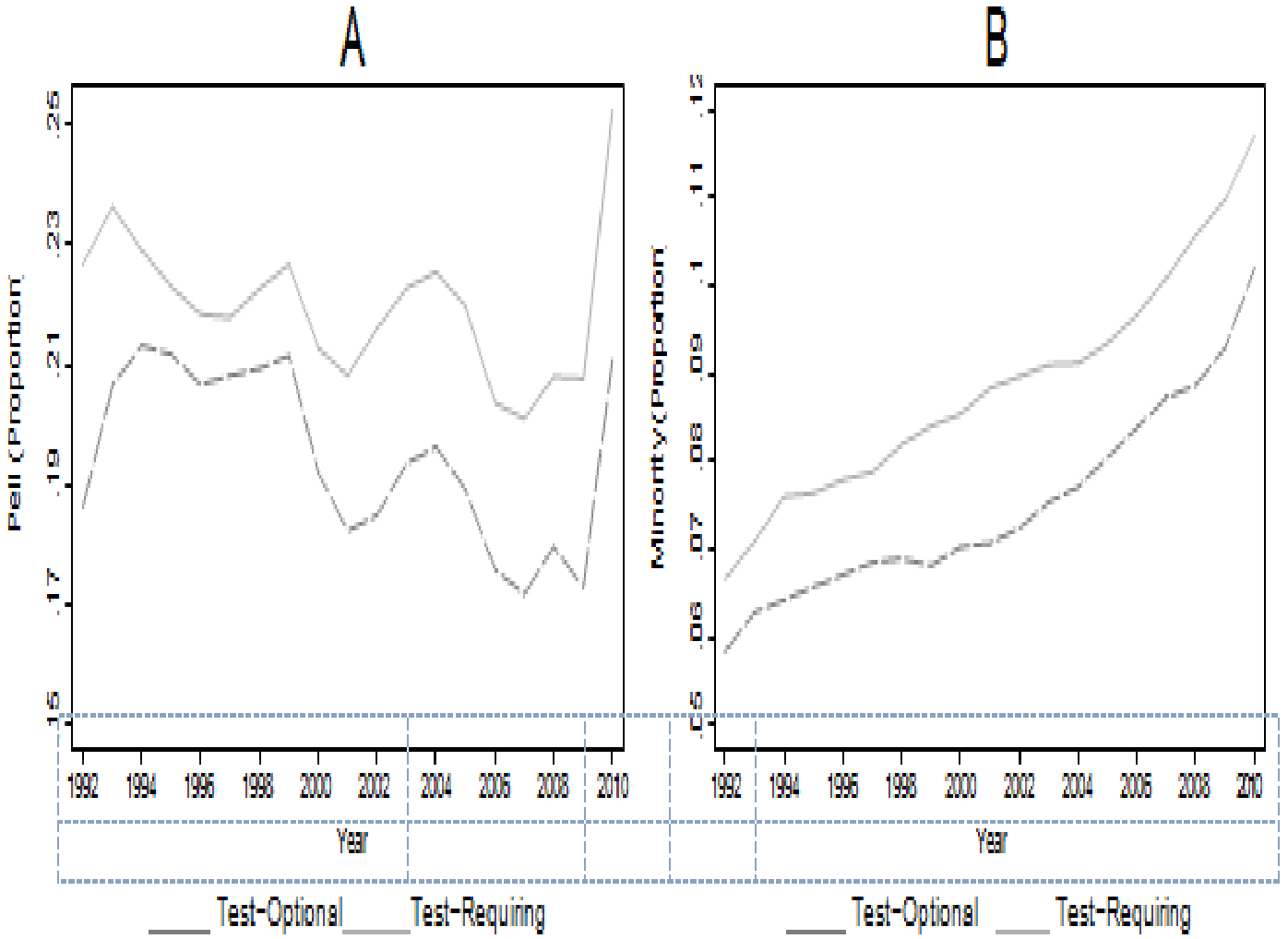
- High school GPA are inflating faster for students in Private (+0.26) and Religious (+0.21) than Public/Charter schools (+0.08).
- The average SAT score for Private schools declined 22 points, Religious increased 15 points and Public/Charter declined 37 points.
- Standardized tests can serve as a check against high school grade inflation.

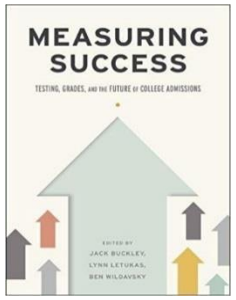


Test-Optional Policies Do Not Increase College Diversity

- Using a difference-in-differences (DiD) approach across 180 institutions from 1992 – 2010, Belasco et al. found that on average, test-optional policies enhance selectivity but not diversity.

- During their time of study, test-optional institutions enrolled a lower proportion of Pell recipients and underrepresented minority students during all the years in the panel compared to test-requiring schools.





Measuring Success: Testing, Grades, and the Future of College Admissions

- Standardized tests predict college success.
- Standardized tests serve as a check against high school grade inflation.
- Test-optional policies do not increase college diversity.

Retention, Transfer, and Drop Out:

Oh my!

Justine Radunzel

Background

- Recent study suggests that only
  - 60% of four-year students complete a degree from initial institution within six years (Kena et al., 2016)
  - 28% of two-year students complete a degree from initial institution within three years
- Largest share leave initial institution during their first two years (Bradburn, 2002; Tinto, 2012)

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Factors related to student retention

- Pre-entry attributes
  - Academic readiness
  - Demographics
- Academic goals and commitments
- Institutional experiences
- Academic and social integration into college environment
  - Living on campus
  - Enrolling full-time
  - Participating in activities
  - Attending closer to home
  - Attending institution that matches preferences
- External commitments (Tinto, 1975; 1993)

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Current Study

- Objective
  - Examine the use of incoming student information from ACT record for early identification of at-risk students
    - In context of early alert/warning systems
  - Determine where transfer students are going

- Study Sample
  - More than 630,000 first-time entering students
    - 2014 freshman cohort
    - Nearly 1,150 two- and four-year institutions with at least 50% ACT-tested
  - Tracked through fall 2015 using NSC data

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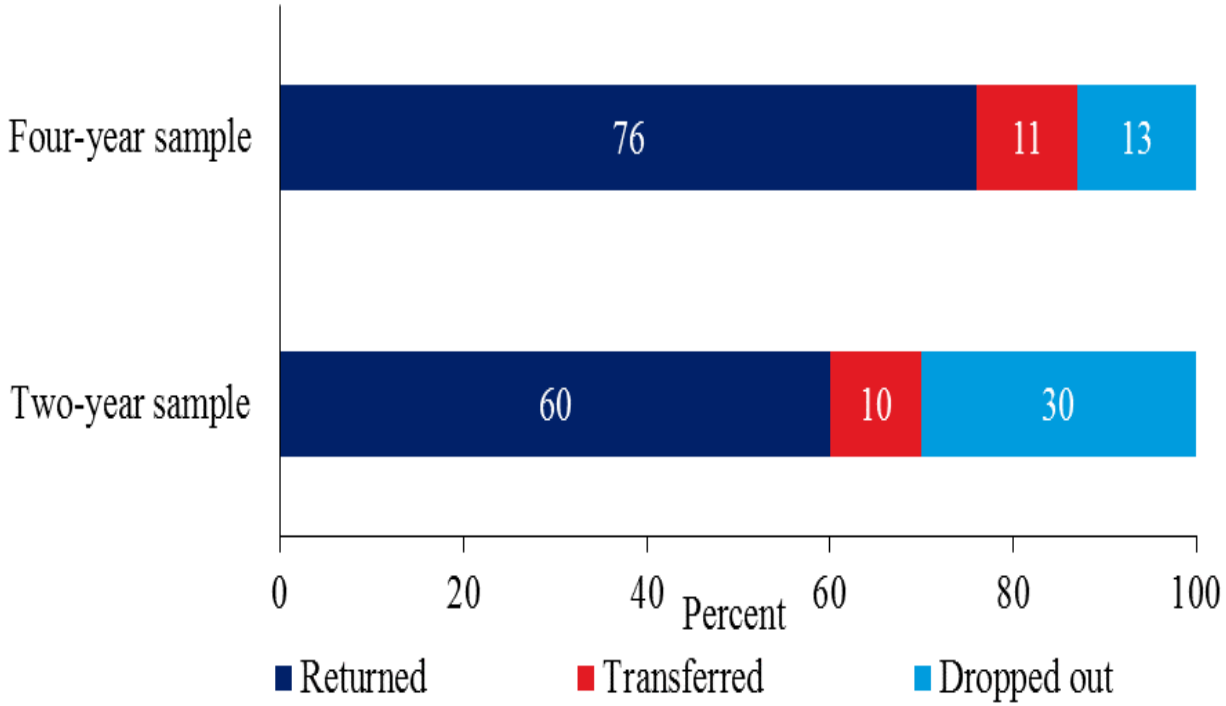
Retention and Attrition Rates



Multidimensional Model of Retention/Attrition

- Academic preparation and achievement levels
- College intentions about living on campus, enrolling full-time, and working while in college
- Educational goals
- Number of college preferences met by initial institution
- Distance from home to initial institution
- Demographic characteristics

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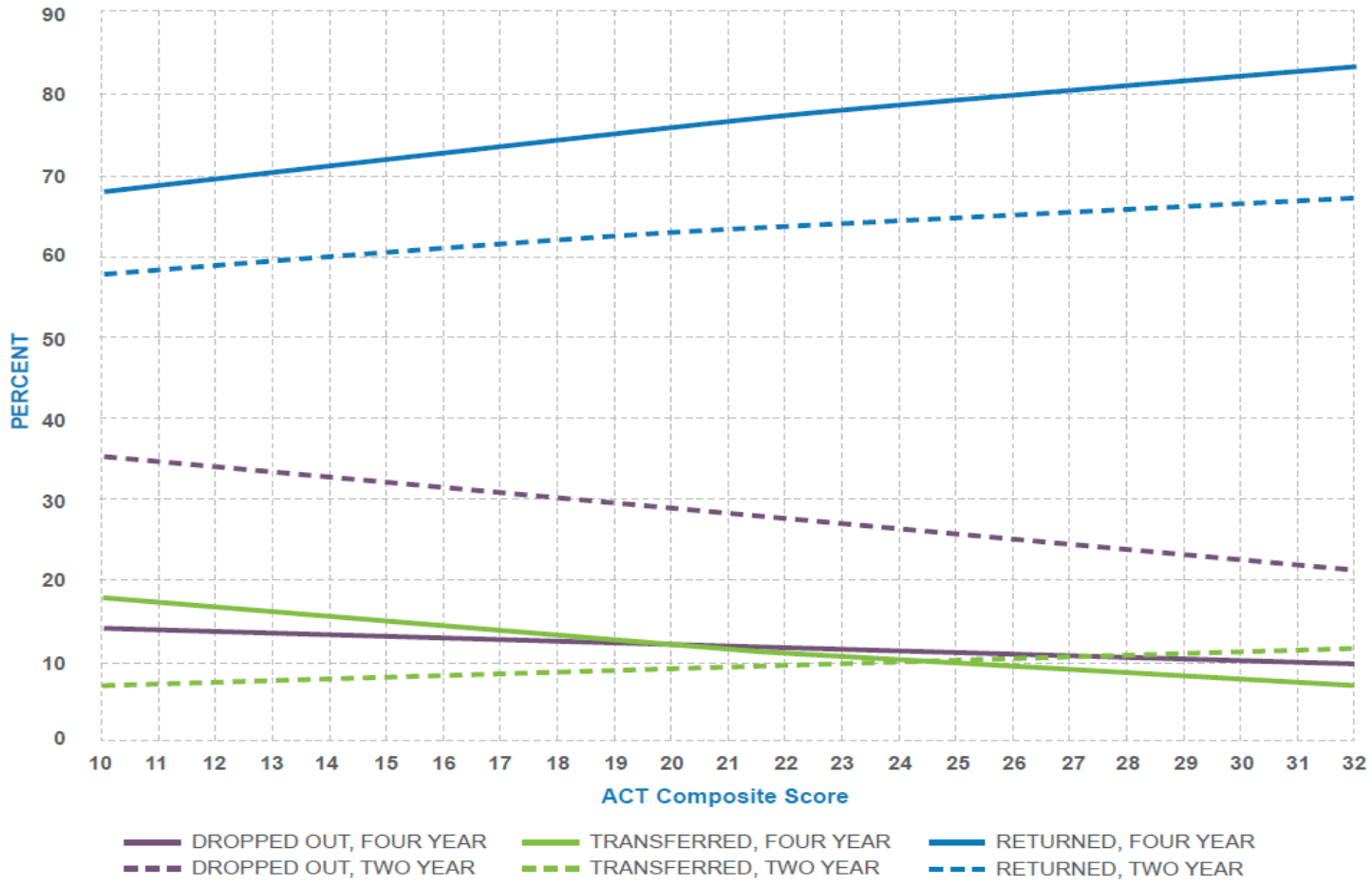
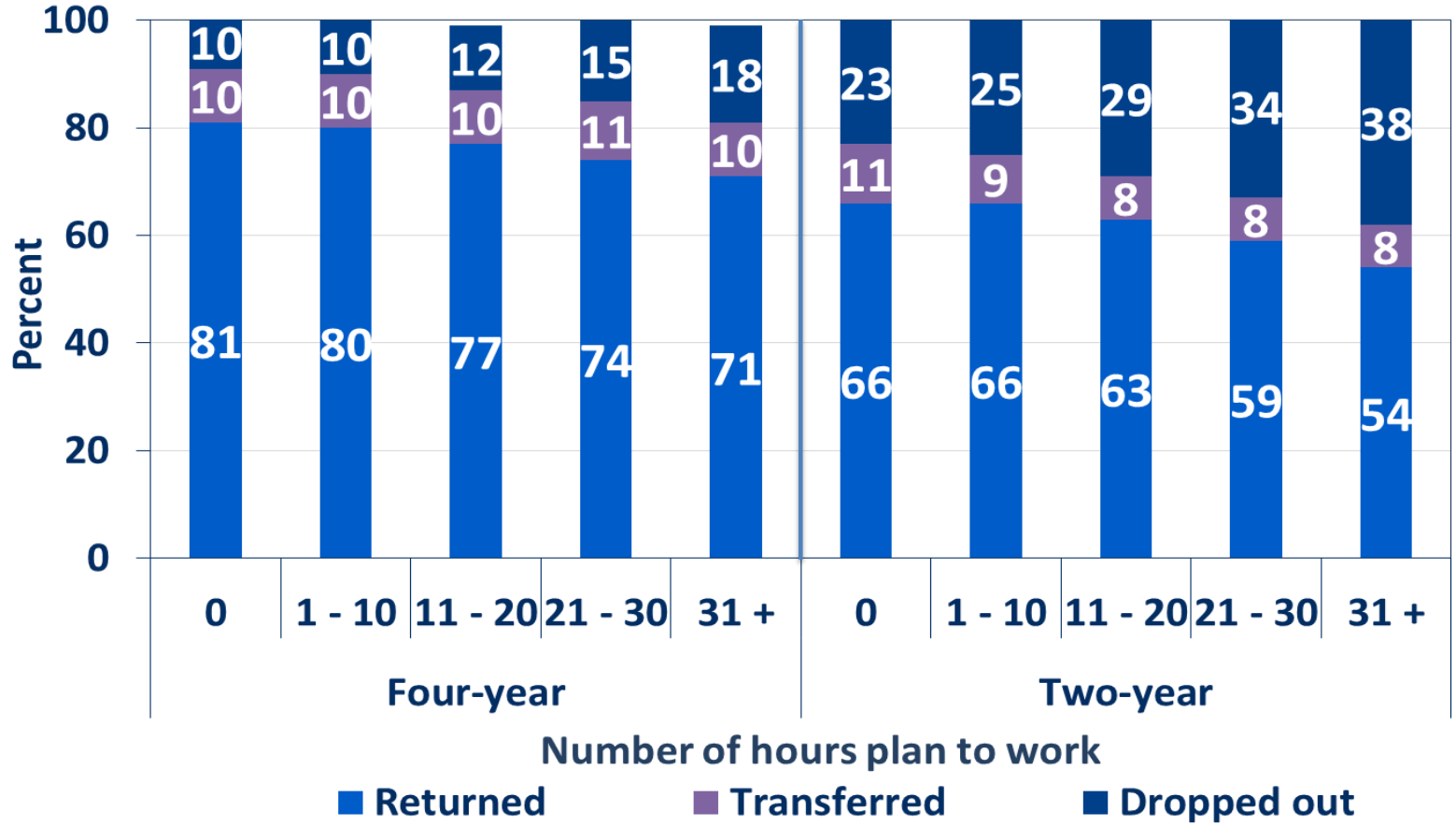
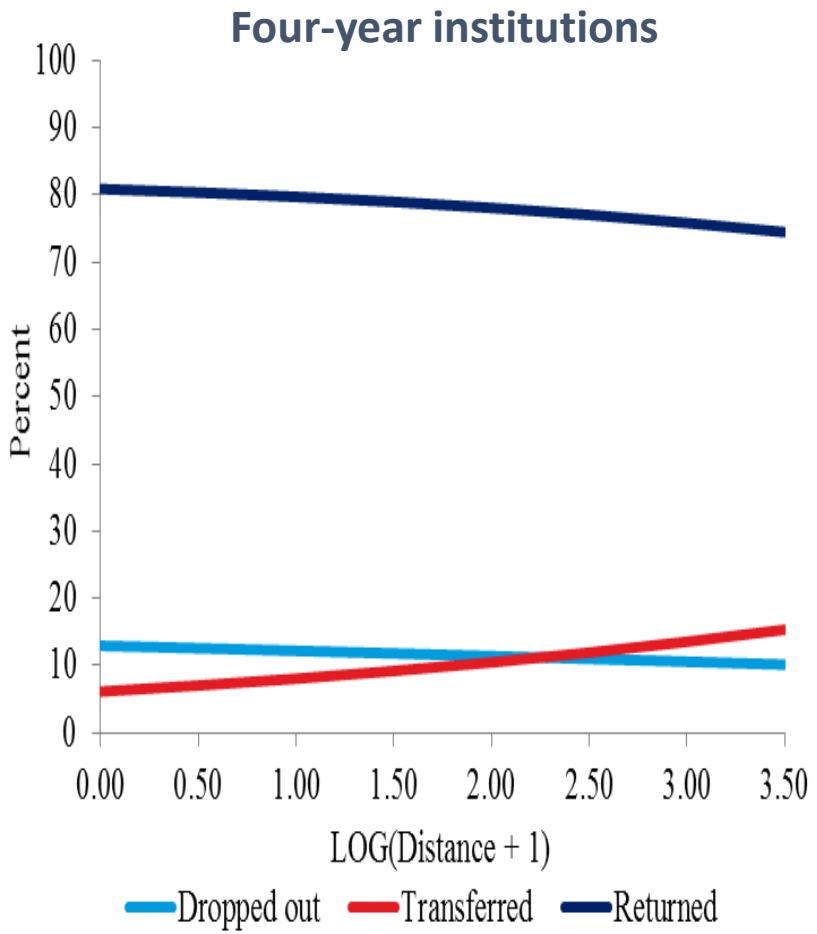
Retention and Attrition Rates by ACT Score

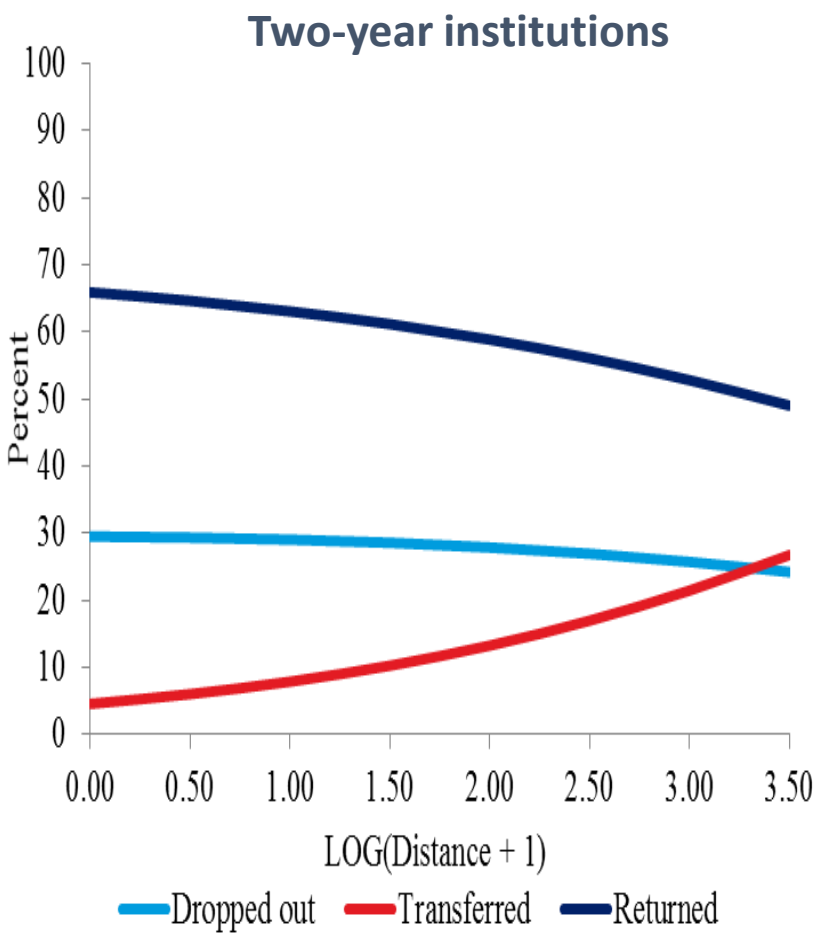


Retention/Attrition by Hours Planned to Work



Retention/Attrition Rated by Distance from Home





Retention Study Implications

- Institutions can use this information to
  - Augment their early alert/warning systems
  - Incorporate it into student-level dashboards
  - Inform their retention strategies
  - Learn more about incoming students using other data available on the ACT student record
  - Inform/implement transfer strategies/policies that help students achieve their educational goals

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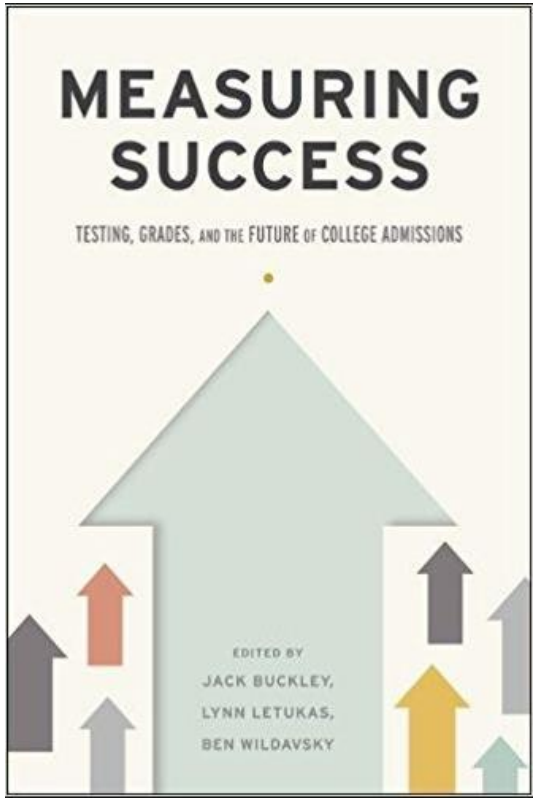
When HSGPA and Test Scores Disagree



Overview

- Prior research has documented the relationship between academic preparation, as measured by high school grade point average (HSGPA) and admissions test scores, and successful college outcomes.
- It has been shown that high HSGPA and admissions test scores are associated with higher chances of enrollment, persistence, and graduation.
- Standardized test scores and high school grade point average (HSGPA) can provide unique information about students and using them in combination can provide a more informative picture of students' academic preparation.

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Overview

- Test scores and grades often send a consistent message about the academic achievement level of students.
- There are instances, however, when test scores and grades send mixed messages about the academic performance of students.

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Overview

For Example:

- "Poor tester" - good high school grades and has low admissions test scores.
- Underprepared student - high HSGPA but remain underprepared for college due to having taken less rigorous courses
- "Good tester" - good admissions test scores yet have low high school grades.
- Prepared Students - student takes advanced and academically challenging courses may have a moderate HSGPA while being academically prepared for college and therefore scoring well on an admissions test

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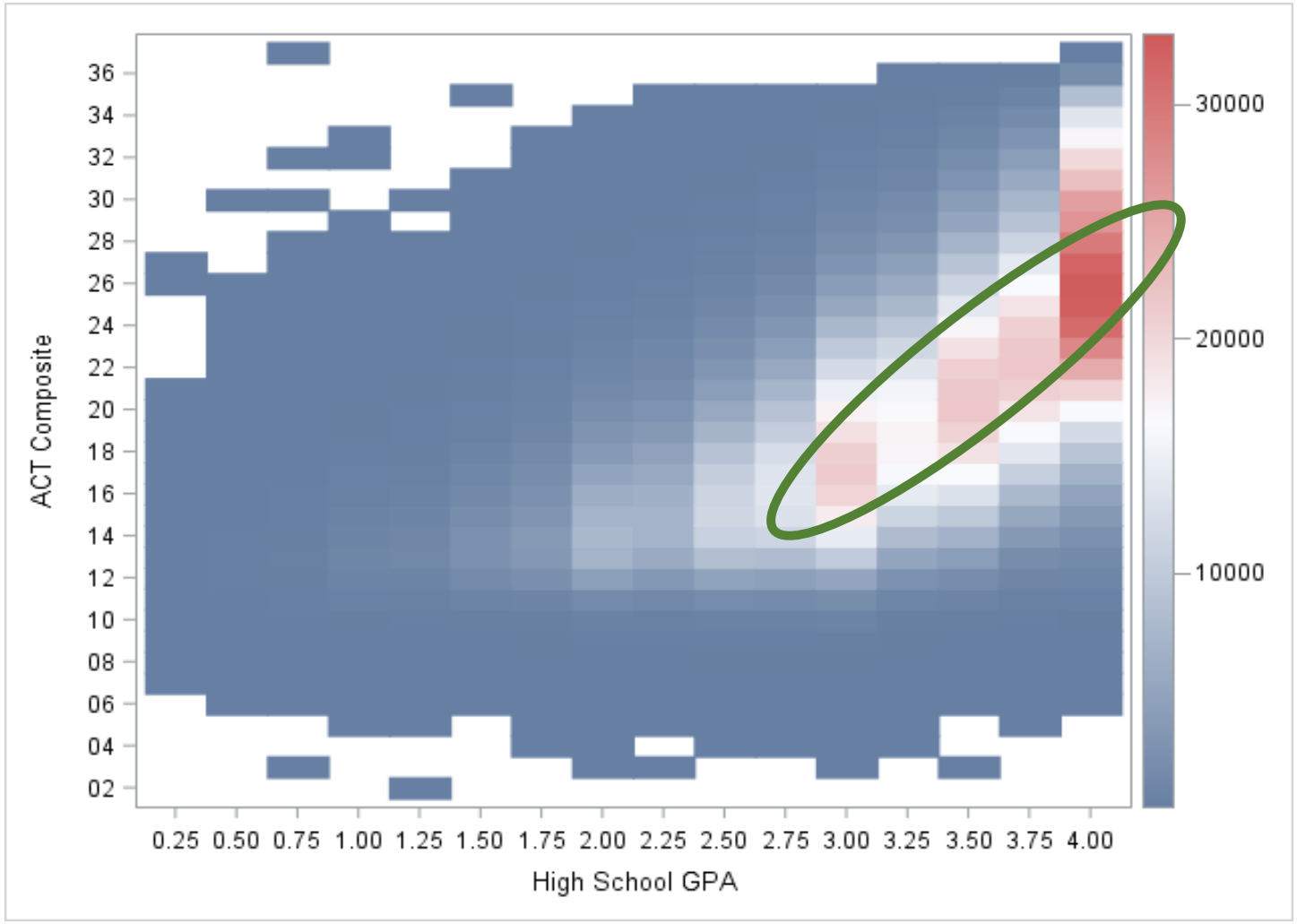

Heat map of ACT Composite score and self-reported HSGPA for the ACT-tested graduating class of 2016 (N= 1,709,659)

Defining Discrepancy

1. Use standardized scores to create discrepancy subgroups
2. Use percentiles to examine whether scores are high, moderate, or low in their respective distributions
3. Use the difference between two standardized scores to quantify the magnitude of discrepant performance

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What do we know about Discrepant Students

- about 25% to 30% of high school students have discrepant achievement,
- tend to have higher percentages of:
  - female,
  - minority, and
  - low-income students

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What do we know about Discrepant Students

- HSGPA discrepant students are more likely to take social science and language courses in high school, while test score discrepant students are more likely to take mathematics, science, and arts courses
- HSGPA discrepant students are more likely to choose education and health majors for their undergraduate studies, and test score discrepant students were more likely to choose arts and STEM college majors
- HSGPA discrepant students are also more likely to speak languages other than English at home.

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What do we know about Discrepant Students

- Having HSGPA discrepant achievement is associated with an overprediction of FYGPA relative to test score discrepant and Consistent achievement students
- Both HSGPA and ACT Composite score discrepant students tend to be less likely to persist to the sophomore year or complete a Bachelor's degree than students with consistent achievement
- Within a similar HSGPA range, test score discrepant students had the highest FYGPA, followed by students with consistent achievement, and finally by HSGPA discrepant students

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Current Study

- Data from the ACT-tested graduating class of 2014
- Enrollment and persistence data from the National Student Clearinghouse
- 1,719,039 students
- nested within 12,805 high schools
- enrolled in one of 2,250 colleges directly after high school

Current Study

- Used normalized ACTC and HSGPA scores to define nine discrepancy groups

ACT Composite group	HSGPA group	Discrepancy Group (%)	Definition of Groups	Direction of Discrepancy	Magnitude of Discrepancy
High	High	$Consistent_H$	Both ACTC and HSGPA scores in top 25%	Consistent Groups	N/A
Moderate	Moderate	$Consistent_M$	Both ACTC and HSGPA scores in the middle 50%		
Low	Low	$Consistent_L$	Both ACTC and HSGPA scores in the bottom 25%		
High	Moderate	$ACTC_H$-$HSGPA_M$	ACTC score in the top 25% & HSGPA in the middle 50%	ACT Composite Discrepant Groups	Small
High	Low	$ACTC_H$-$HSGPA_L$	ACTC score in the top 25% & HSGPA in the bottom 25%		Large
Moderate	Low	$ACTC_M$-$HSGPA_L$	ACTC score in the middle 50% & HSGPA in the bottom 25%.		Small
Moderate	High	$HSGPA_H$-$ACTC_M$	ACTC score in the middle 50% & HSGPA in the top 25%	HSGPA Discrepant Groups	Small
Low	High	$HSGPA_H$-$ACTC_L$	ACTC score in the bottom 25% & HSGPA in the top 25%		Large
Low	Moderate	$HSGPA_M$-$ACTC_L$	ACTC score in the bottom 25% & HSGPA in the middle 50%		Small

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What did we find?

Discrepancy group	N	%	
$Consistent_H$	235,480	13.70%	51.26%
$Consistent_M$	182,242	10.60%	
$Consistent_L$	463,525	26.96%	
$ACTC_H$-$HSGPA_M$	173,587	10.10%	21.65%
$ACTC_H$-$HSGPA_L$	15,766	0.92%	
$ACTC_M$-$HSGPA_L$	182,704	10.63%	
$HSGPA_H$-$ACTC_M$	135,783	7.90%	15.48%
$HSGPA_H$-$ACTC_L$	11,257	0.65%	
$HSGPA_M$-$ACTC_L$	119048	6.93%	
Missing	199,647	11.61%	

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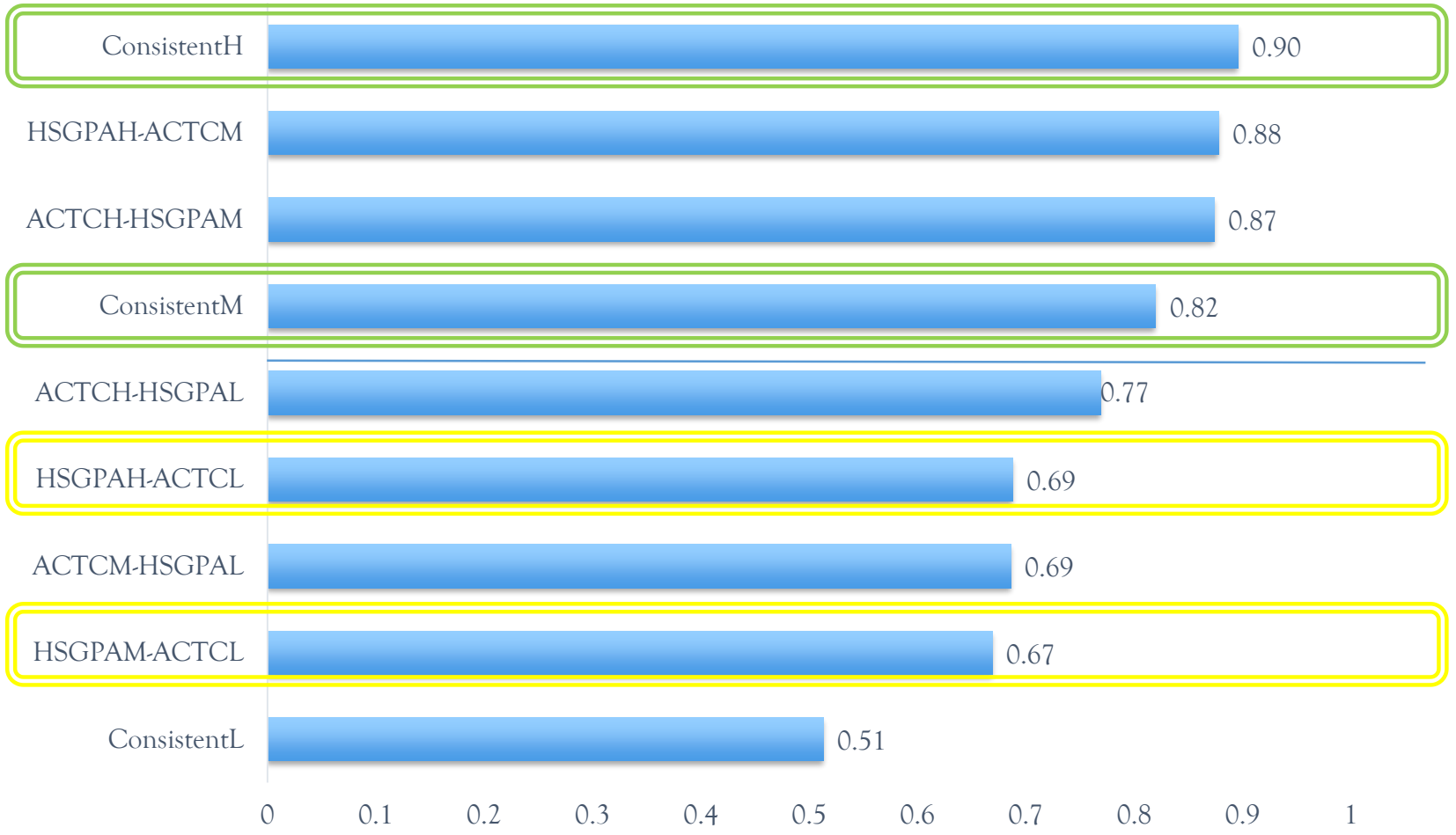
What did we find: Enrollment Probability



What did we find: Enrollment Probability - Subgroups

Gender

- Female students have a higher probability of enrollment than male students.

Minority Status

- Probability of enrollment was similar for minority and white students

Family Income

- Differences in probability of persistence due to income are smallest when students score consistently high, or High-Moderate
- Income also has a more pronounced effect on enrollment probabilities when students have either a low test score or HSGPA.

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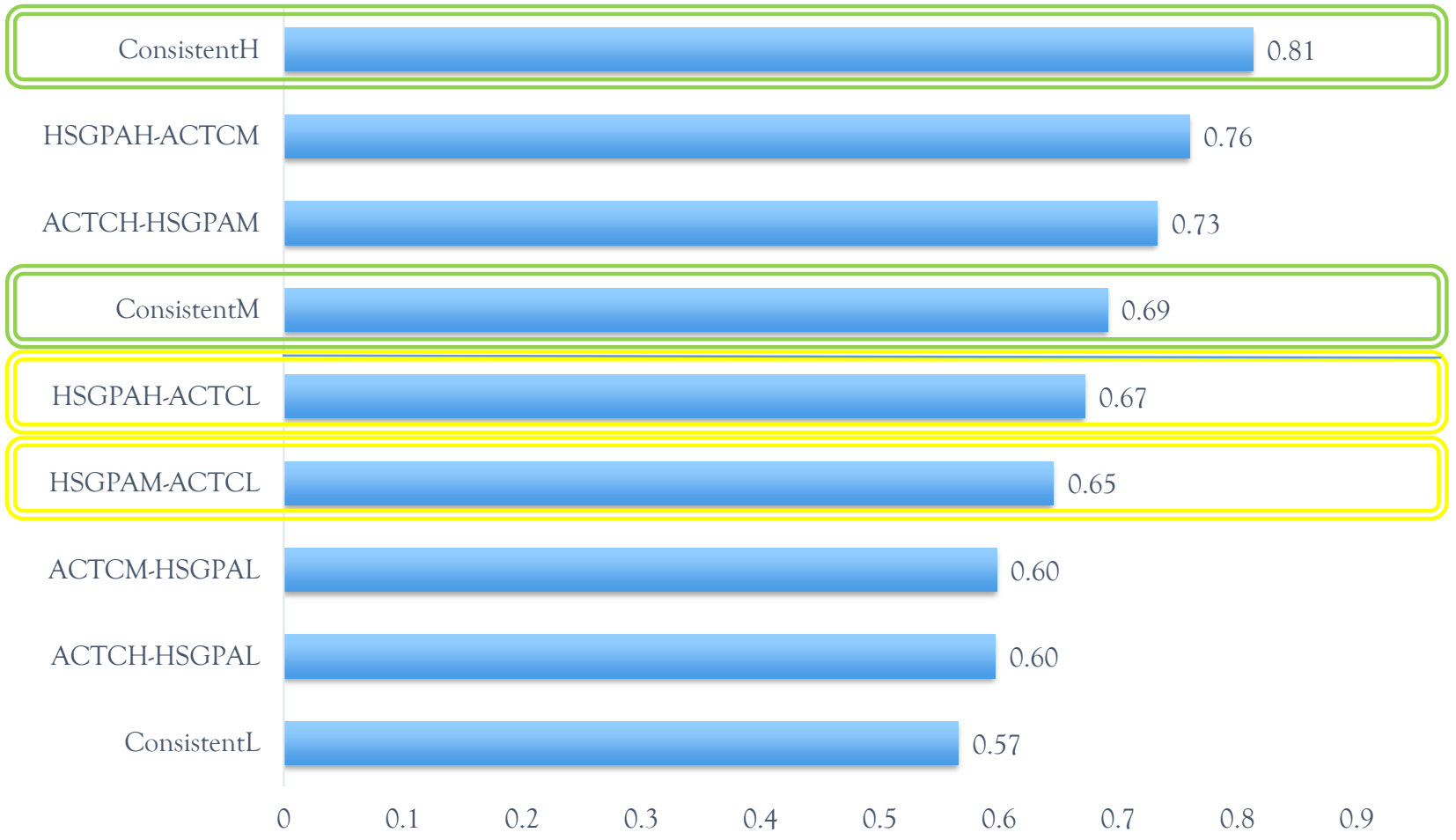
What did we find: Persistence Probability



What did we find: Persistence Probability - Subgroups

Gender

- Female students have a higher probability of persistence than male students.

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Family Income

- Differences in probability of persistence due to income are smallest when students score consistently high

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What does this tell us?

- Clear negative effects associated with having discrepant achievement
- When a student has a Moderate or High HSGPA but a low ACTC they have lower likelihoods of enrollment and persistence
- These are the types of students most likely to withhold test scores in a test optional admissions scenario

What does this tell us?

- Compensatory nature of ACT Composite and HSGPA
  - higher grades can offset lower test scores and vice versa in terms of future college outcomes
  - high school grades encompass students' non-cognitive factors such as scholastic engagement, self-regulation, discipline, or habits of inquiry, *in addition* to providing information on cognitive skills.
  - Standardized tests, on the other hand, provide a more narrow assessment focusing on cognitive skills in a standardized manner
- This compensatory relationship is lost when institutions do not collect both pieces of student academic performance.

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If your interested in further discussion after today…

Association for Institutional Research Conference

Discussion Group:

What Can We Learn When HSGPA and Test Scores Don't Agree

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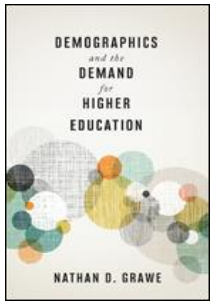
Forthcoming Astra Academy Webinars

- May 8 – 2.00 PM EDT – Mary Hiebert and Christine Brongniart, CUNY, “CUNY ASAP: Scheduling for Successful Outcomes”

- May 22 – 3.00 PM EDT – Ross Markle, Educational Testing Service, “Noncognitive Assessment: Bringing Data, Understanding, and Action to Student Success”



- Fall 2018 – Nathan Grawe, Carleton College, *Demographics and the Demand for Higher Education*

Your Comments and Questions

- Comments or questions? Please feel free to type them to John Barnshaw and he will attempt to address as many as possible in the allotted time.

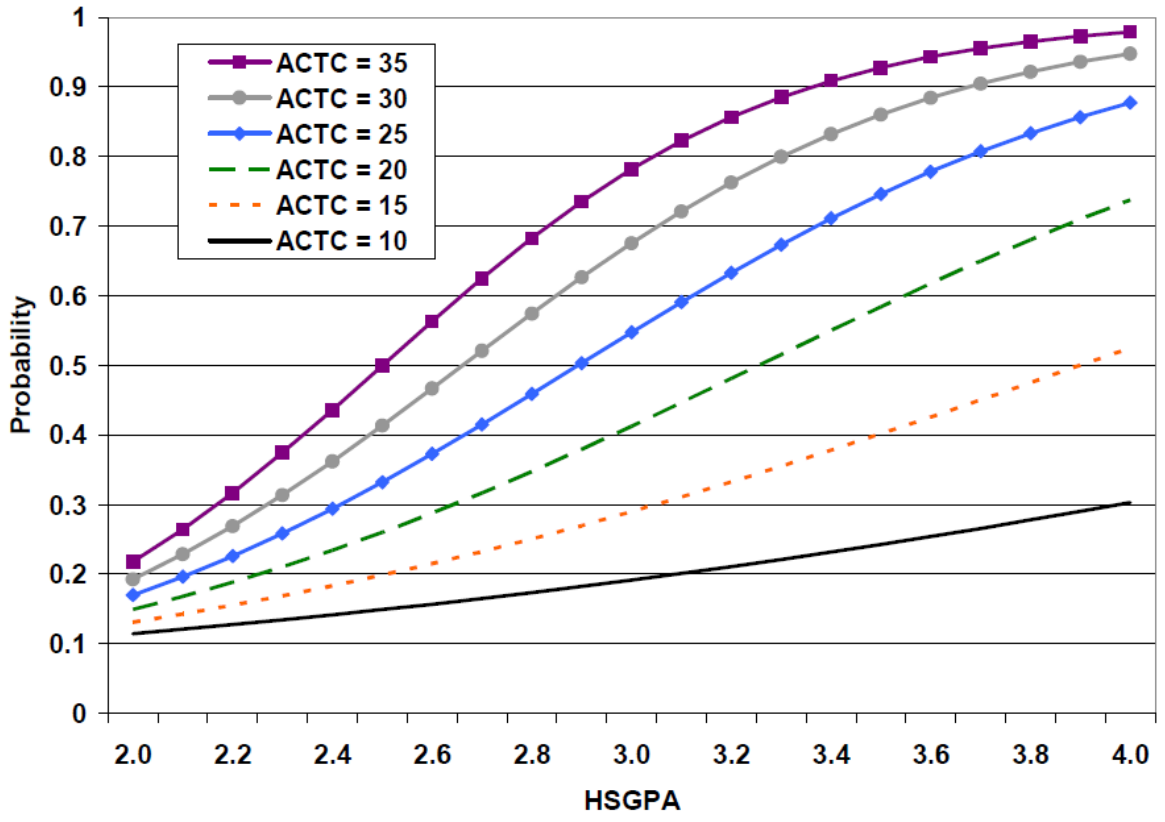
Added Value of Test Score

Incremental Validity of Test Scores:

Six-year Cumulative GPA of 3.00 or Higher

- Among students with the exact same HSGPA, students with higher ACT composite scores are more likely to earn a cumulative GPA of 3.00 or higher than students with lower ACT composite scores (Radunzel & Noble, 2012).

- For example among students with a 3.0 HSGPA, students with an ACT composite score of 20 have roughly .40 probability of earning a cumulative GPA of 3.00 or higher as compared to a nearly .70 probability for students with an ACT composite score of 35.

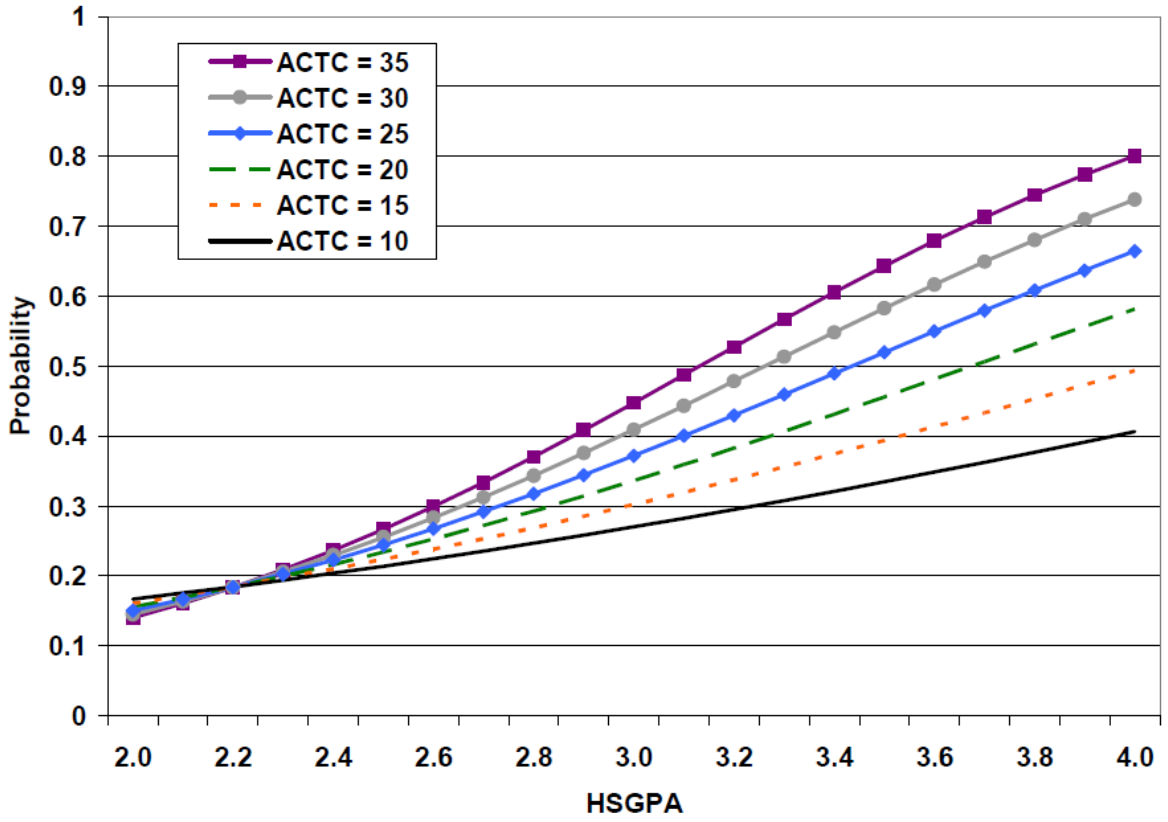


Incremental Validity of Test Scores:

Six-year Bachelor's Degree Completion Rates

- Among students with the exact same HSGPA, students with higher ACT composite scores are more likely to earn a bachelor's degree in six years than students with lower ACT composite scores (Radunzel & Noble, 2012).

- For example among students with a 3.0 HSGPA, students with an ACT composite score of 20 have roughly .35 probability of earning of a bachelor's degree in six years as compared to about .40 probability for students with an ACT composite score of 30.



Discrepant Performance:
Differential Prediction

Mean Residual by Discrepant Group

Model	Higher HSGPA	Non-discrepant	Higher ACT
HSGPA	-0.31	0.02	0.20
ACT	0.37	0.02	-0.60
HSGPA & ACT	-0.05	0.01	-0.05

- For each regression model, a student's predicted FYGPA was compared to their observed FYGPA.
  - $FYGPA_{predicted} > FYGPA_{earned}$ → over-prediction (negative residual values)
  - $FYGPA_{predicted} < FYGPA_{earned}$ → under-prediction (positive residual values)
- All three models accurately predicted FYGPA for the non-discrepant group.
- For the Higher HSGPA group, the HSGPA only model over-predicted their FYGPA while the ACT model under-predicted their FYGPA; the HSGPA & ACT model most accurately predicted their performance.
  - If test-optional institutions rely solely on HSGPA for the higher HSGPA group, this group will not perform as well on campus as expected.
- For the Higher ACT group, the HSGPA only model under-predicted their FYGPA while the ACT model over-predicted their FYGPA; the HSGPA & ACT model most accurately predicted their performance.
- The HSGPA & ACT model resulted in the least amount of differential prediction across the three discrepant groups.

Subgroup Differences & Test Bias

Achievement Gaps:

A problem with the test or a larger issue?

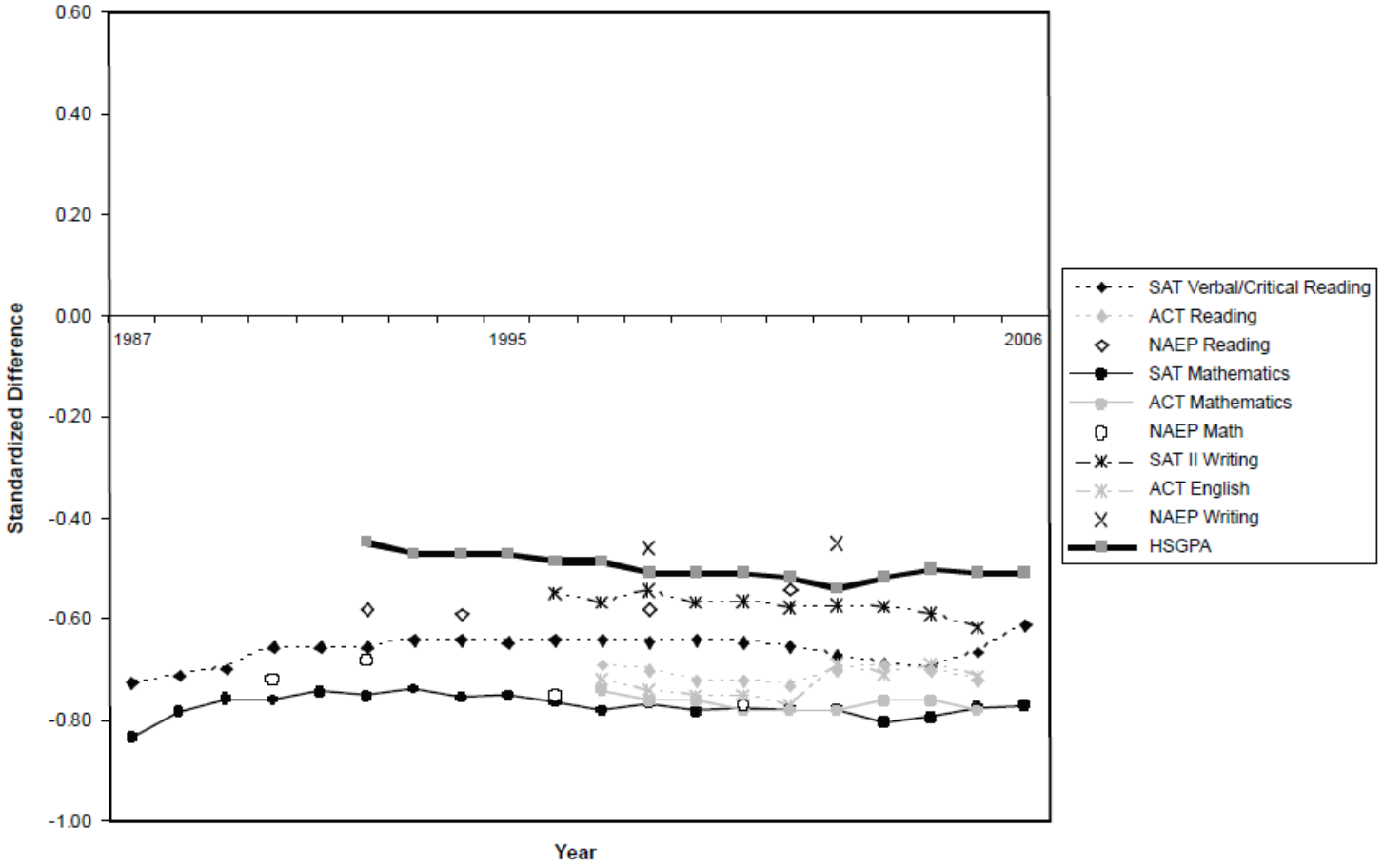


Figure 2. Standardized differences for African Americans across tests (African Americans minus total).

African American students perform lower than the total group across a variety of educational indicators (Kobrin, Sathy, & Shaw, 2007).

Achievement Gaps:

A problem with the test or a larger issue?

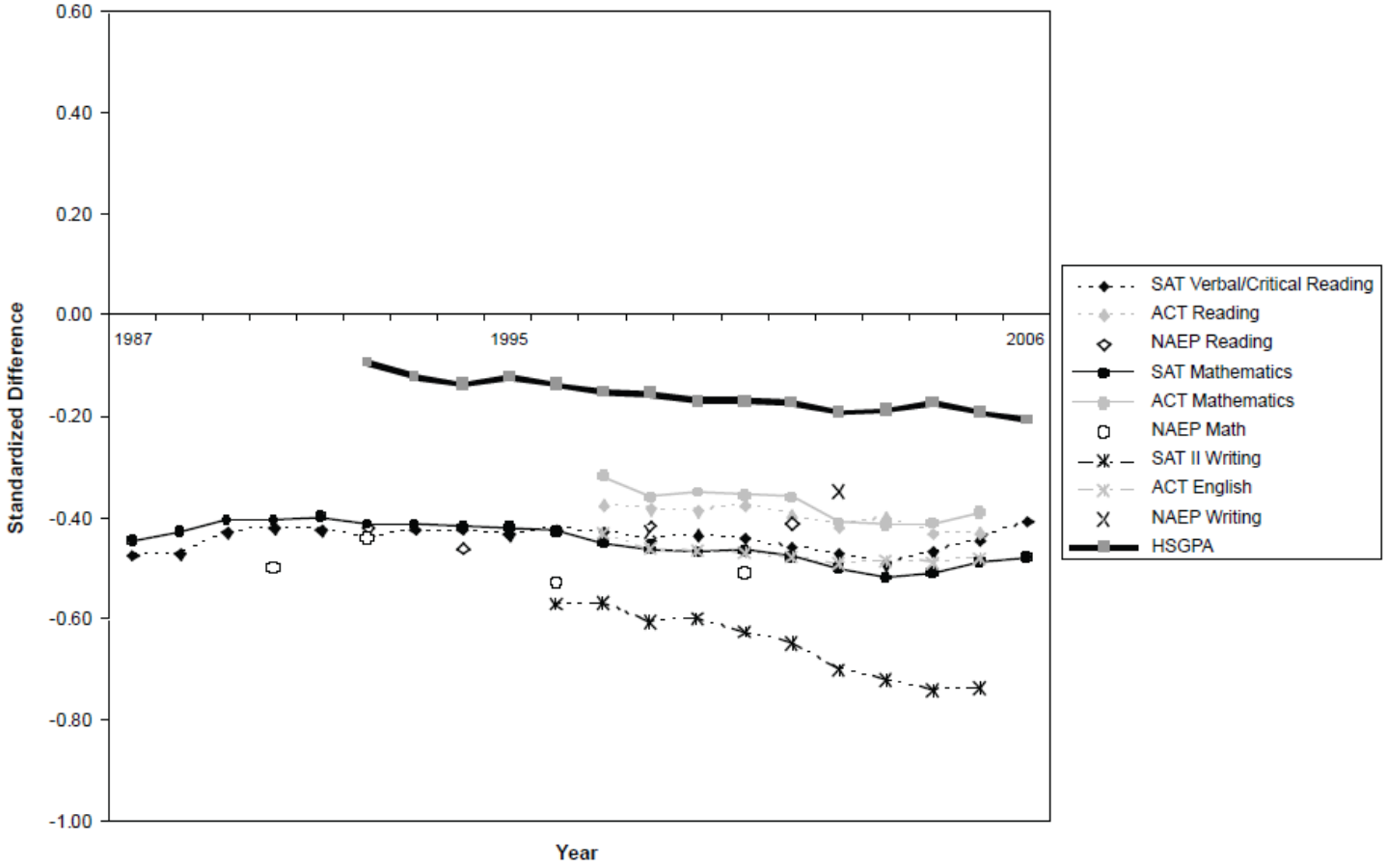


Figure 5. Standardized differences for Hispanics across tests (Hispanics minus total).

Similar to the African American results, Hispanic students perform lower than the total group across a variety of educational indicators (Kobrin, Sathy, & Shaw, 2007).

Achievement Gaps:

A problem with the test or a larger issue?

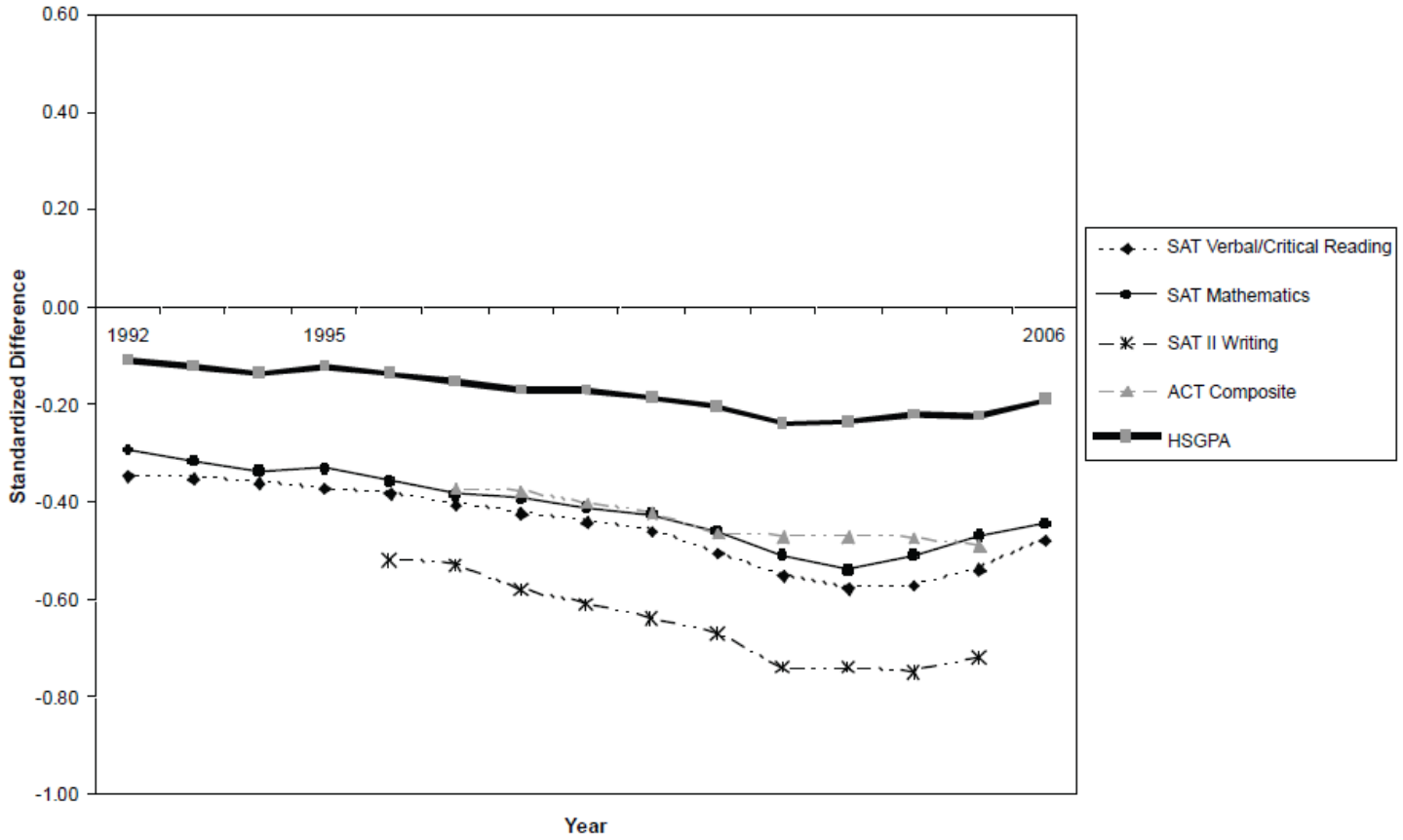


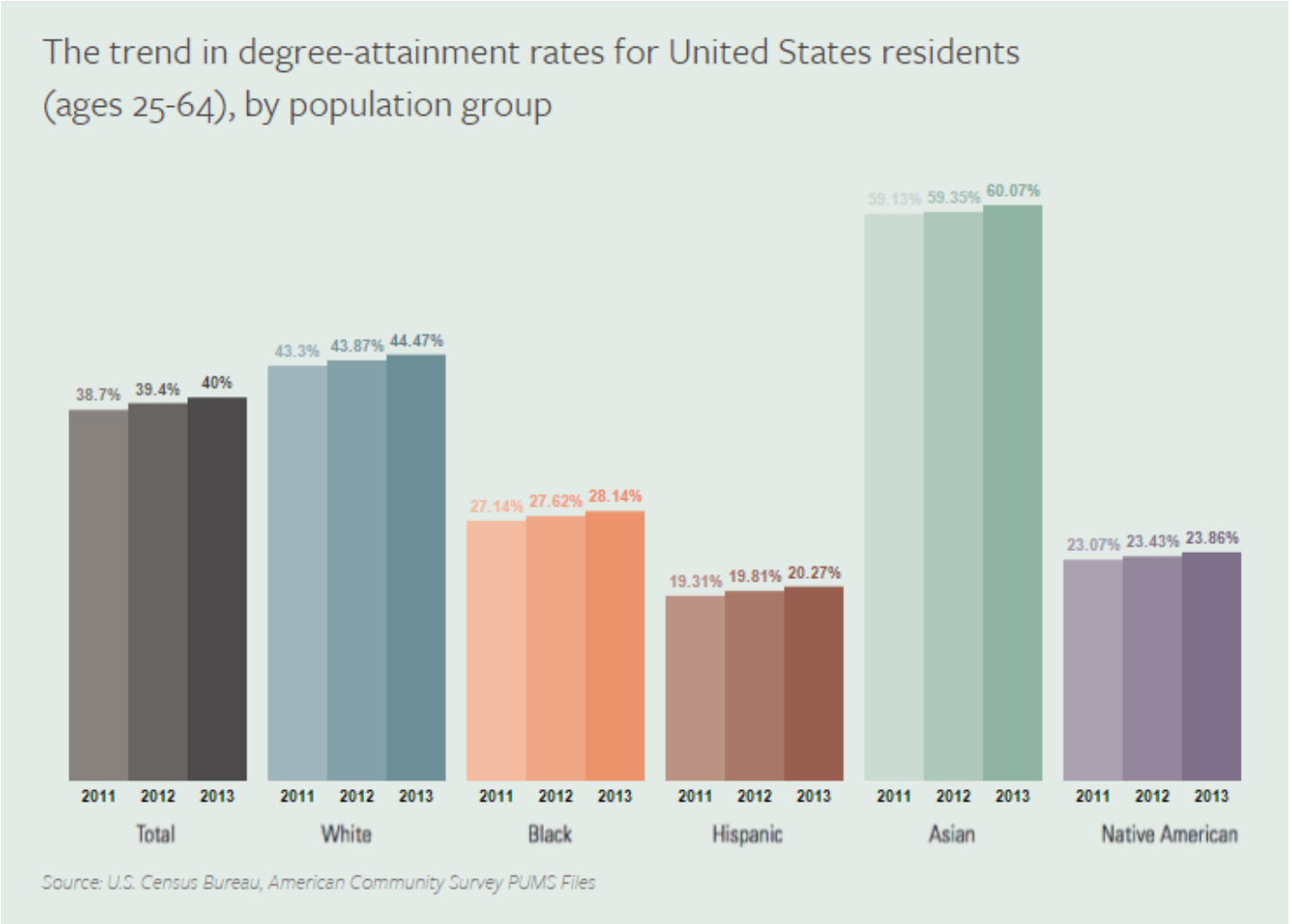
Figure 8. Standardized differences for low-income students* across tests (low income minus total).

*Low-income students are those reporting an annual parental income of less than $30,000.

Low-income students perform lower than the total group across a variety of educational indicators (Kobrin, Sathy, & Shaw, 2007).

Achievement Gaps:

A problem with the test or a larger issue?

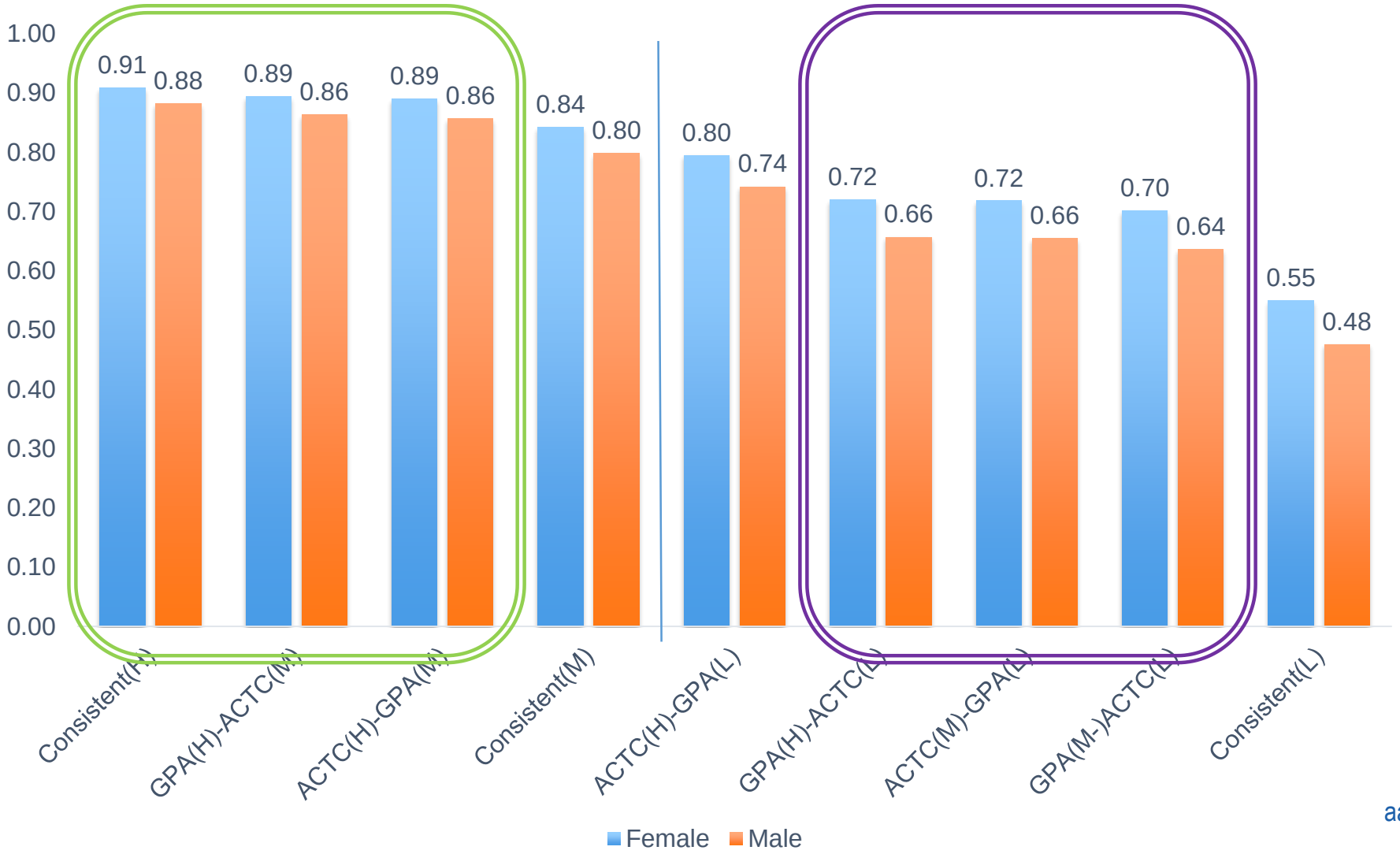


African American and Hispanic students have lower degree-attainment rates as compared to White students.

Subgroup Differences Graphs

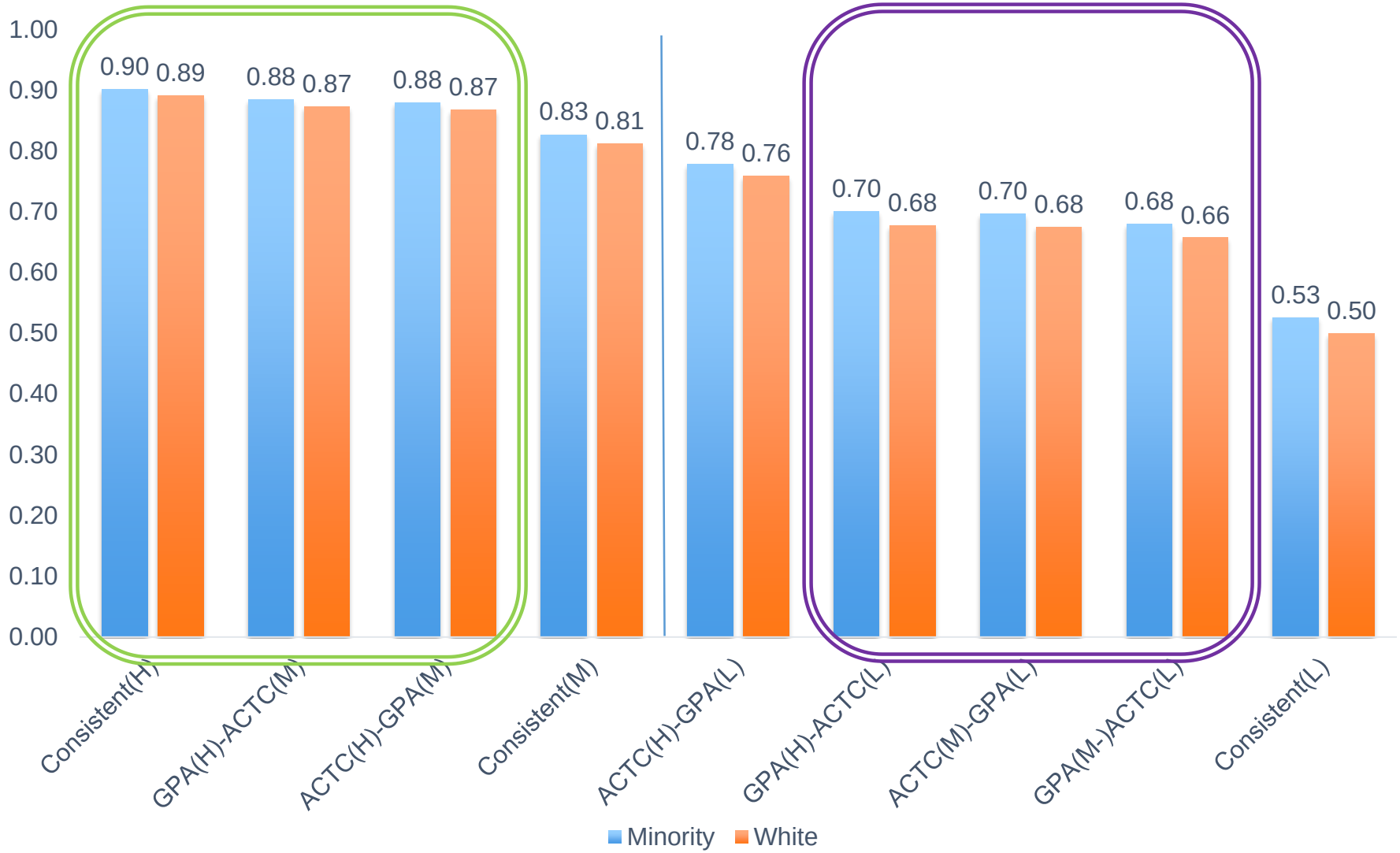
What did we find: Enrollment Probability (Gender)

- Female students have a higher probability of enrollment than male students.



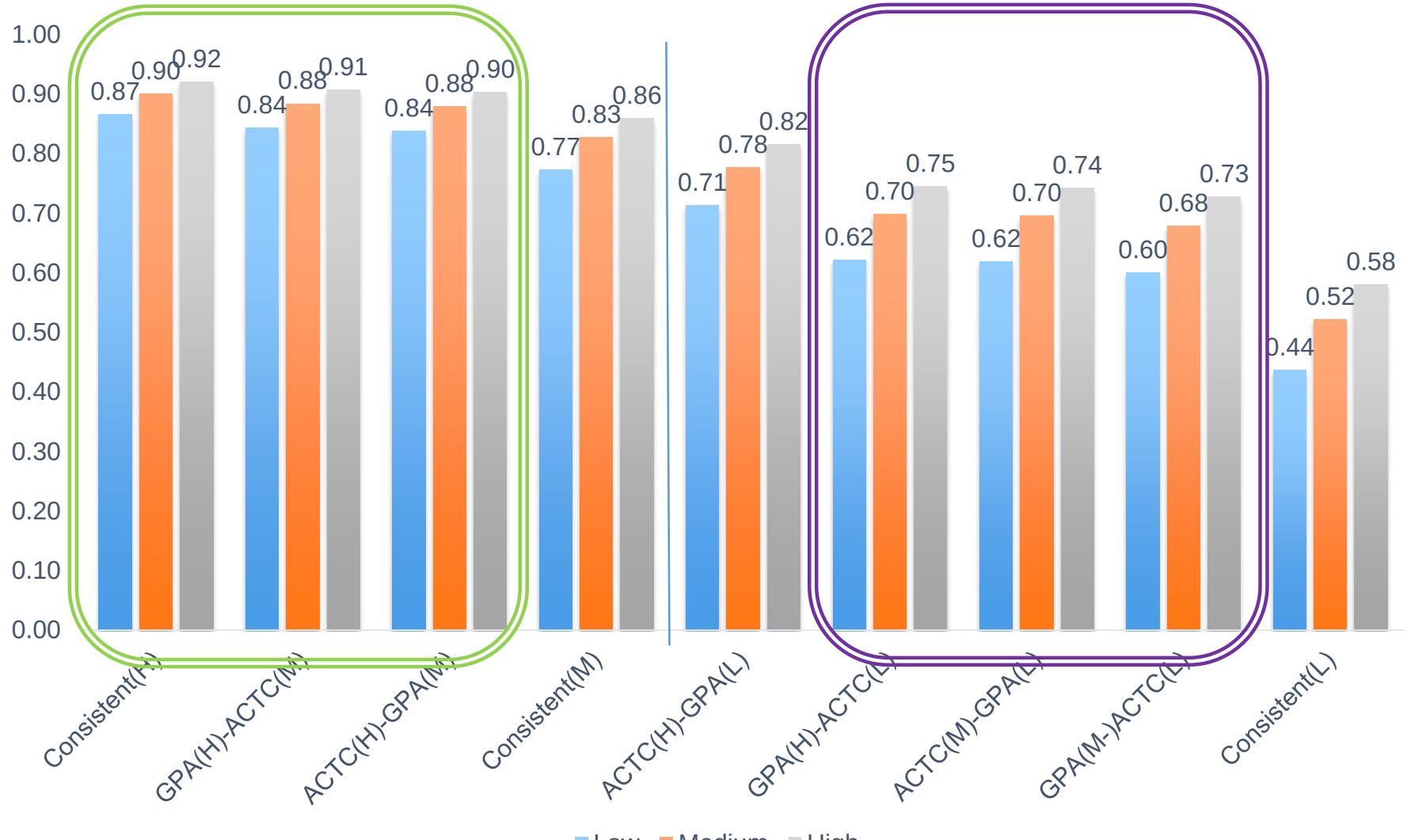
What did we find: Enrollment Probability (Minority Status)

- Probability of enrollment was similar for minority and white students



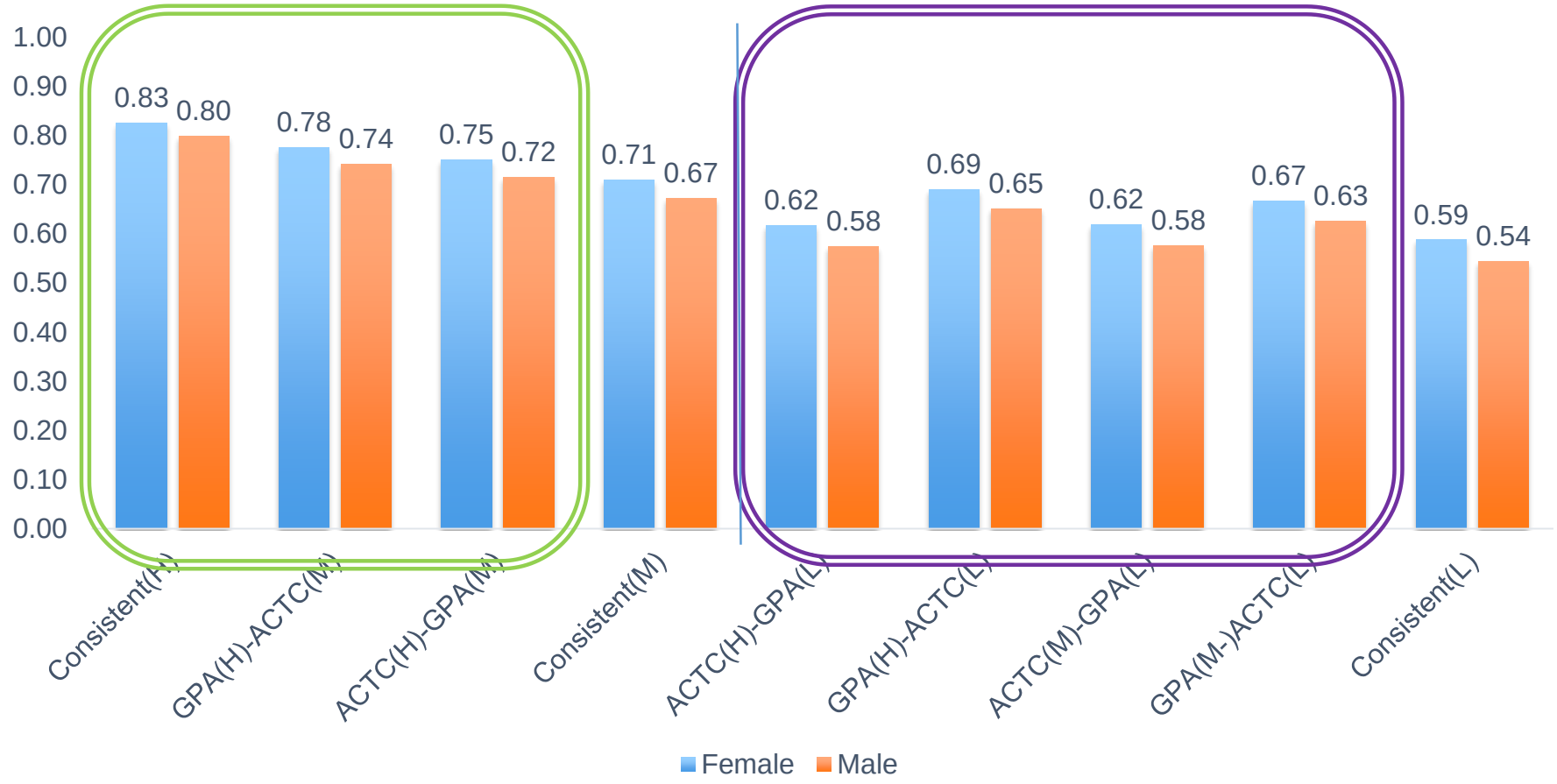
What did we find: Enrollment Probability (Family Income)

- Differences in probability of persistence due to income are smallest when students score consistently high, or High-Moderate



What did we find: Persistence Probability (Gender)

- Females have higher probability of persistence.



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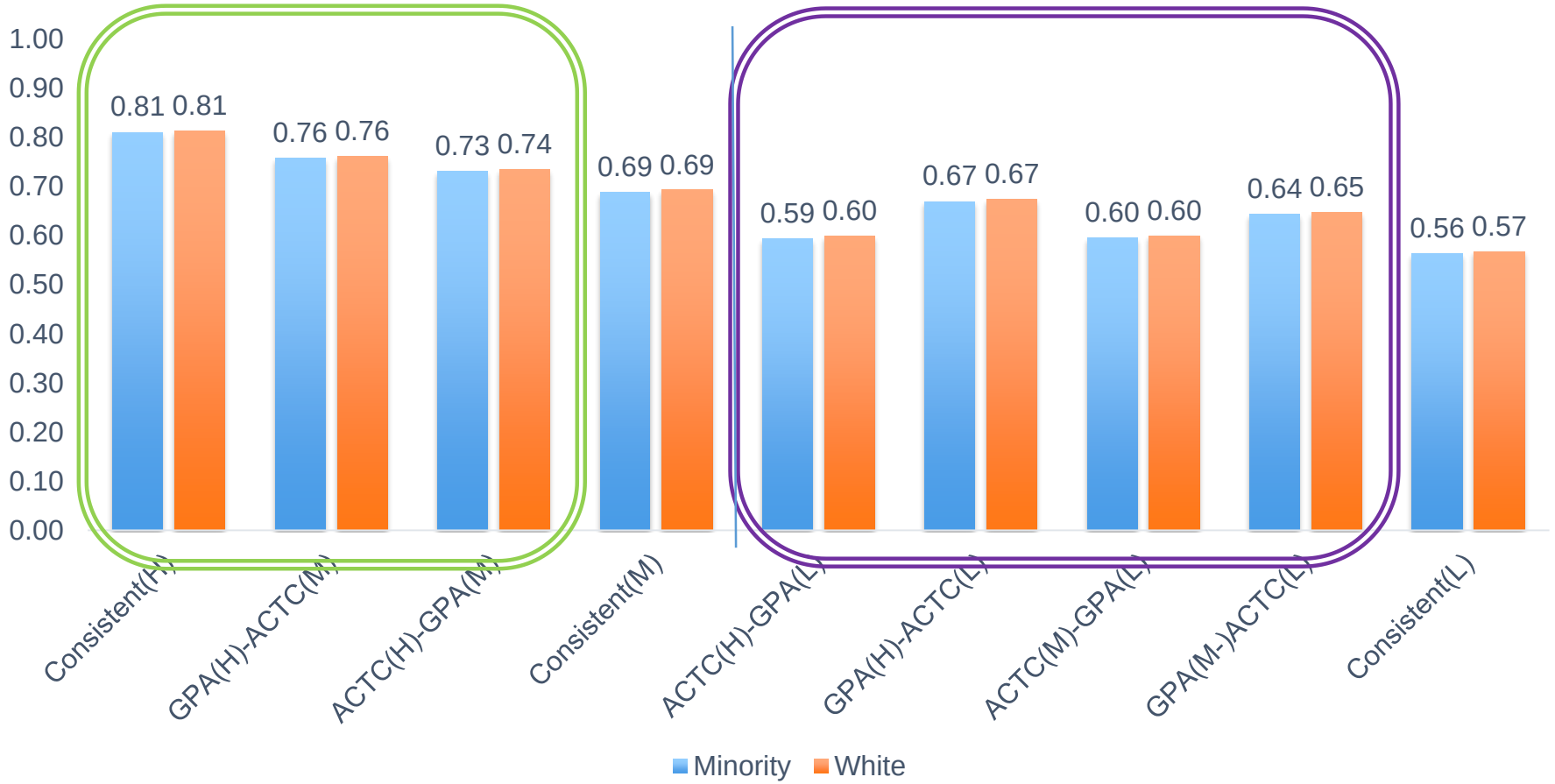
What did we find: Persistence Probability (Minority Status)

- Probability of persistence was similar for minority and white students



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What did we find: Persistence Probability (Family Income)

- Differences in probability of persistence due to income are smallest when students score consistently high