Predictive Validity of ACT from 2002-07 to 2008-11

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Association for Institutional Research Forum

May 28 2014

Orlando, FL

Illinois Education Research Council

Our Mission

To provide objective and reliable evidence for Illinois P-20 education policy making and program development.

Ensuring Research-Informed Education Policy for Illinois

Academic Momentum

- In Adelman's *Toolbox Revisited* (2006) – noted the importance of high academic intensity in high school as related to later college completion
- Entering freshman cohort from the NELS:88 study (on-track to be freshmen in 1992)
  - 95% of students who had a curriculum with high academic intensity in high school, later graduated with a Bachelor's degree
  - Mathematics preparation (above Algebra 2) a key indicator of pre-college momentum
  - Successfully completing credits in gateway courses in college
  - Less than 20 credits completed by end of first year – predicts non-completion
    - *"Six is good, 9 is better, and 12 is a guarantee of momentum"*

ACT as an Indicator of College Readiness

Benchmark = Minimum score needed on an ACT subject-area test to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing college courses

- The corresponding credit-bearing college course used to determine College Readiness Benchmark Scores:
  - English benchmark → College English Composition
  - Math benchmark → College Algebra
  - Reading benchmark → College Social Studies
  - Science benchmark → College Biology.

Relevance of ACT and HS Preparation to College Success

- Rumblings about removing math requirements – e.g., Algebra 2 as a prerequisite for college
  - Emeritus professor of political science at Queens College, City University of New York, and a co-author of *"Higher Education? How Colleges Are Wasting Our Money and Failing Our Kids — and What We Can Do About It.",* **Andrew Hacker** (2012) NYT
  - Novelist and nonfiction writer, **Nicholson Baker** in 2013 *Harper's Magazine*
- Seemingly in contradiction of ***Common Core***
- A recent study of ACT/SAT optional institutions, found that ACT/SAT non-submitters were only slightly less likely to graduate and only had slightly lower GPAs - **William Hiss & Valerie Franks**

Study Goal and Research Questions

Purpose

To investigate the relationship of college readiness with retention and progression of students through college and with college completion.

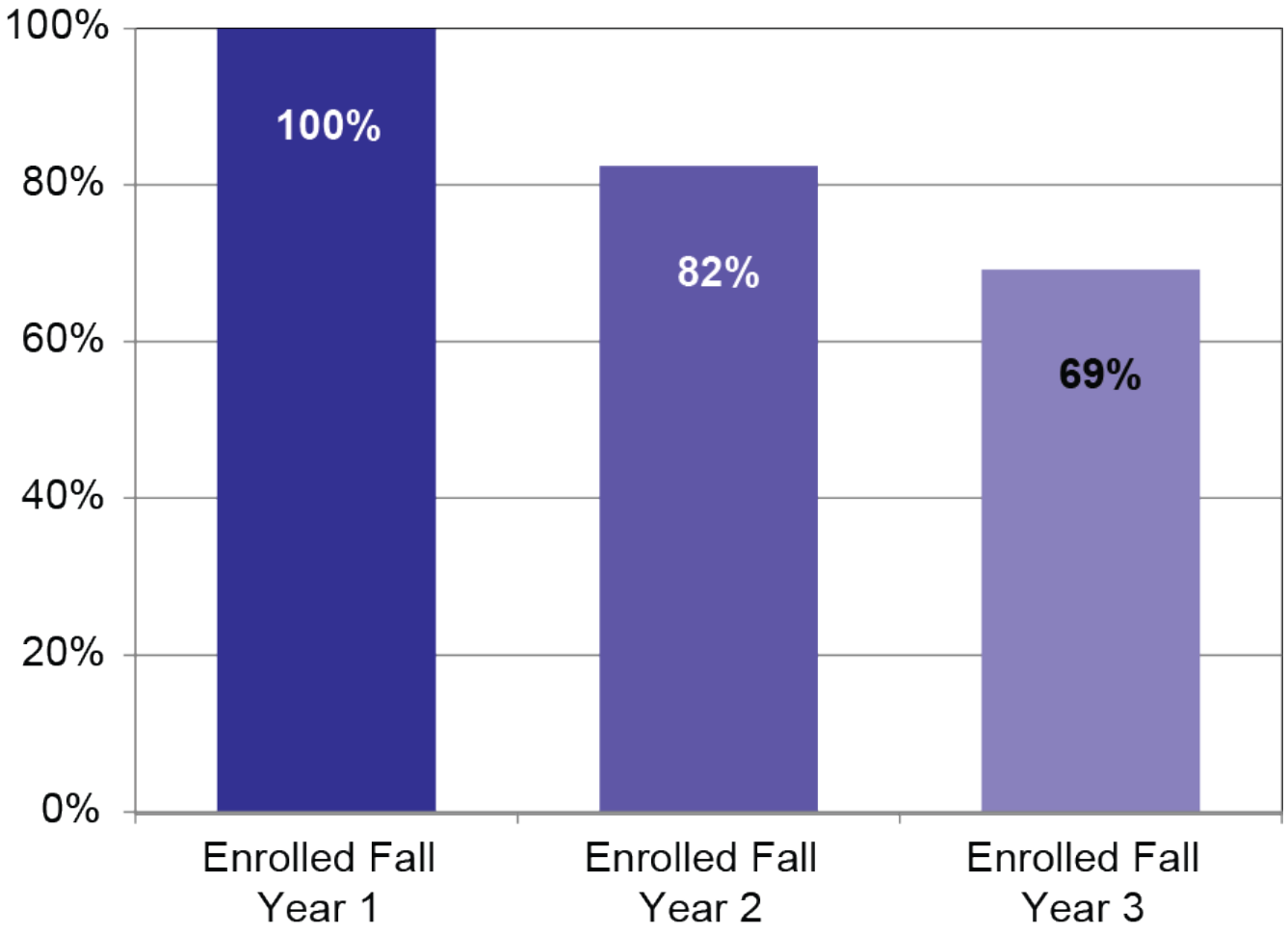
Research Questions

- What is the relationship of college readiness to retention and progression for two samples of students, six-years apart at two Illinois universities?
- For the 2002 cohort, what is the relationship of college readiness and later college completion?
- How did the prediction of college retention and progression from ACT change across time at two Illinois institutions?

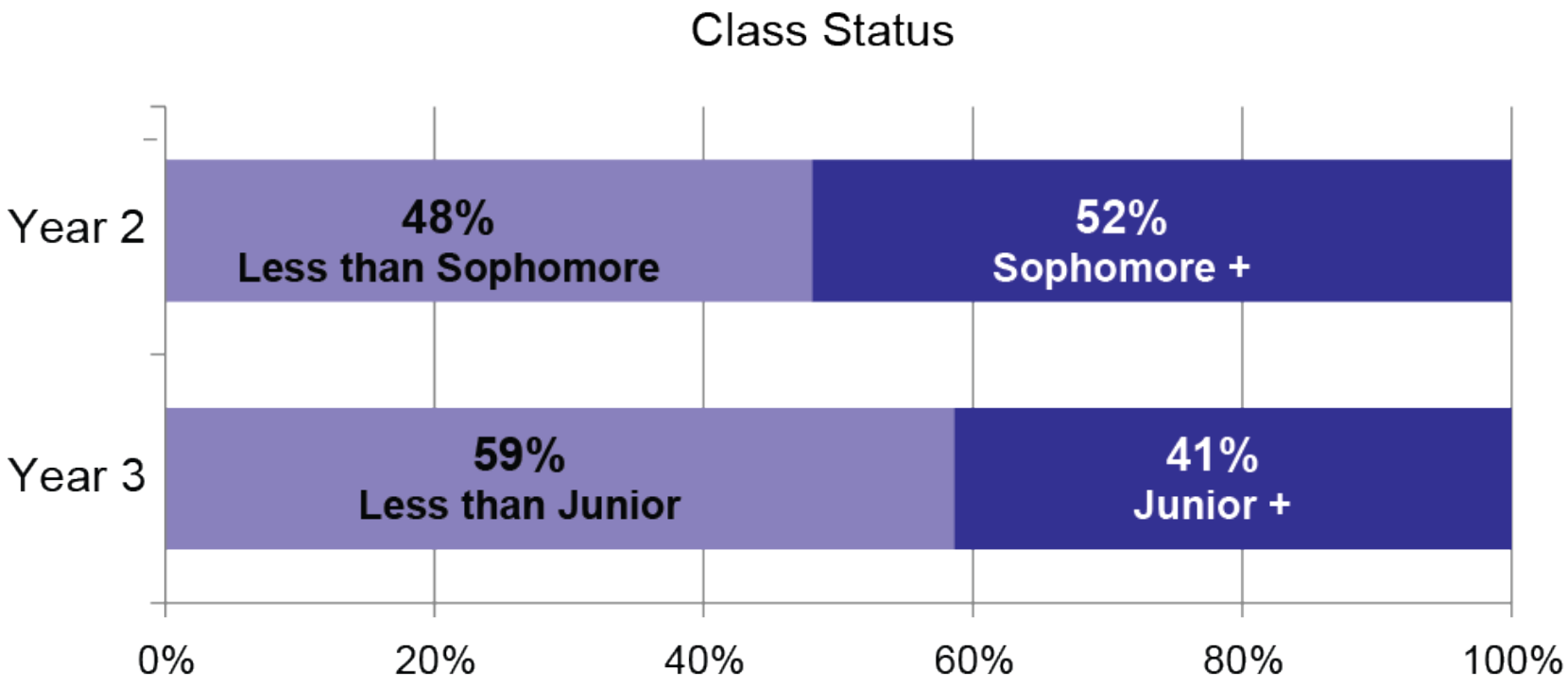
2002 Sample

- Sample from 2002 public high school graduating class
- Selected those that enrolled in college in fall 2002 at one of two institutions in IL (one private and one public)
- Enrolled and attempting credit hours in fall 2002
- n_{public} = 2,370 , $n_{private}$ = 1,400
- *N = 3,770*

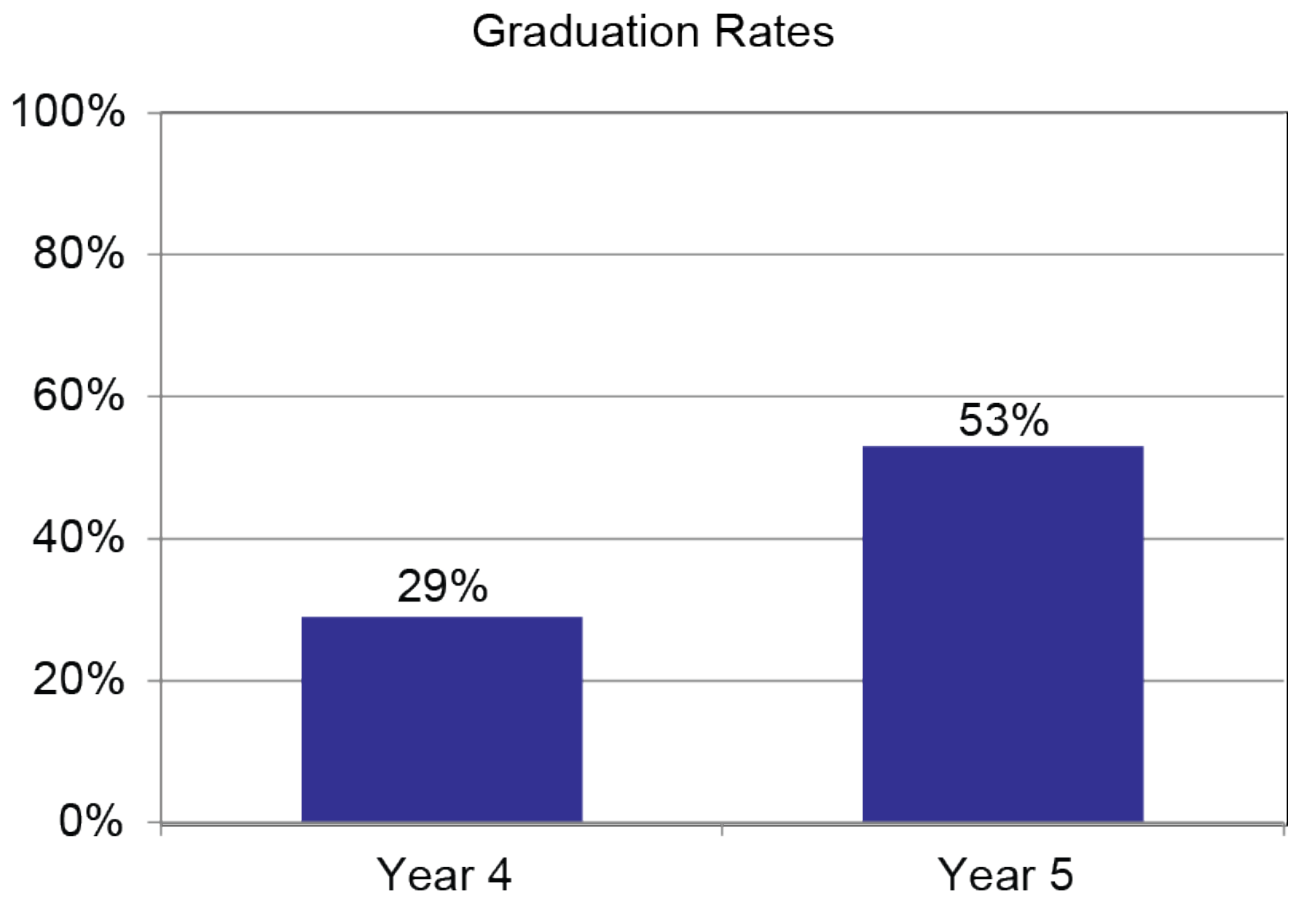
Retention (2002 Cohort)



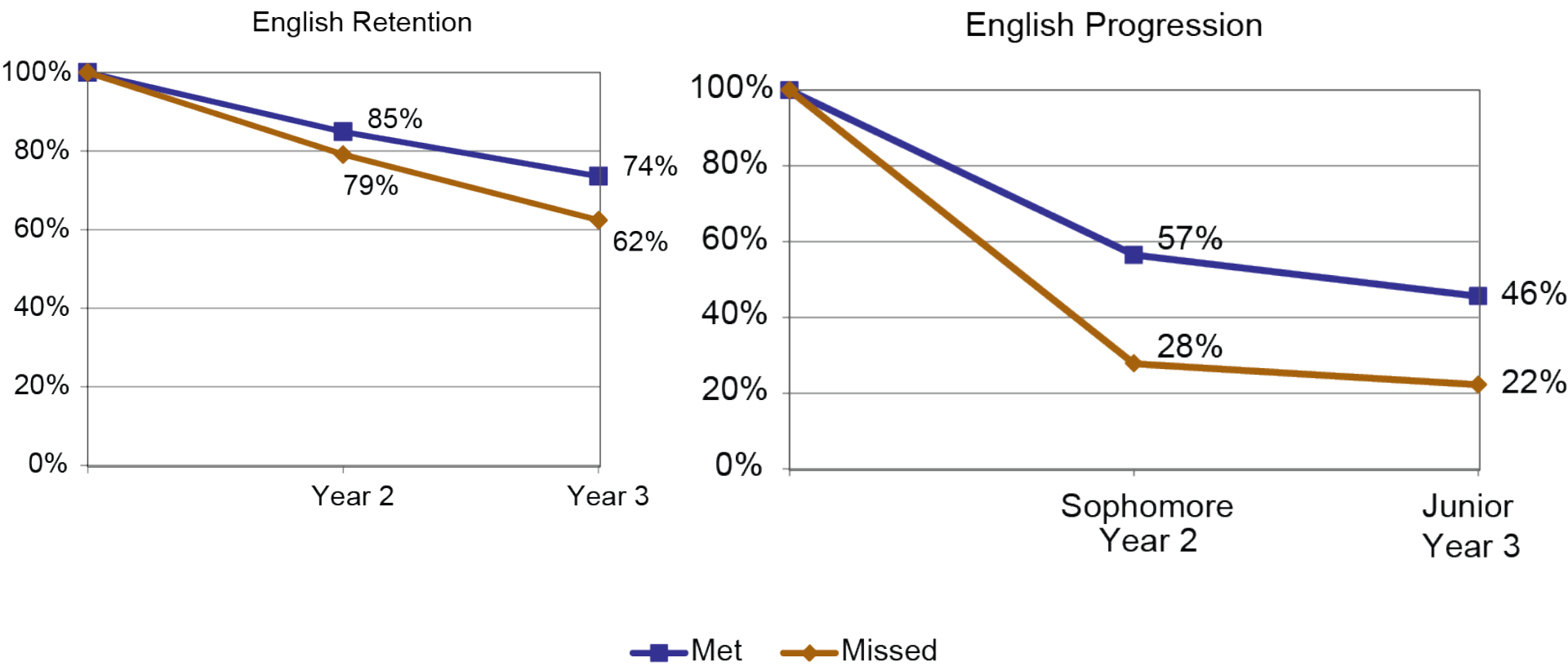
On Target Progression in Class Status (2002 Cohort)



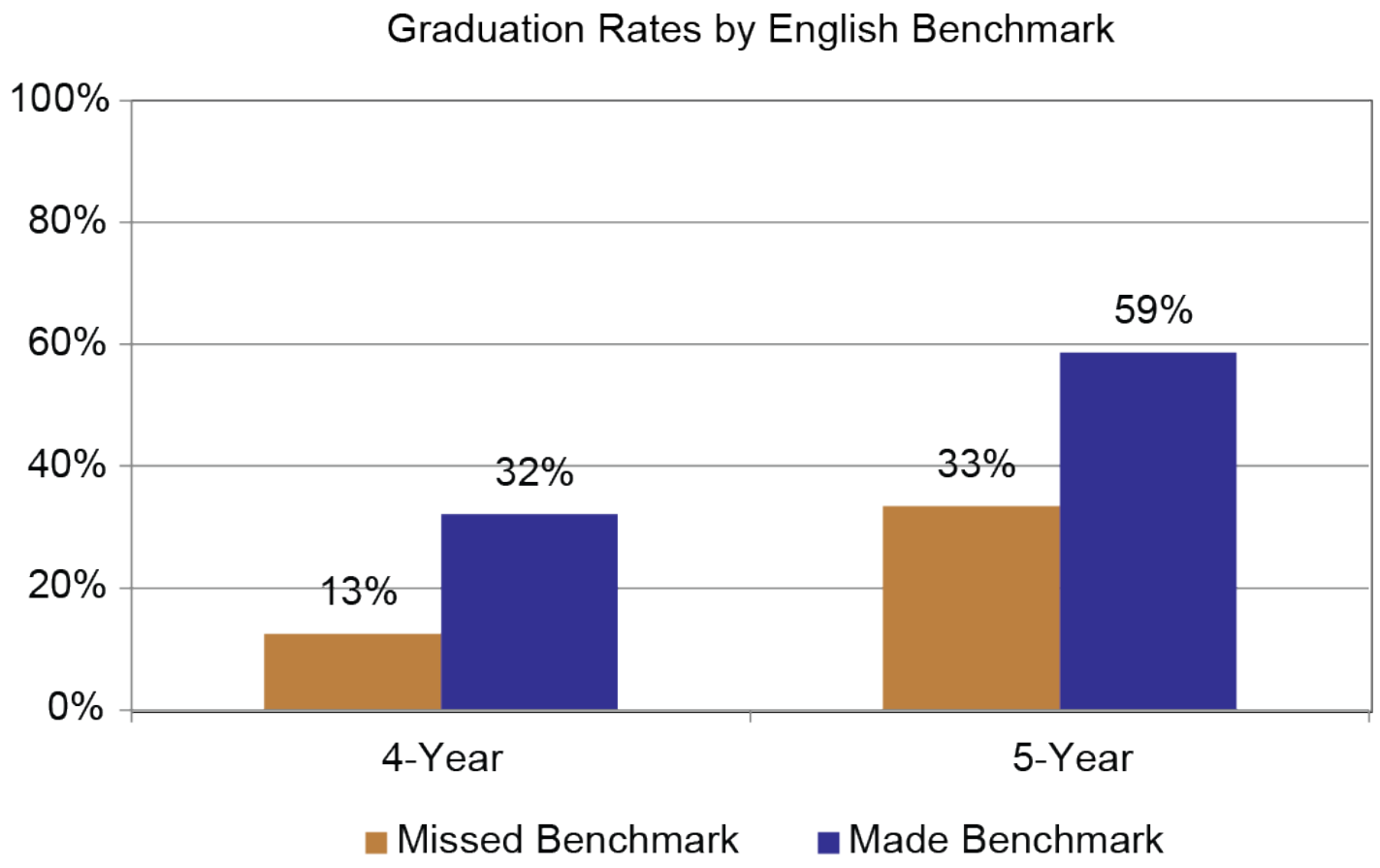
Overall Graduation Rates (2002 Cohort)



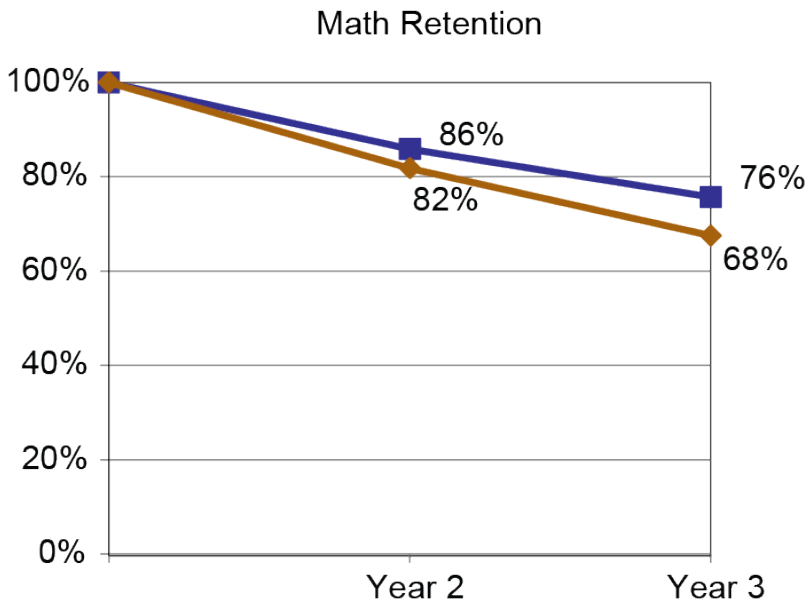
Retention & Progression by ACT Benchmark – English (2002 Cohort)

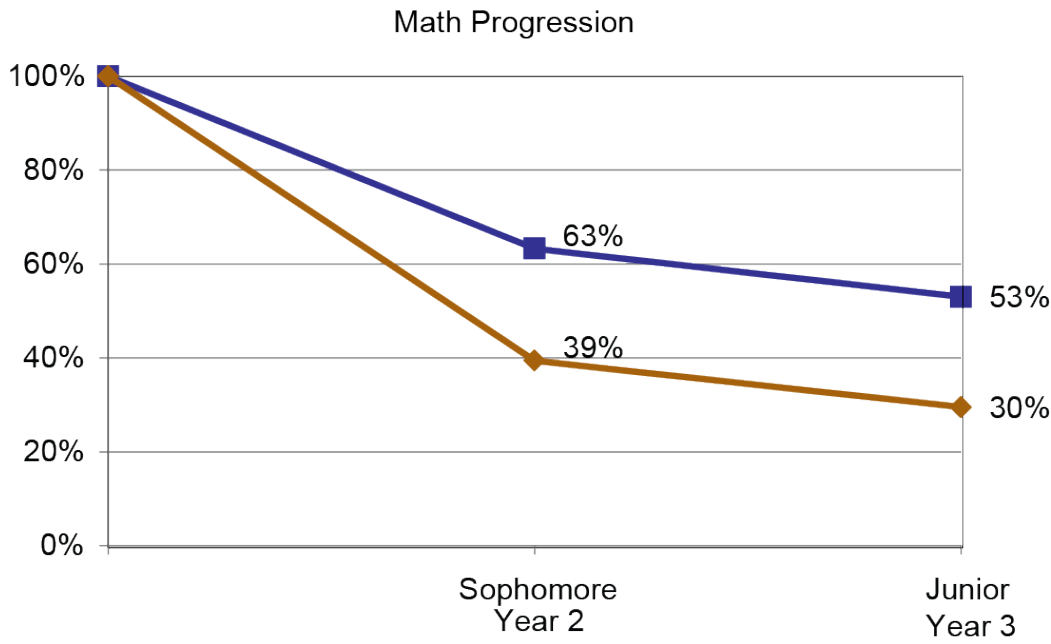


Graduation Rates by ACT Benchmark – English (2002 Cohort)



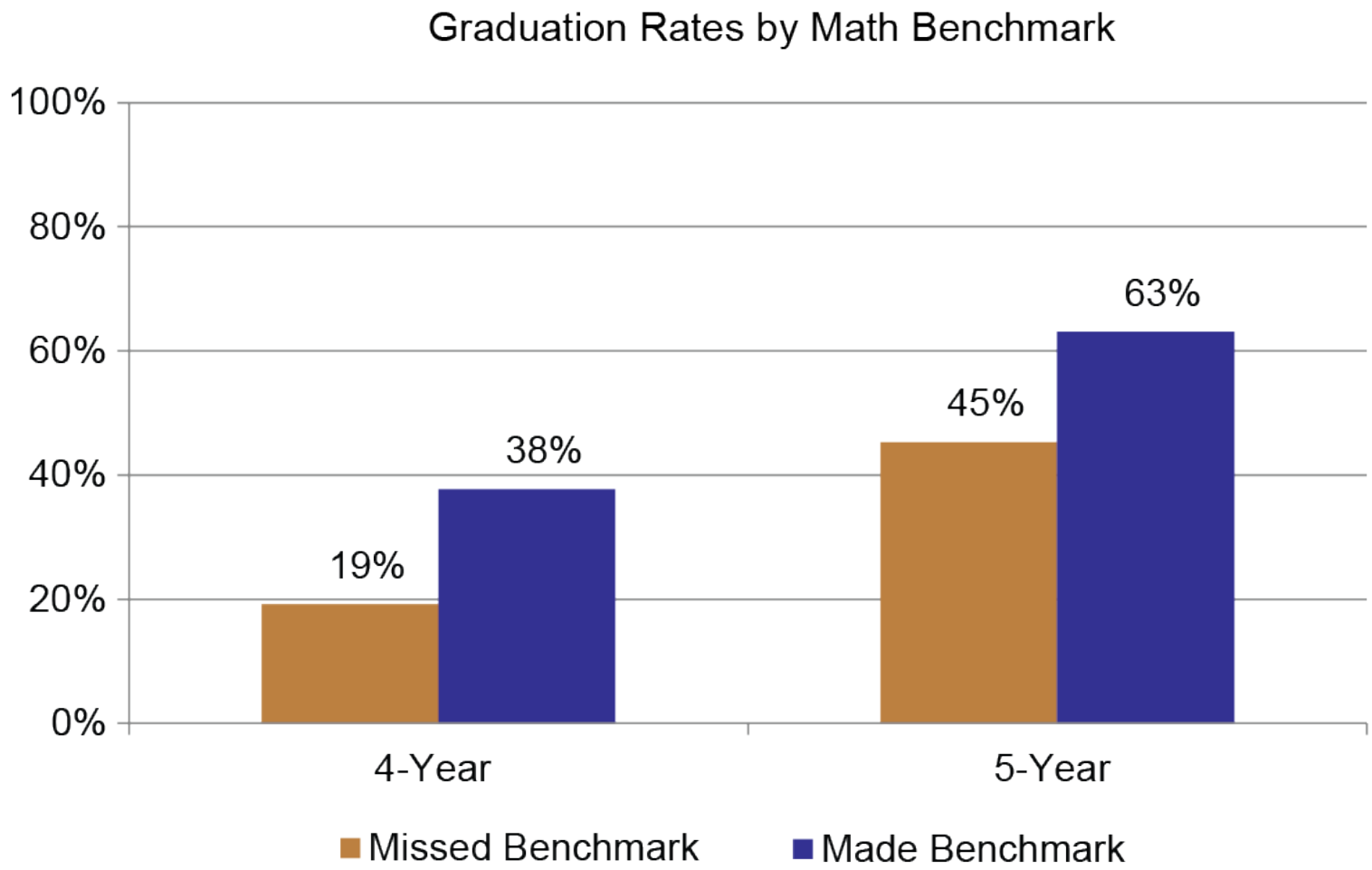
Retention & Progression by ACT Benchmark – Math (2002 Cohort)



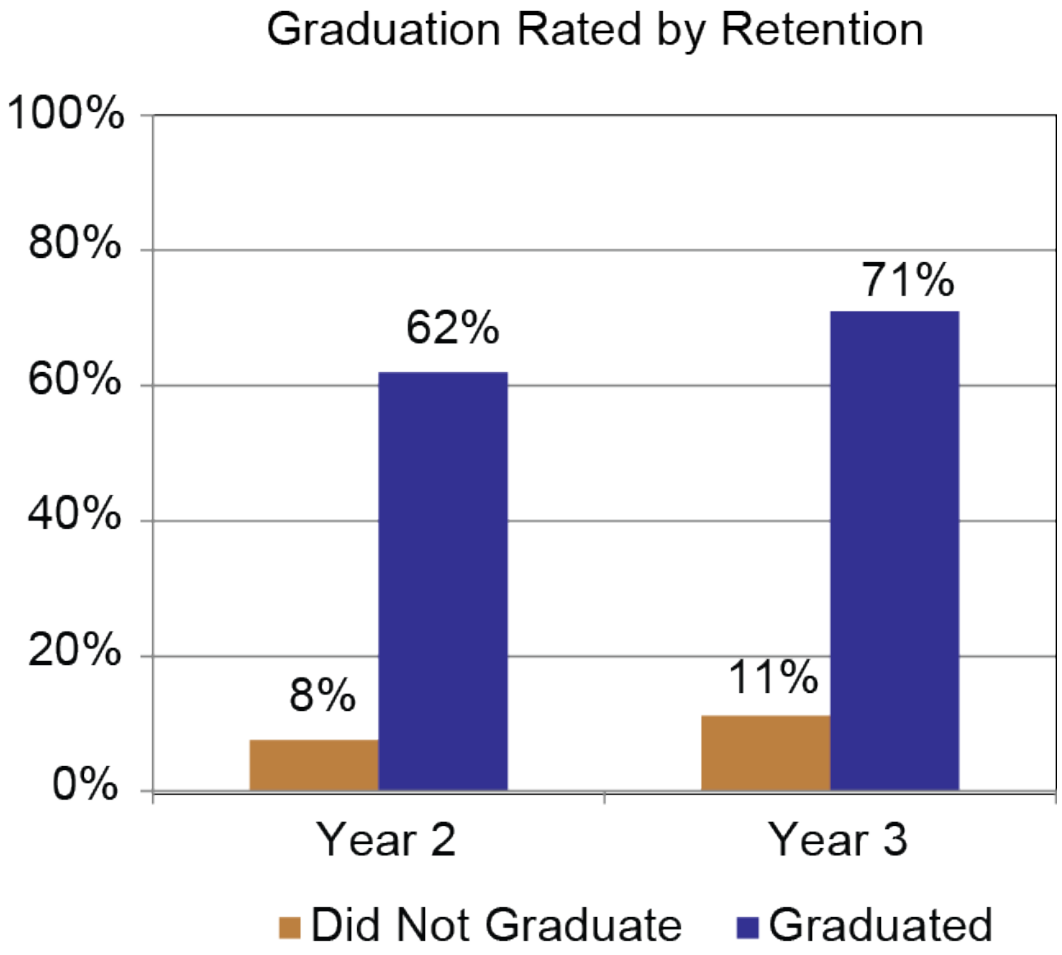


Met Missed

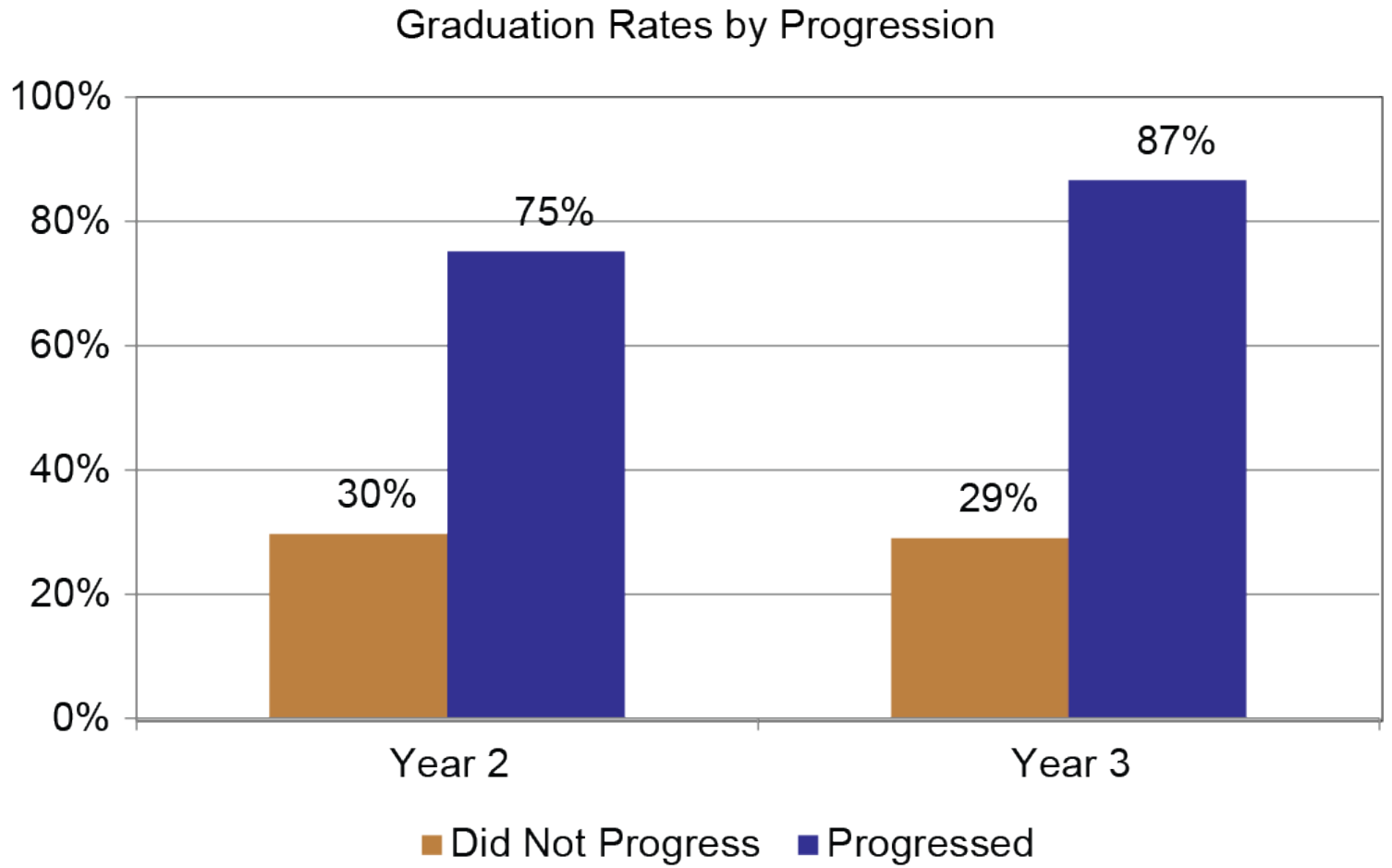
Graduation Rates by ACT Benchmark – Math (2002 Cohort)



Graduation Rates for those Retained in Years 2 and 3 (2002 Cohort)



Graduation Rates for those that Progressed in Class Status in Years 2 and 3 (2002 Cohort)



Predictor Model of Progression (2002 Cohort)

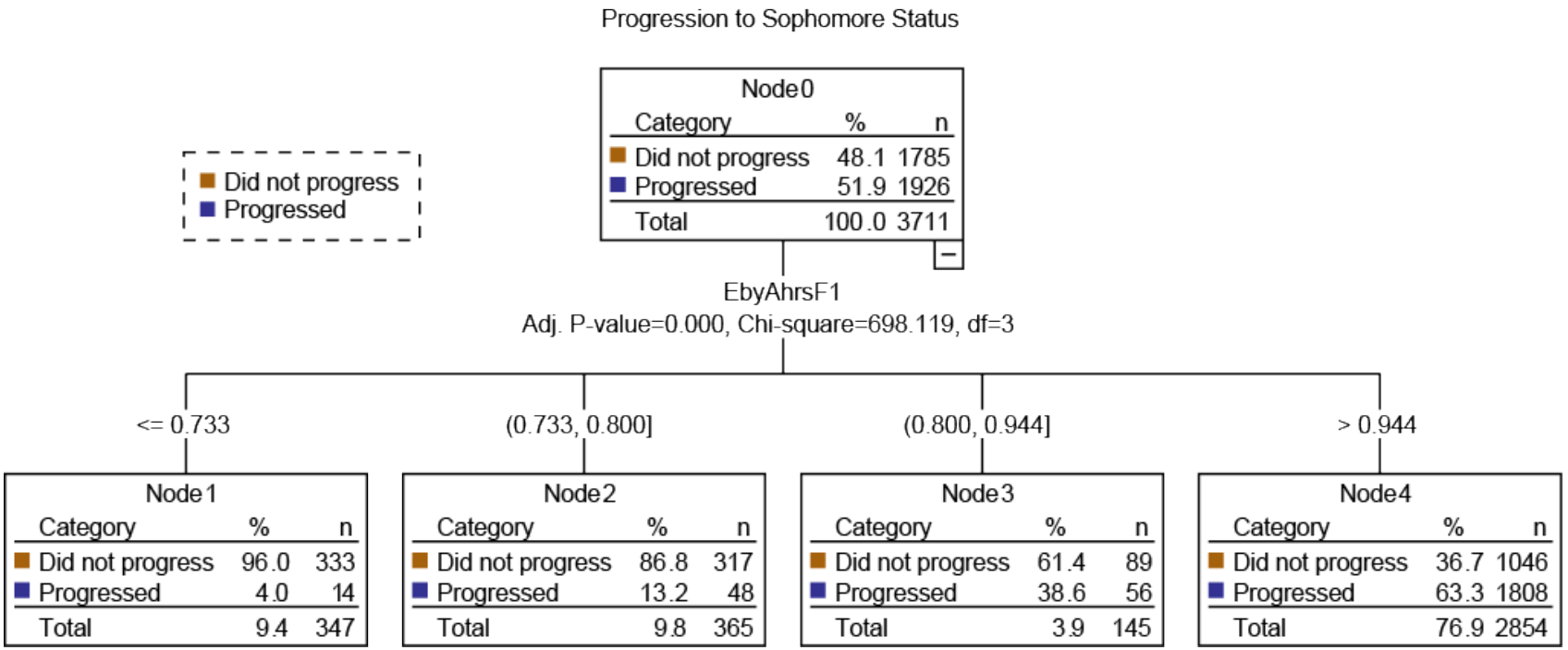
Sophomore Status

- English ACT BM
- Math ACT BM
- HS GPA
- Underrepresented minority
- Gender
- Earned by Attempted Credit Hours
  - Fall year 1
  - Spring year 1

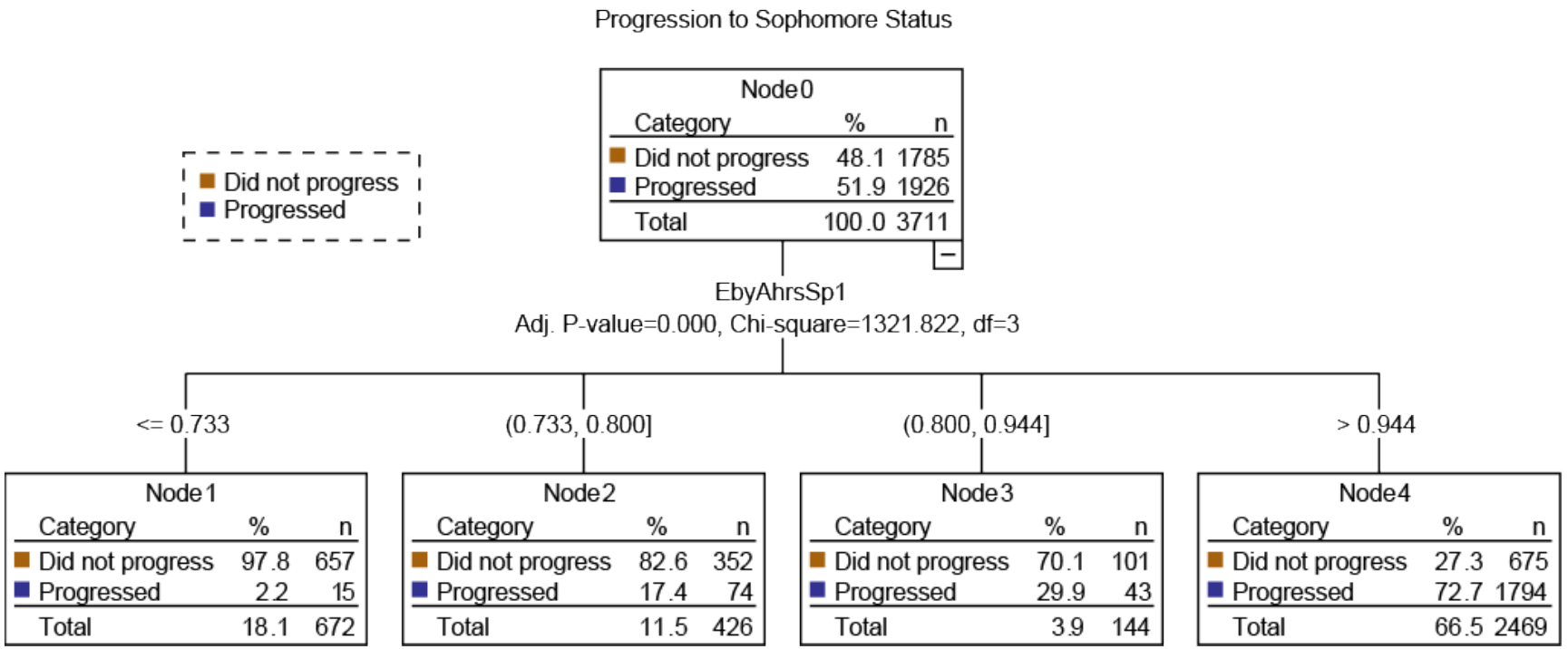
Junior Status

- English ACT BM
- Math ACT BM
- HS GPA
- Underrepresented minority
- Gender
- Earned by Attempted Credit Hours
  - Fall year 1
  - Spring year 1
  - Fall year 2
  - Spring year 2

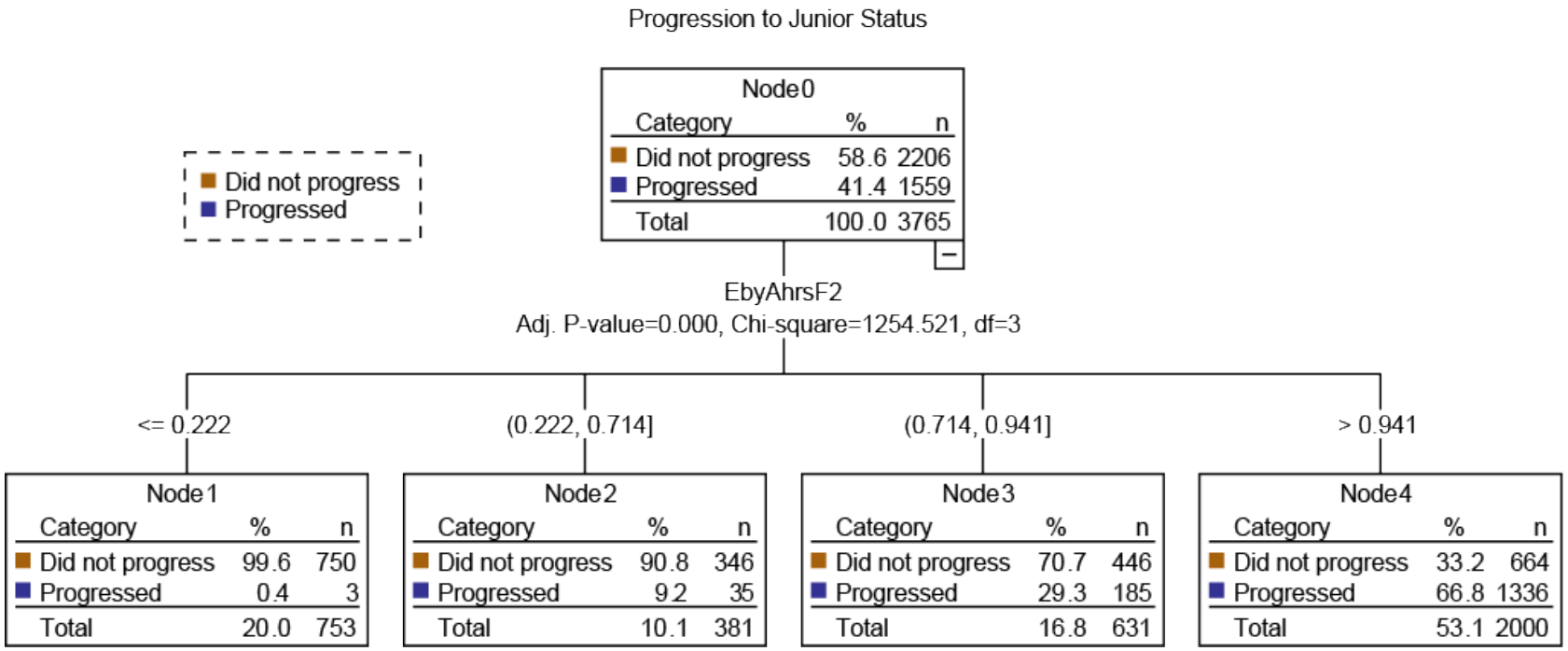
Earned by Attempted Credit Hours – Fall Year 1 (2002 Cohort)



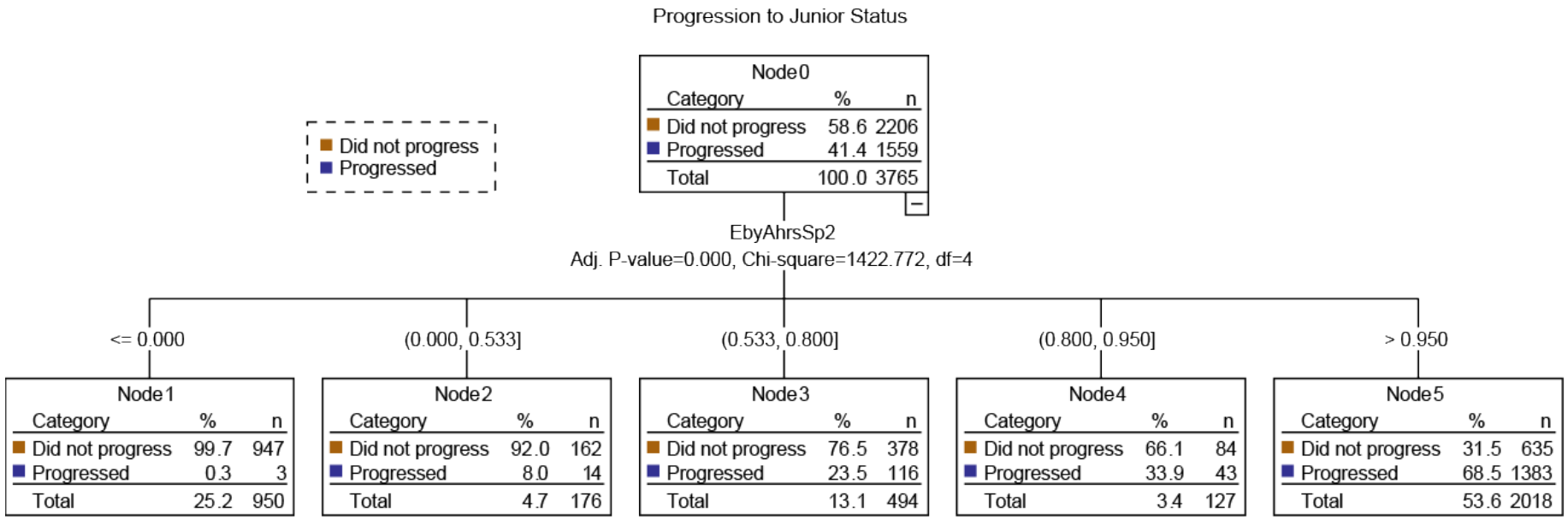
Earned by Attempted Credit Hours – Spring Year 1 (2002 Cohort)



Earned by Attempted Credit Hours – Fall Year 2 (2002 Cohort)



Earned by Attempted Credit Hours – Spring Year 2 (2002 Cohort)



Logistic Regression Method

- Hierarchical Prediction
- Used Nagelkerke R^2 to determine the strength of the model
  - Does a correction to the Cox & Snell R2 to allow the values to range up to 1.
- Δ R^2 calculated between each stage of predictors
  - ACT benchmarks
  - HS GPA
  - Demographics
  - Earned by Attempted credit hours in first year or two of college
- Dependent Measures = Progression to sophomore and junior status in both samples and 4-year and 5-year college completion in earlier sample

Prediction of Progression to Sophomore (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	**.870**	**.133**	**.000**	**2.387**
Math Benchmark	**.684**	**.086**	**.000**	**1.981**
Intercept	-.886			

Nagelkerke R^2=.08

Prediction of Progression to Sophomore (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.772	.135	.000	2.164
Math Benchmark	.485	.090	.000	1.624
High School GPA	**.679**	**.084**	**.000**	**1.972**
Intercept	-2.950	.287	.000	.052

Nagelkerke R^2=.11

Prediction of Progression to Sophomore (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.699	.137	.000	2.012
Math Benchmark	.497	.096	.000	1.644
High School GPA	.614	.086	.000	1.849
Gender	**-.323**	**.089**	**.000**	**.724**
Minority	**-.327**	**.103**	**.001**	**.721**
Intercept	-2.454	.306	.000	.086

Nagelkerke R^2=.12

Prediction of Progression to Sophomore (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.732	.174	.000	2.080
Math Benchmark	.741	.129	.000	2.098
High School GPA	.284	.113	.012	1.328
Gender	-.332	.118	.005	.718
Minority	-.277	.135	.041	.758
Earned by attempted Fall Year 1				
Low vs High	**-2.926**	**.344**	**.000**	**.054**
Mid-low vs High	**-2.397**	**.216**	**.000**	**.091**
Mid-High vs High	**-1.523**	**.251**	**.000**	**.218**
Earned by attempted Spring Year 1				
Low vs High	**-4.397**	**.296**	**.000**	**.012**
Mid-low vs High	**-2.301**	**.170**	**.000**	**.100**
Mid-High vs High	**-1.683**	**.247**	**.000**	**.186**
Intercept	-.255	.397	.521	.775

Nagelkerke R^2=.58

Prediction of Progression to Junior (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	**.696**	**.140**	**.000**	**2.005**
Math Benchmark	**.776**	**.086**	**.000**	**2.173**
Intercept	-1.246	.129	.000	.288

Nagelkerke R^2=.08

Prediction of Progression to Junior (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.577	.143	.000	1.780
Math Benchmark	.550	.090	.000	1.734
High School GPA	**.807**	**.085**	**.000**	**2.242**
Intercept	-3.718	.298	.000	.024

Nagelkerke R^2=.12

Prediction of Progression to Junior (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.493	.145	.001	1.637
Math Benchmark	.531	.096	.000	1.700
High School GPA	.756	.087	.000	2.131
Gender	**-.249**	**.088**	**.005**	**.779**
Minority	**-.379**	**.105**	**.000**	**.685**
Intercept	-3.263	.315	.000	.038

Nagelkerke R^2=.13

Prediction of Progression to Junior (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.336	.166	.043	1.400
Math Benchmark	.648	.112	.000	1.911
High School GPA	.510	.100	.000	1.665
Gender	-.188	.104	.069	.828
Minority	-.343	.122	.005	.708
Earned by attempted Fall Year 1				
Low vs High	**-2.752**	**.404**	**.000**	**.064**
Mid-low vs High	**-1.962**	**.228**	**.000**	**.141**
Mid-High vs High	**-.873**	**.240**	**.000**	**.418**
Earned by attempted Spring Year 1				
Low vs High	**-3.287**	**.266**	**.000**	**.037**
Mid-low vs High	**-1.711**	**.174**	**.000**	**.181**
Mid-High vs High	**-.927**	**.239**	**.000**	**.396**
Intercept	-1.550	.360	.000	.212

Nagelkerke R^2=.45

Prediction of 5-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	**.693**	**.127**	**.000**	**1.999**
Math Benchmark	**.581**	**.085**	**.000**	**1.789**
Intercept	-.594	.115	.000	.552

Nagelkerke R^2=.06

Prediction of 5-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.592	.129	.000	1.808
Math Benchmark	.390	.089	.000	1.477
High School GPA	**.652**	**.083**	**.000**	**1.919**
Intercept	-2.566	.278	.000	.077

Nagelkerke R^2=.09

Prediction of 5-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.476	.132	.000	1.610
Math Benchmark	.304	.095	.001	1.356
High School GPA	.615	.085	.000	1.849
Gender	**-.136**	**.088**	**.121**	**.873**
Minority	**-.513**	**.101**	**.000**	**.599**
Intercept	-2.101	.299	.000	.122

Nagelkerke R^2=.10

Prediction of 5-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.263	.175	.134	1.300
Math Benchmark	.371	.128	.004	1.449
High School GPA	.262	.113	.020	1.300
Gender	-.017	.118	.884	.983
Minority	-.343	.134	.011	.709
Earned by attempted Fall Year 1				
Low vs High	-1.412	.274	.000	.244
Mid-low vs High	-.427	.191	.025	.653
Mid-High vs High	-.484	.275	.079	.616
Earned by attempted Spring Year 1				
Low vs High	-1.056	.192	.000	.348
Mid-low vs High	-.723	.170	.000	.486
Mid-High vs High	-.417	.263	.113	.659
Earned by attempted Fall Year 2				
Low vs High	-.638	.277	.021	.528
Mid-low vs High	-1.065	.193	.000	.345
Mid-High vs High	-.402	.140	.004	.669
Earned by attempted Spring Year 2				
Low vs High	-3.011	.257	.000	.049
Mid-low vs High	-2.800	.288	.000	.061
Mid vs High	-1.335	.138	.000	.263
Mid-High vs High	-.964	.244	.000	.381
Intercept	.782	.406	.054	2.187

Nagelkerke R^2=.57

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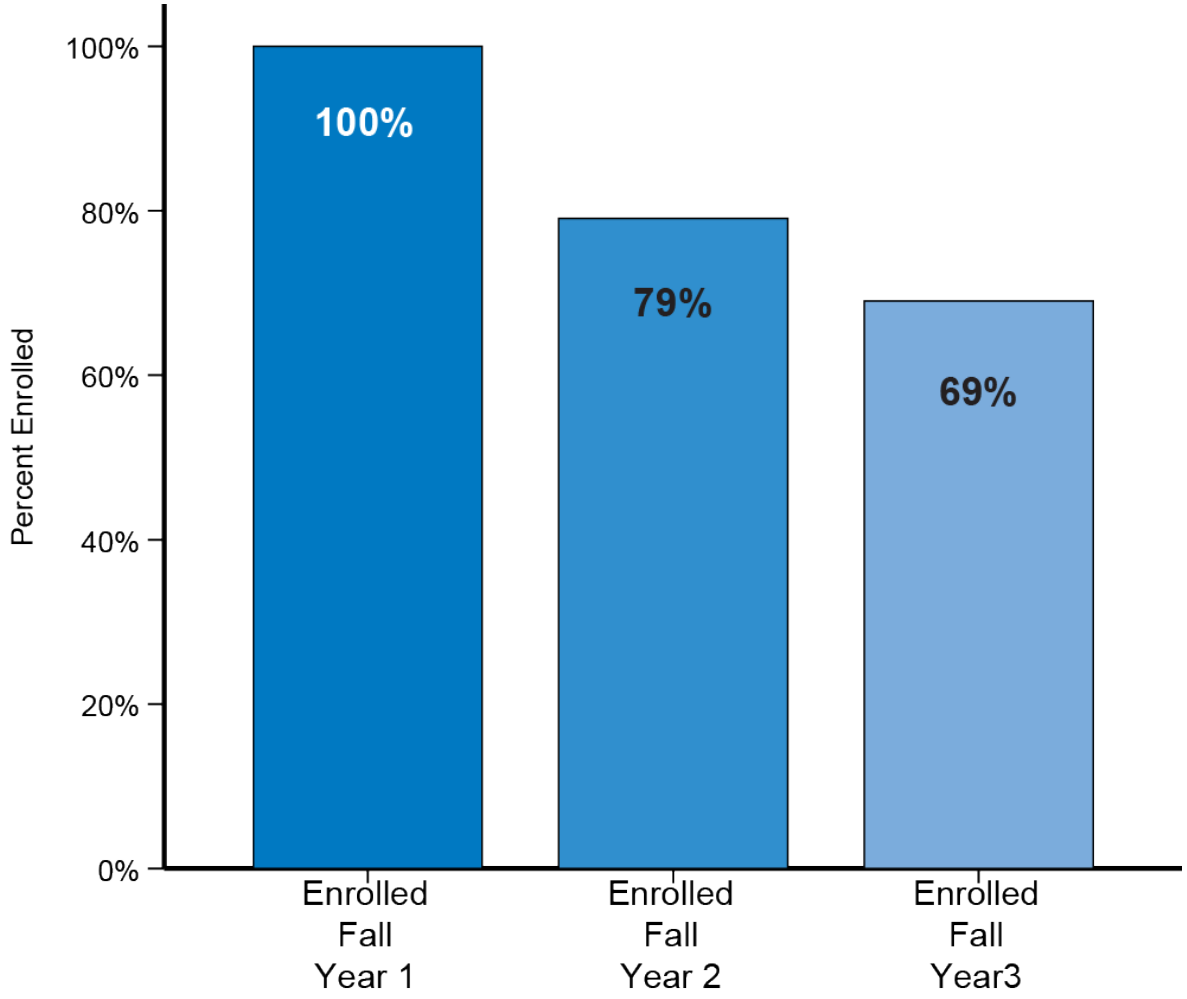
Mid vs High	-1.335	.138	.000	.263
Mid-High vs High	-.964	.244	.000	.381
Intercept	.782	.406	.054	2.187
Nagelkerke R^2=.57				

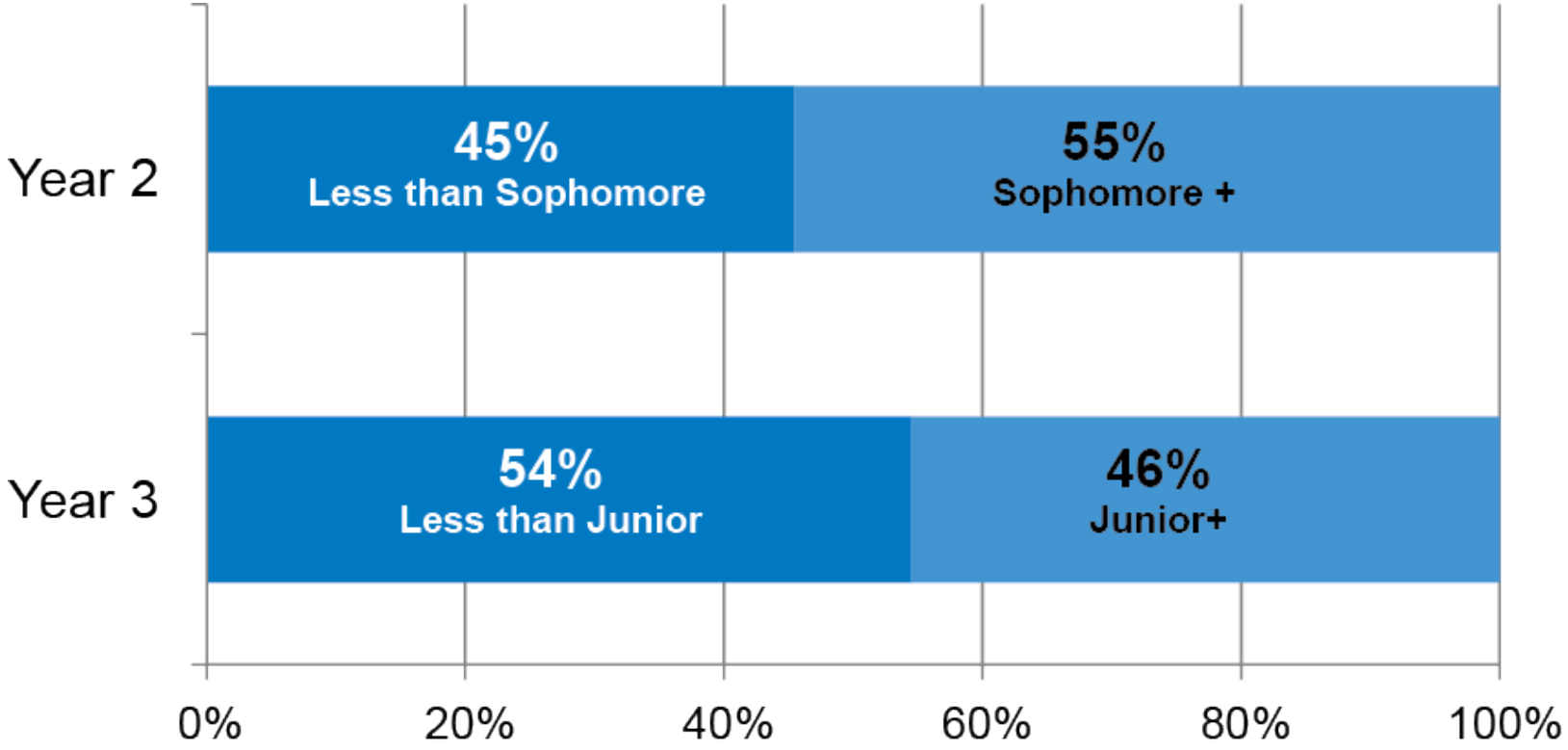
2008 Study Sample

- Students who initially enrolled (attempted credit hours) as first-time freshman
- Students were pursuing a bachelor's degree during the fall semester of 2008-09
- Students had to be enrolled and attempting credit hours
- This sample was not a high school cohort but a sample of those enrolled at the two institutions

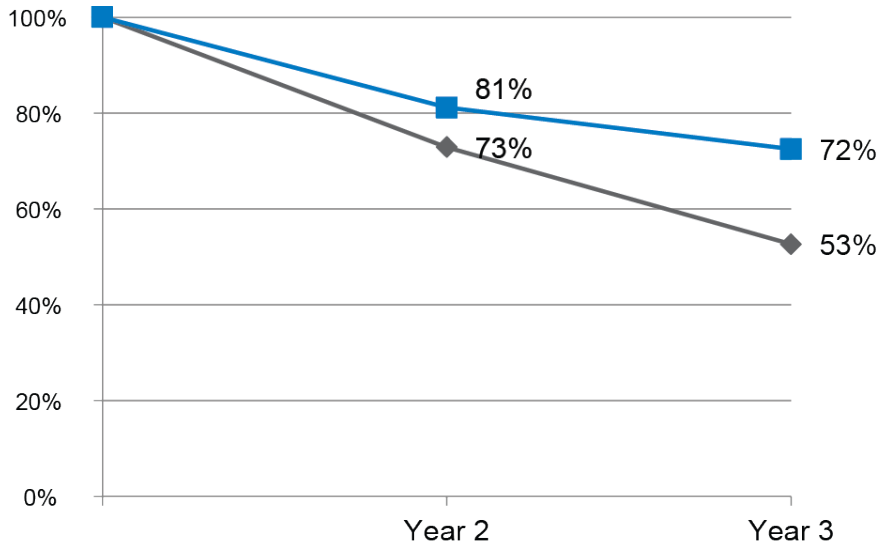
Retention (2008 Sample)

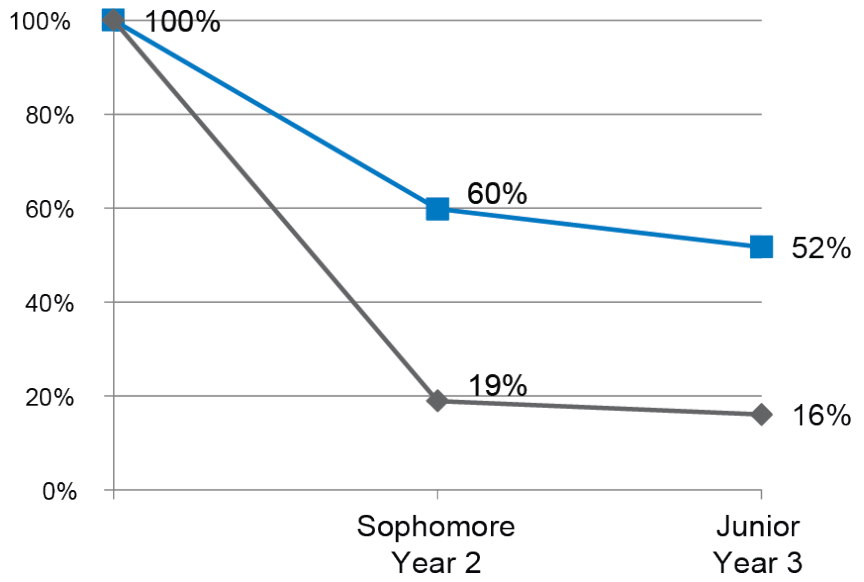


On Target Progression in Class Status (2008 Sample)



Retention and Progression by ACT Benchmark – English (2008 Sample)

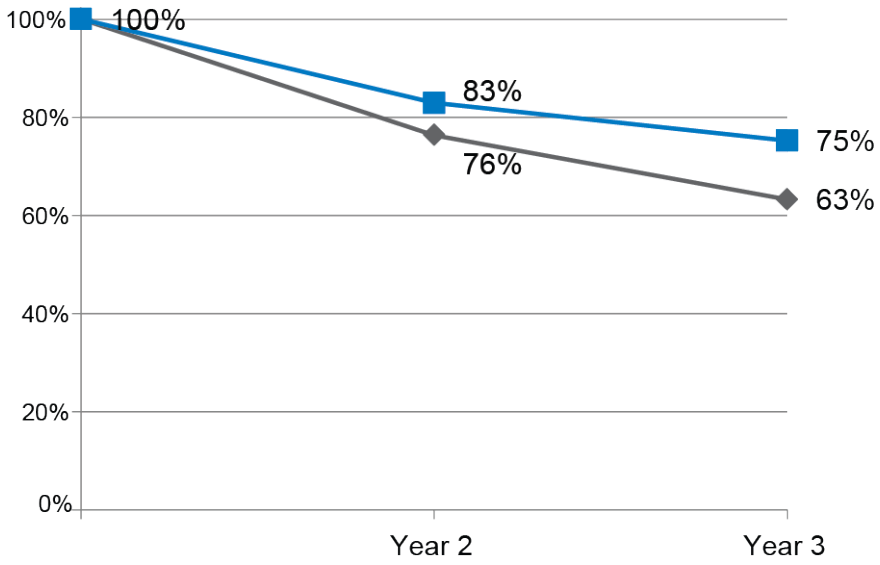


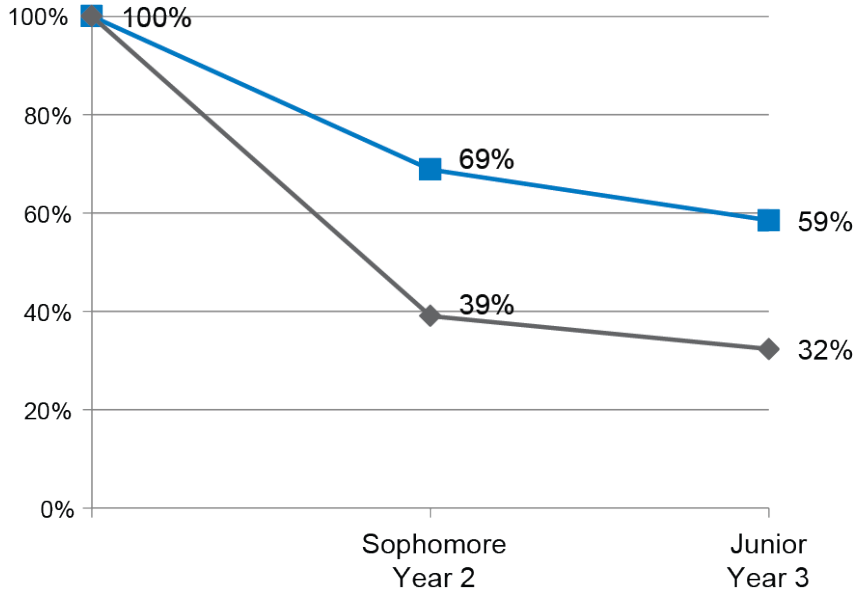


Met

Missed

Retention and Progression by ACT Benchmark – Math (2008 Sample)





Met

Missed

Predictors of Progression (2008 Sample)

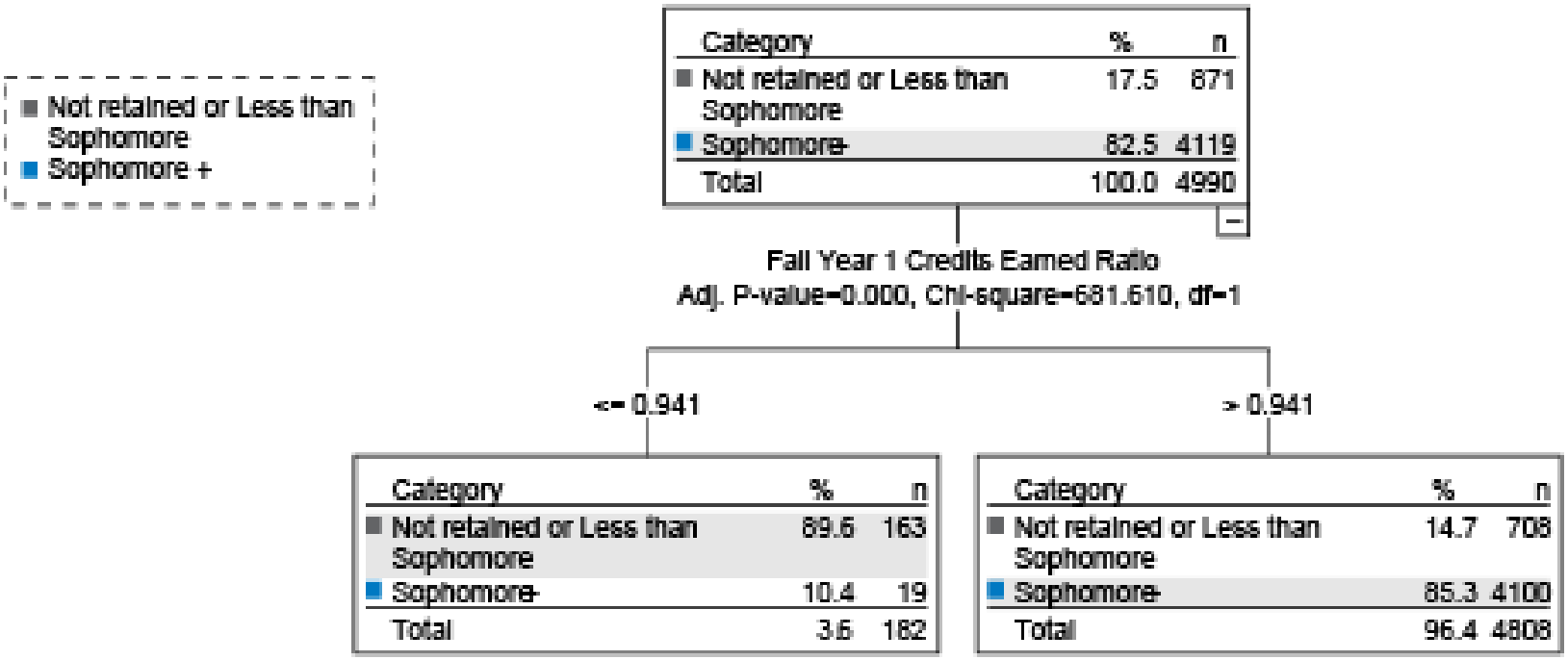
Sophomore Status

- English ACT BM
- Math ACT BM
- HS GPA
- Underrepresented minority
- Gender
- Earned by Attempted Credit Hours
  - Fall year 1
  - Spring year 1

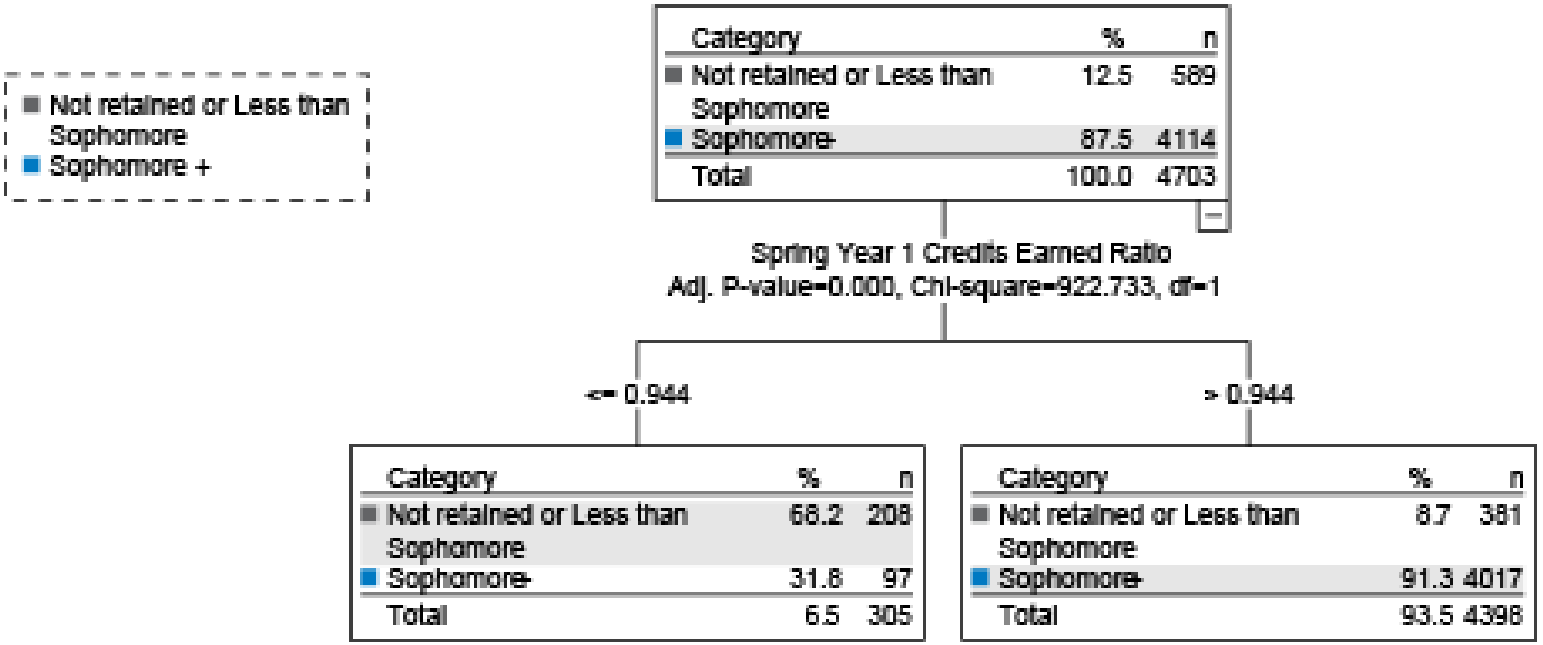
Junior Status

- English ACT BM
- Math ACT BM
- HS GPA
- Underrepresented minority
- Gender
- Earned by Attempted Credit Hours
  - Fall year 1
  - Spring year 1
  - Fall year 2

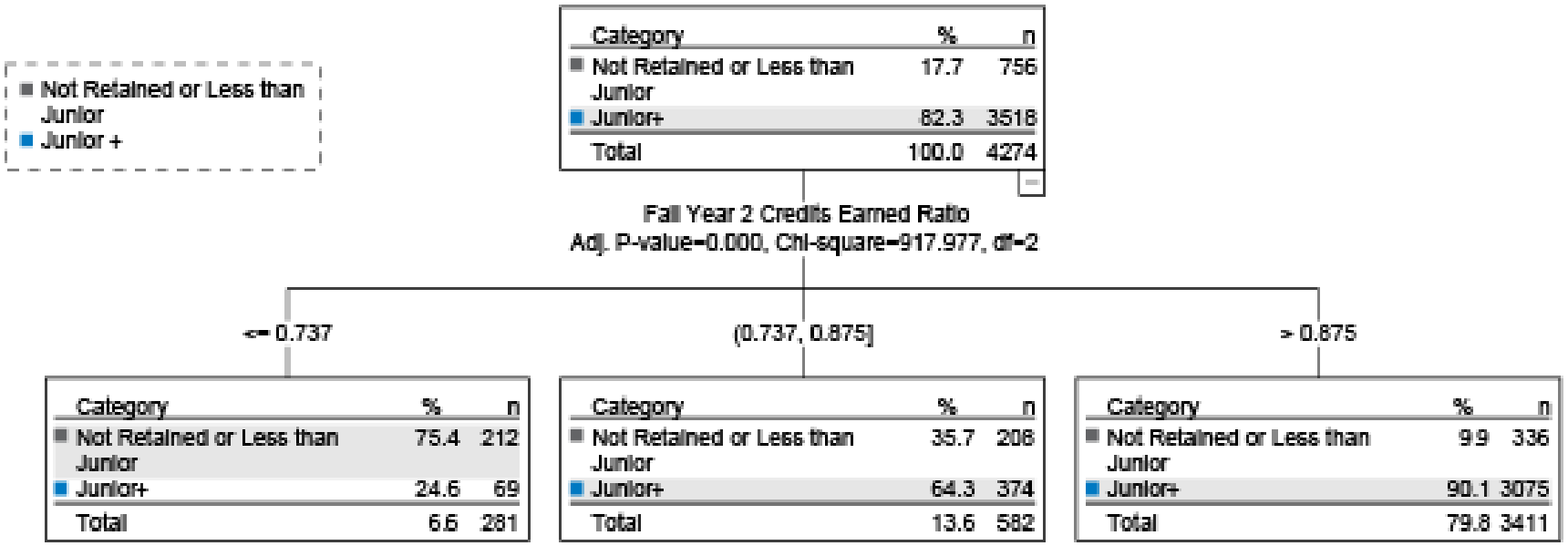
Earned by Attempted Credit Hours – Fall Year 1 (2008 Sample)



Earned by Attempted Credit Hours – Spring Year 1 (2008 Sample)



Earned by Attempted Credit Hours – Fall Year 2 (2008 Sample)



Prediction of Progression to Sophomore (2008 Sample)

	b	*SE*	*p*	OR
English Benchmark	**1.571**	**.132**	**.000**	**4.811**
Math Benchmark	**1.086**	**.074**	**.000**	**2.963**
Intercept	-1.590	.126	.000	204

Nagelkerke R^2=.18

Prediction of Progression to Sophomore (2008 Sample)

	b	*SE*	*p*	OR
English Benchmark	1.178	.141	.000	3.248
Math Benchmark	.759	.079	.000	2.136
High School GPA	**1.732**	**.089**	**.000**	**5.654**
Intercept	-6.716	.305	.000	.001

Nagelkerke R^2=.31

Prediction of Progression to Sophomore (2008 Sample)

	b	*SE*	*p*	OR
English Benchmark	.979	.145	.000	2.661
Math Benchmark	.646	.083	.000	1.907
High School GPA	1.700	.091	.000	5.473
Gender	**.089**	**.081**	**.270**	**1.093**
Minority	**-.774**	**.089**	**.000**	**.461**
Intercept	-6.204	.313	.000	.002

Nagelkerke R^2=.33

Prediction of Progression to Sophomore (2008 Sample)

	b	*SE*	*p*	OR
English Benchmark	1.172	.165	.000	3.228
Math Benchmark	.960	.103	.000	2.611
High School GPA	1.191	.110	.000	3.291
Gender	.030	.099	.760	.970
Minority	-.664	.108	.000	.515
Earned by attempted Fall Year 1				
Low vs High	**-2.531**	**.157**	**.000**	**.080**
Earned by attempted Spring Year 1				
Low vs High	**-3.866**	**.231**	**.000**	**.021**
Mid-low vs High	**-2.410**	**.156**	**.000**	**.090**
Intercept	-3.928	.372	.000	.020

Nagelkerke R^2=.60

Prediction of Progression to Junior – 2008 Sample

	b	*SE*	*p*	OR
English Benchmark	**1.608**	**.145**	**.000**	**4.991**
Math Benchmark	**.863**	**.072**	**.000**	**2.371**
Intercept	-1.902	.140	.000	.149

Nagelkerke R^2=.14

Prediction of Progression to Junior – 2008 Sample

	b	*SE*	*p*	OR
English Benchmark	1.206	.154	.000	3.341
Math Benchmark	.504	.078	.000	1.655
High School GPA	**1.764**	**.086**	**.000**	**5.837**
Intercept	-7.164	.306	.000	.001

Nagelkerke R^2=.29

Prediction of Progression to Junior – (2008 Sample)

	b	*SE*	*p*	OR
English Benchmark	1.034	.157	.000	2.813
Math Benchmark	.426	.082	.000	1.530
High School GPA	1.722	.088	.000	5.597
Gender	**.157**	**.077**	**.043**	**1.170**
Minority	**-.654**	**.090**	**.000**	**.520**
Intercept	-6.743	.312	.000	.001

Nagelkerke R^2=.30

Prediction of Progression to Junior (2008 Sample)

	b	*SE*	*p*	OR
English Benchmark	1.138	.180	.000	3.120
Math Benchmark	.601	.103	.000	1.823
High School GPA	1.293	.112	.000	3.645
Gender	.027	.098	.780	1.028
Minority	-.435	.112	.000	.647
Earned by attempted Fall Year 1				
Low vs High	**-1.784**	**.170**	**.000**	**.168**
Earned by attempted Spring Year 1				
Low vs High	**-2.966**	**.328**	**.000**	**.052**
Mid-low vs High	**-1.636**	**.166**	**.000**	**.195**
Earned by attempted Fall Year 2				
Low vs High	**-3.094**	**.221**	**.000**	**.020**
Mid-low vs High	**-1.181**	**.099**	**.000**	**.307**
Intercept	-4.188	.390	.000	.015

Nagelkerke R^2=.62

Summary of Major Findings

- Fairly constant retention and progression values across the years
- ACT benchmarks more related to progression and completion than to retention
- Meeting ACT English and math benchmarks very related to progression to sophomore and junior status in both samples
- Once HS GPA, and measure of college course success in years 1 & 2 added in model, *both English and math benchmarks still significant predictors of progression to sophomore status* in both samples.
- Once HS GPA, and measure of college course success in years 1 & 2 added in model, *only math benchmark still significant predictor of progression to junior status and college completion in early sample*
- Once HS GPA, and measure of college course success in years 1 & 2 added in model, *both English and math benchmarks still significant predictor of progression to junior status in more recent sample*

Concluding Remarks

- Yes, college readiness still as important in recent sample as in earlier sample!
- Meeting English benchmark more important predictor of later progression in more recent sample
- In all models for both samples, meeting math benchmark is an important predictor of future success
- High school preparation matters!

Policy Implications

- Progression is key
  - CCA's "15 to finish" initiative highlights the importance of taking enough credit hours to have on-target progression
  - Early accumulation of credits via dual credit or AP will help students progress on target
- Common Core in ELA and math should help to ensure students are college ready and increase college success rates
- ACT or other achievement tests – still important measures of future success, as well as providing key information on college readiness

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