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

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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 HS Preparation

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 to College Success

- Rumblings about removing math requirements – e.g., Algebra 2 as a prerequisite for college
  - Novelist and nonfiction writer, **Nicholson Baker** in 2013 *Harper's Magazine*
  - 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**
- 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**
- Seemingly in contradiction of ***Common Core***

Study Goal and Research Questions

Purpose

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

Determine the relationship of progression at different points and college completion.

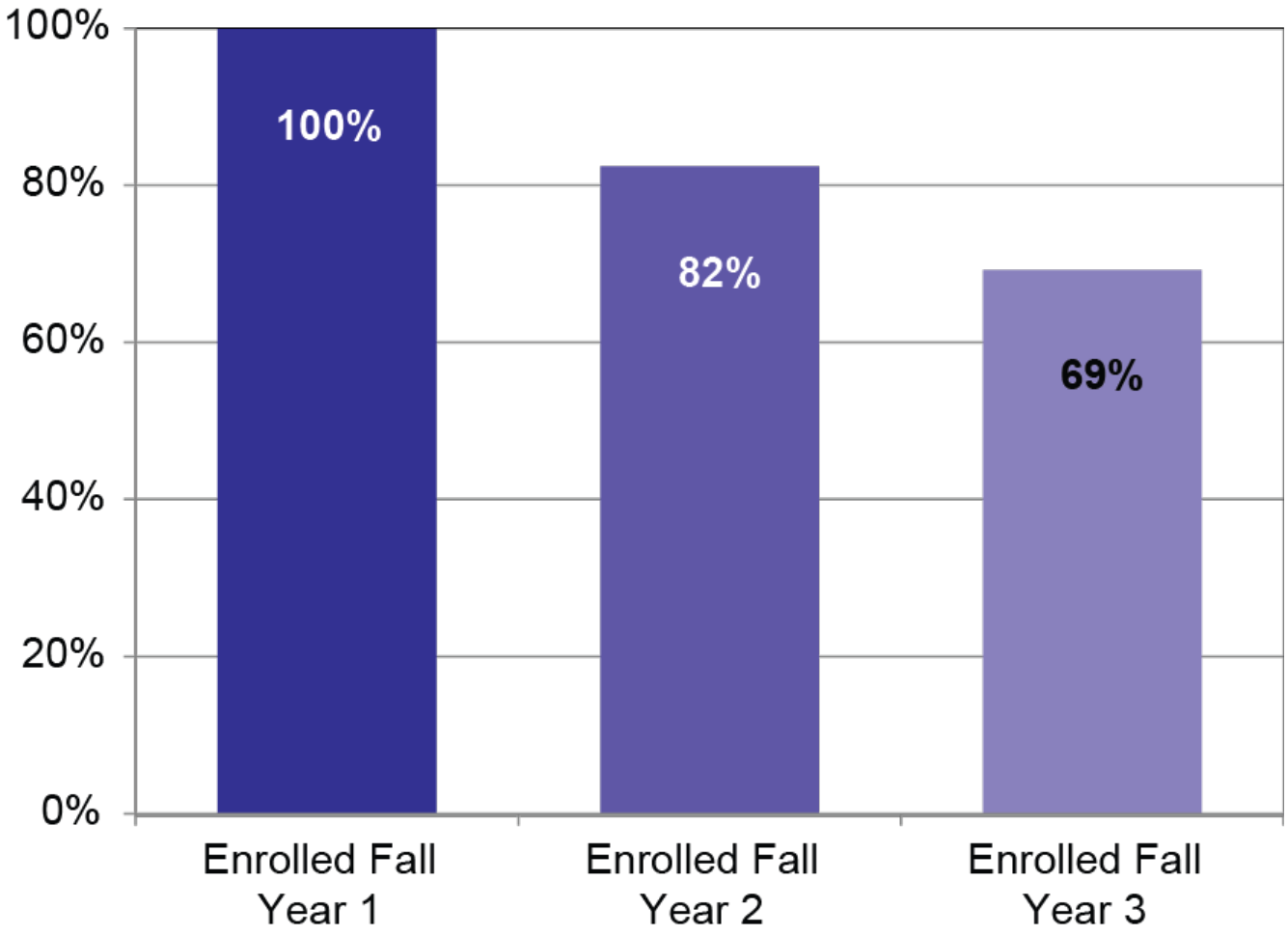
Research Questions

- 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?
- Is ACT still predictive of college retention and progression, controlling for demographics, HS GPA and early college success?
- How did the prediction of college retention and progression from ACT change across the two samples?

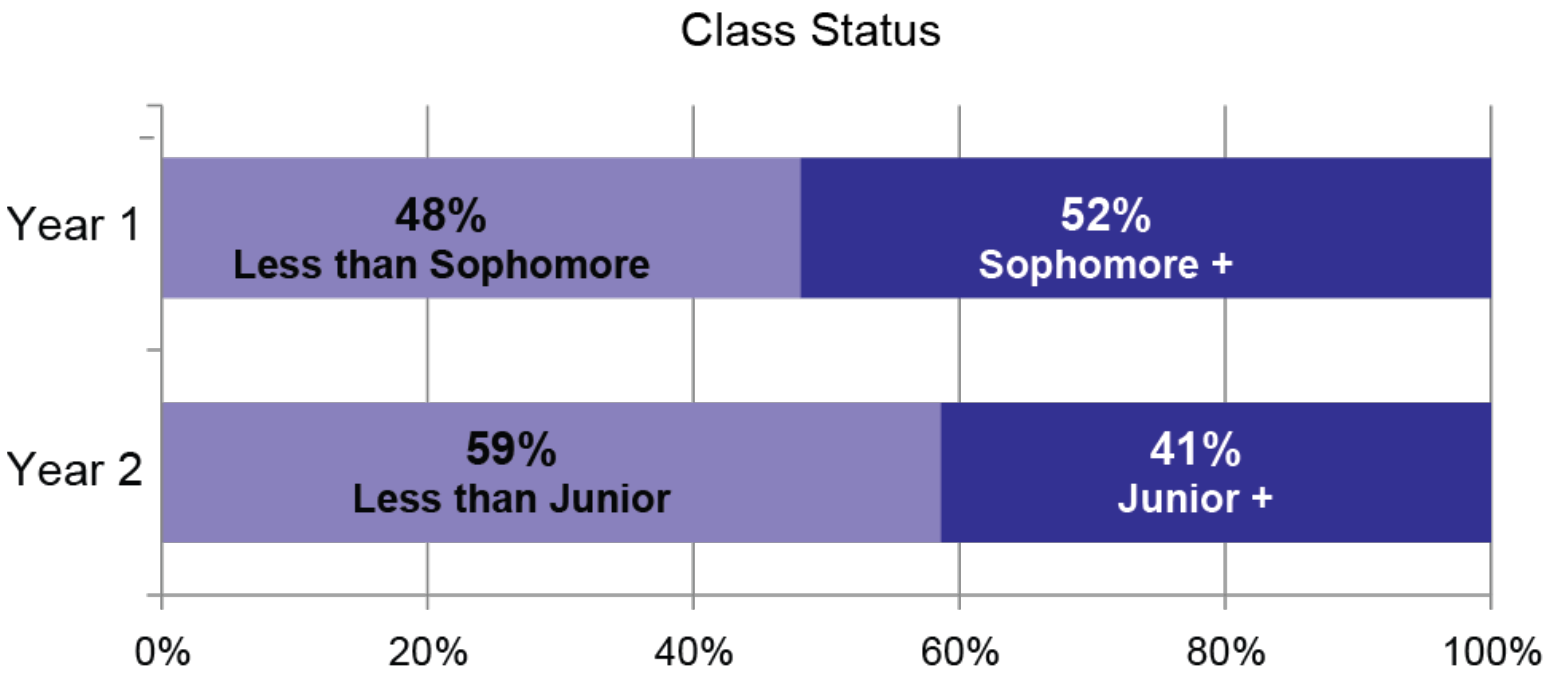
2002 Sample

- 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} = , $n_{private}$ =
- *N = 3,770*

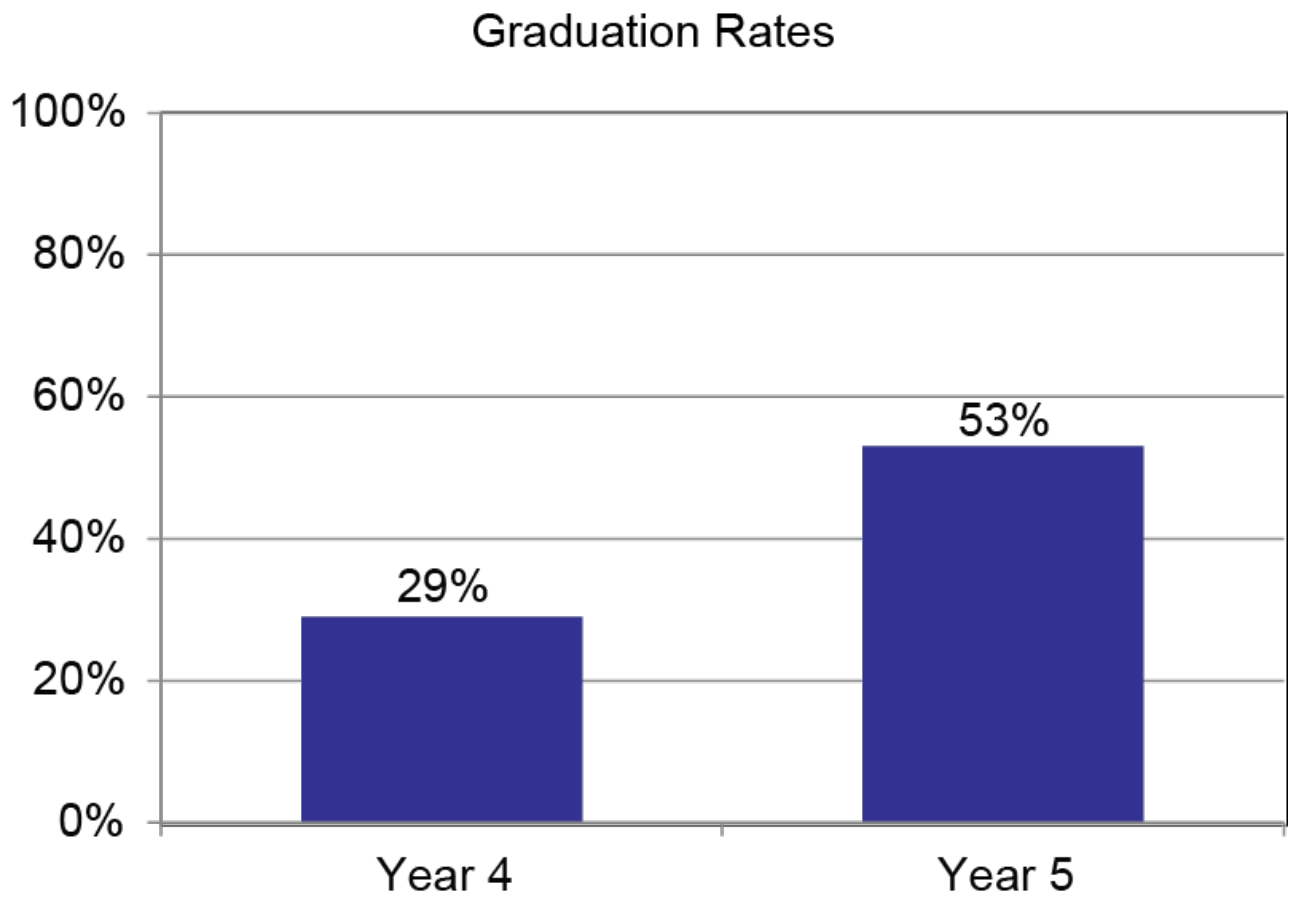
Retention (2002 Cohort)



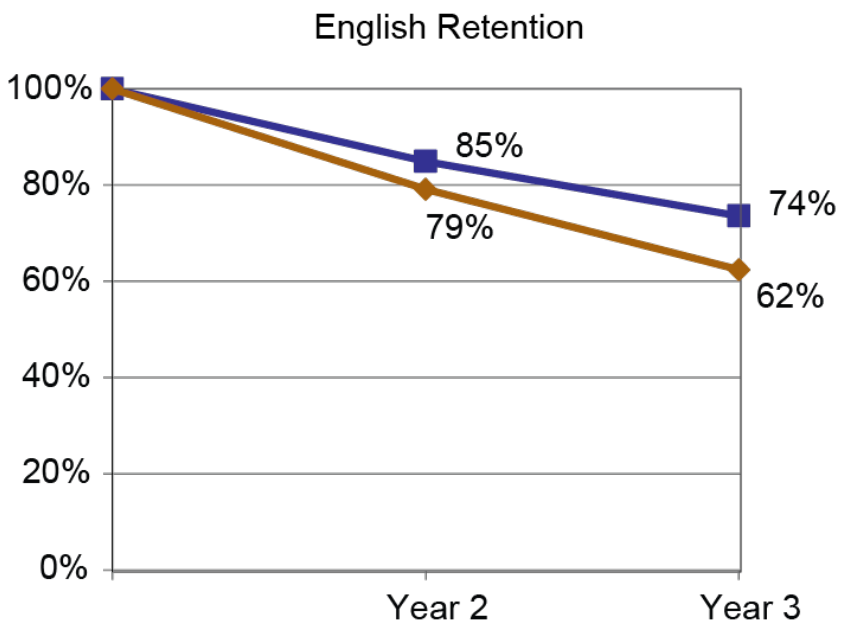
On Target Progression in Class Status (2002 Cohort)

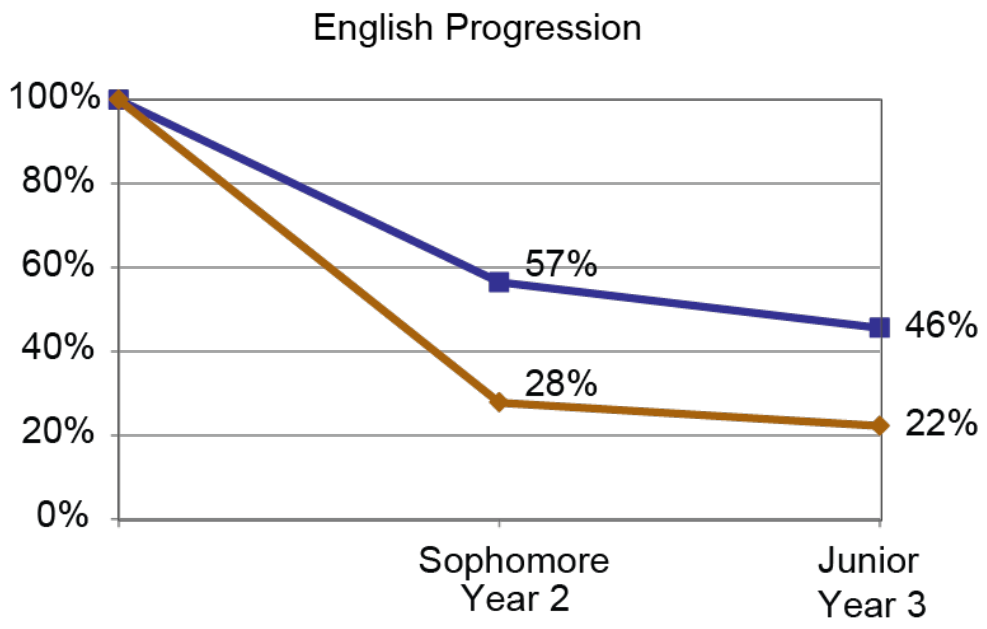


Overall Graduation Rates (2002 Cohort)



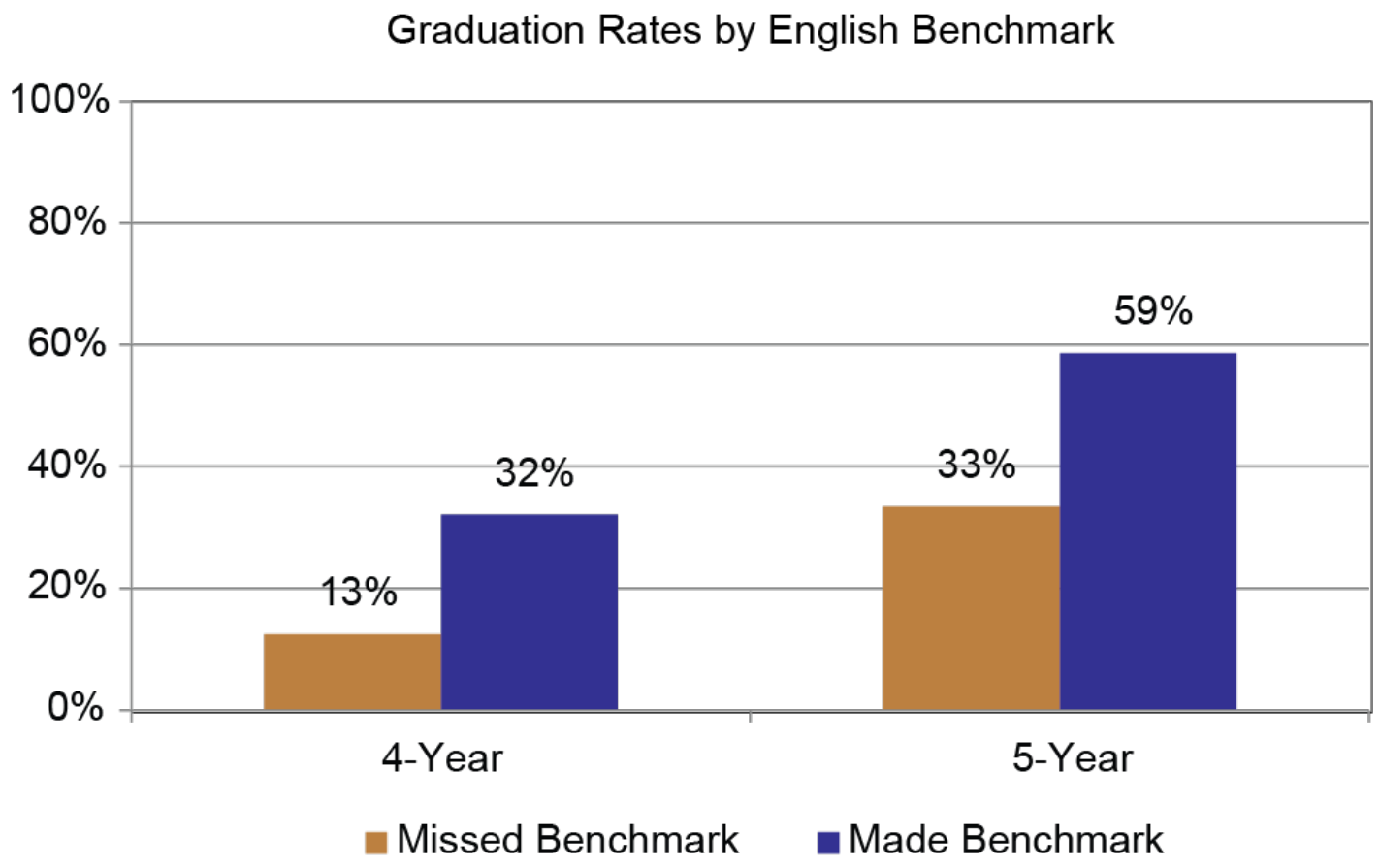
Retention & Progression by ACT Benchmark – English (2002 Cohort)



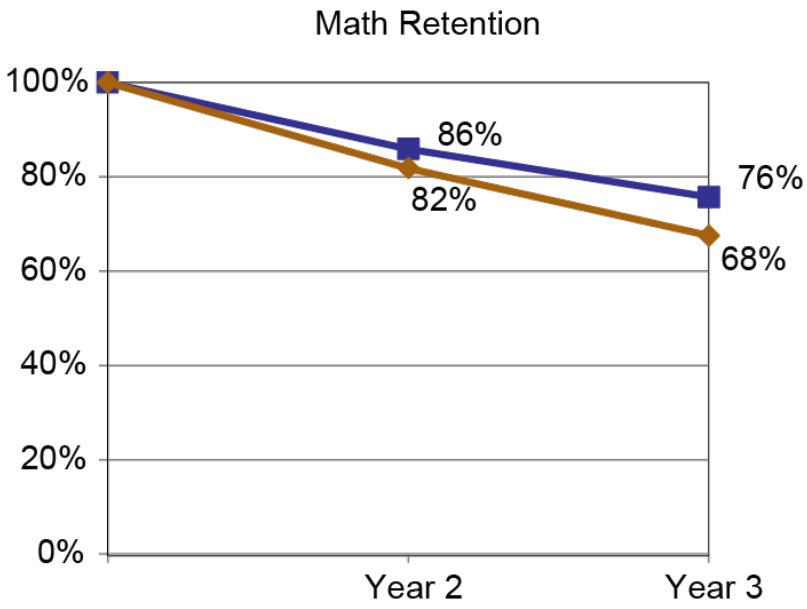


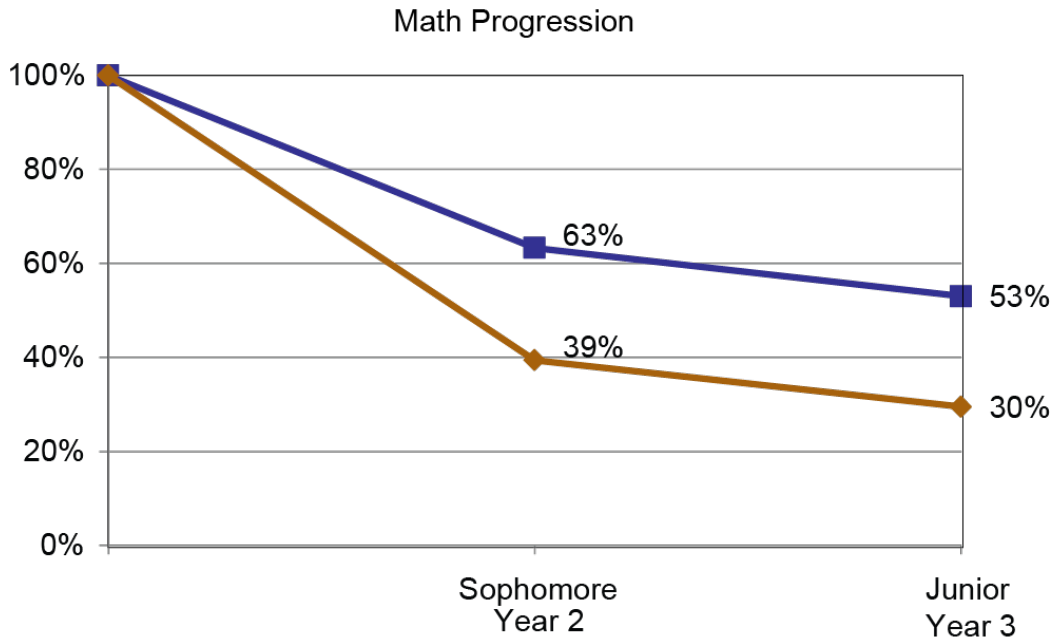
Met Missed

Graduation Rates by ACT Benchmark – English (2002 Cohort)



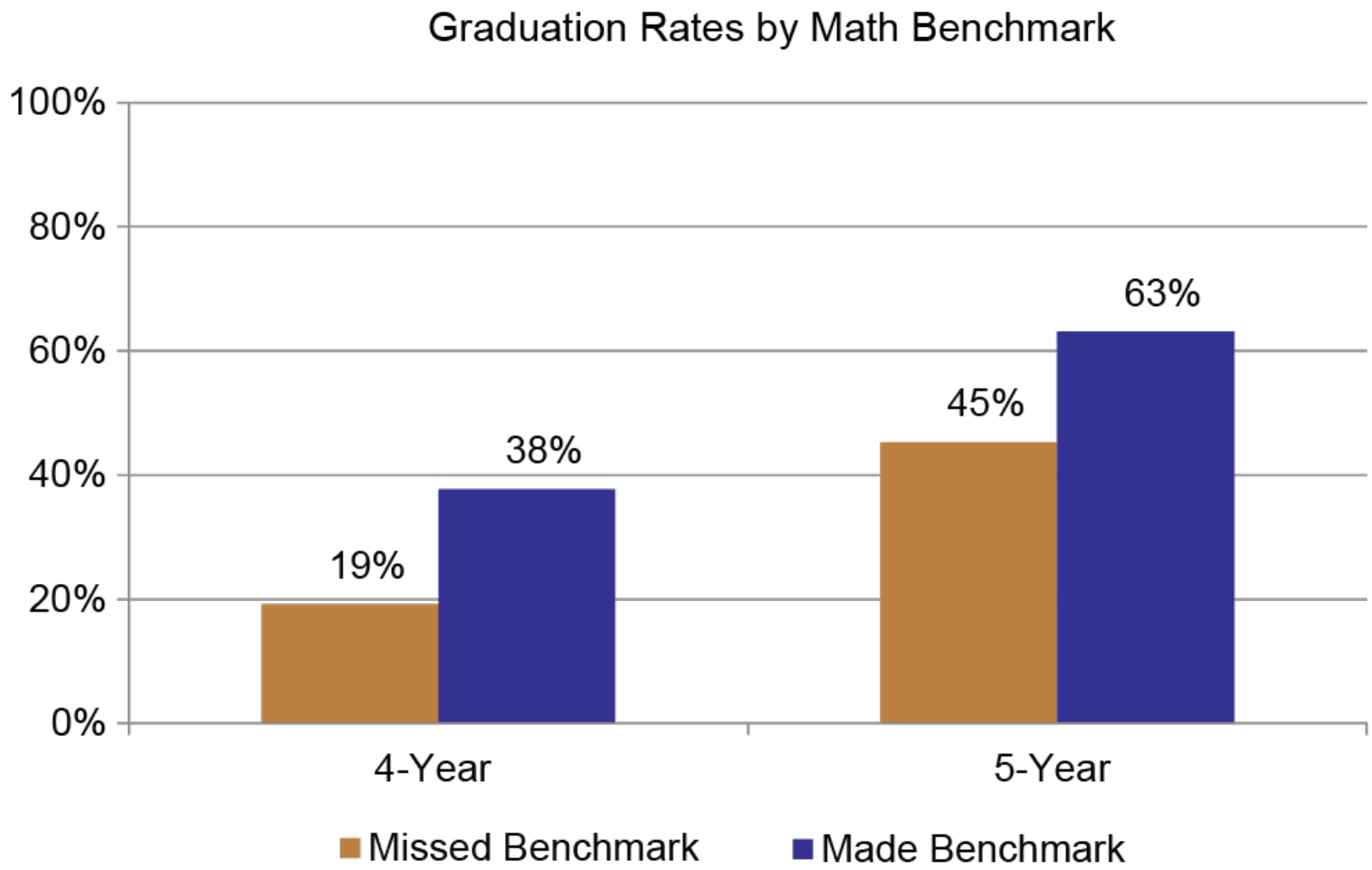
Retention & Progression by ACT Benchmark – Math (2002 Cohort)



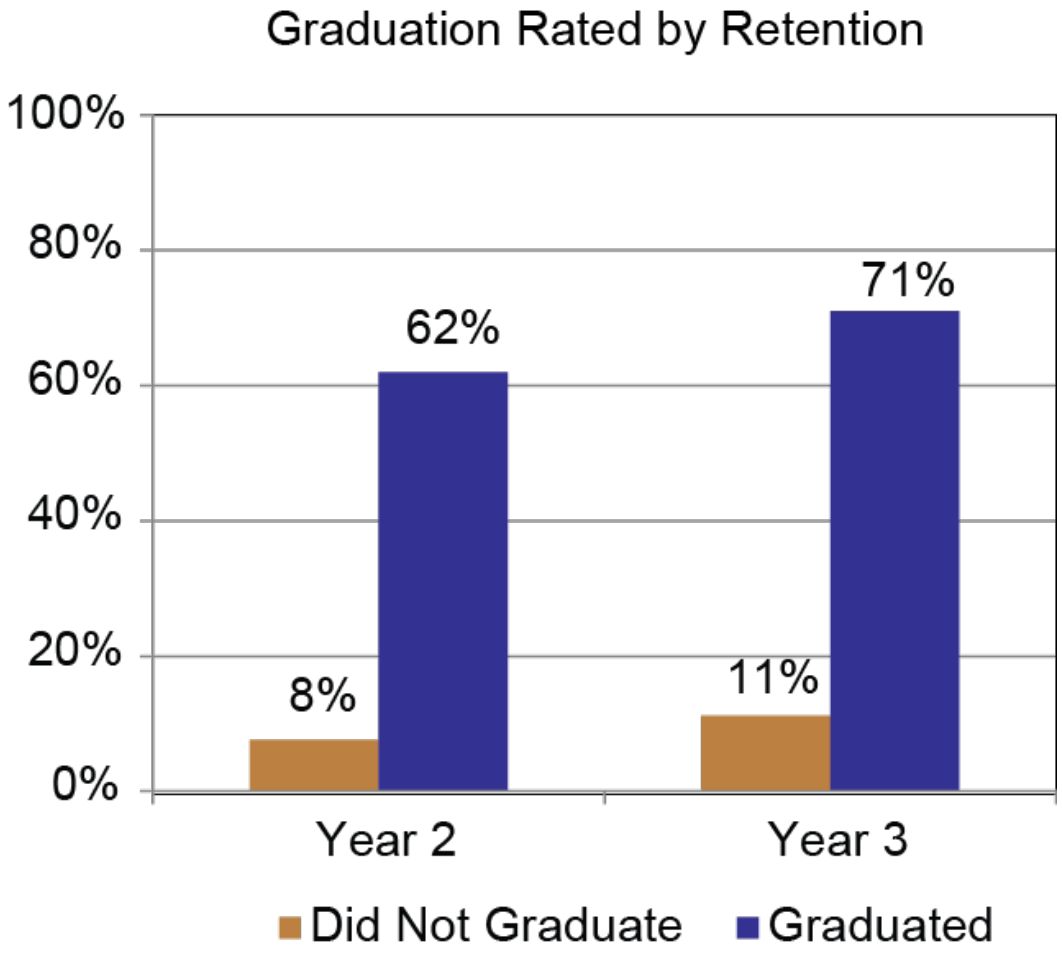


Met Missed

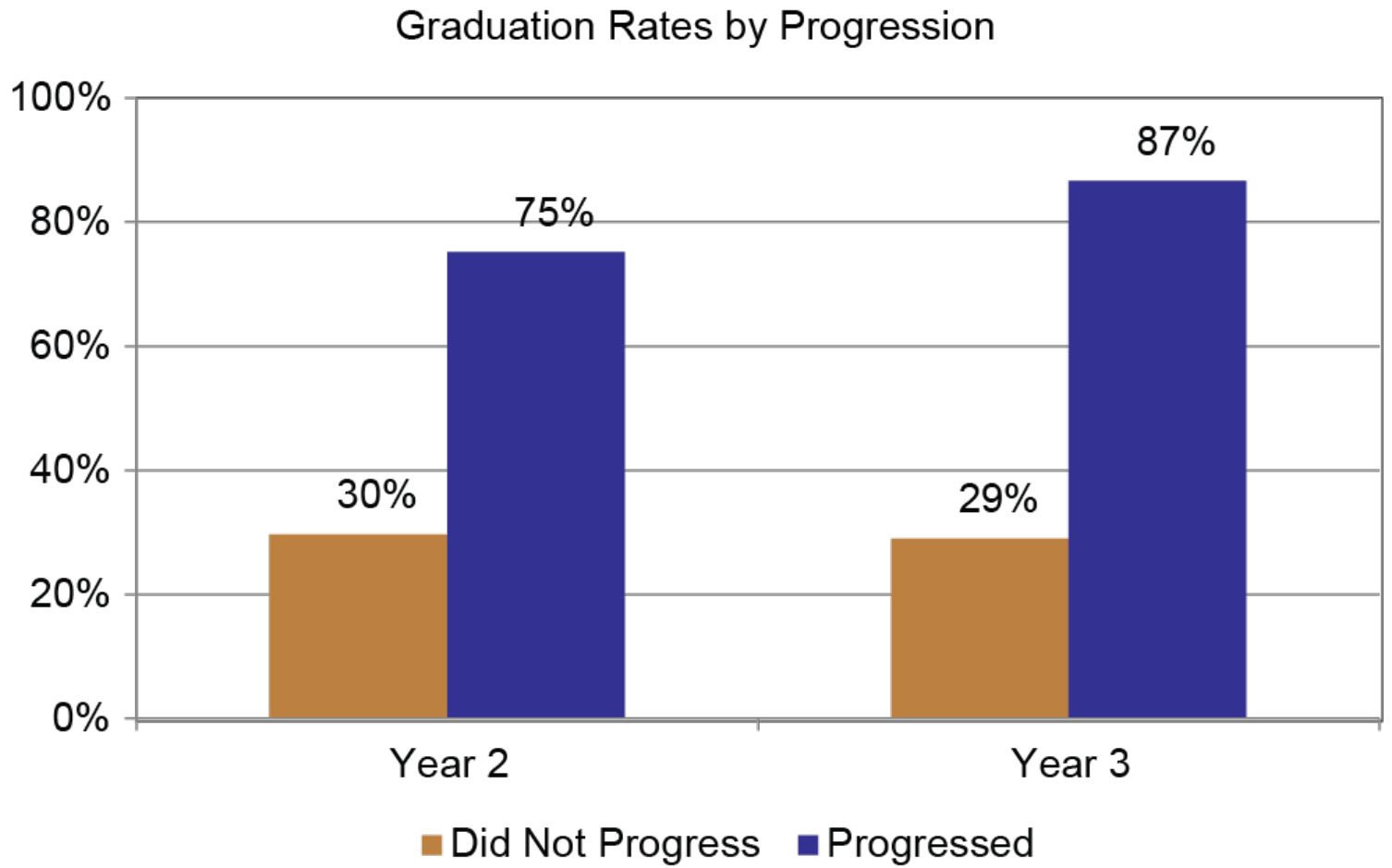
Graduation Rates by ACT Benchmark – Math (2002 Cohort)



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)

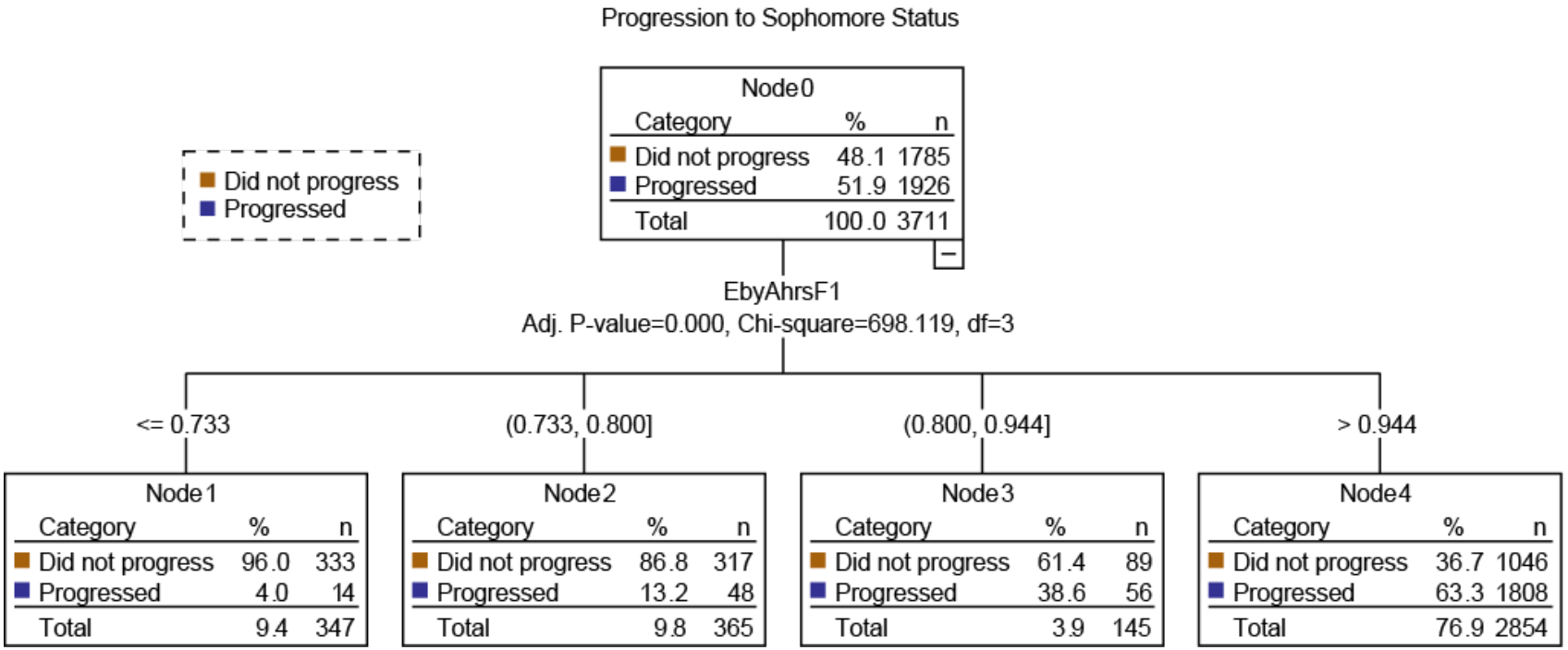
Sophomore Status

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

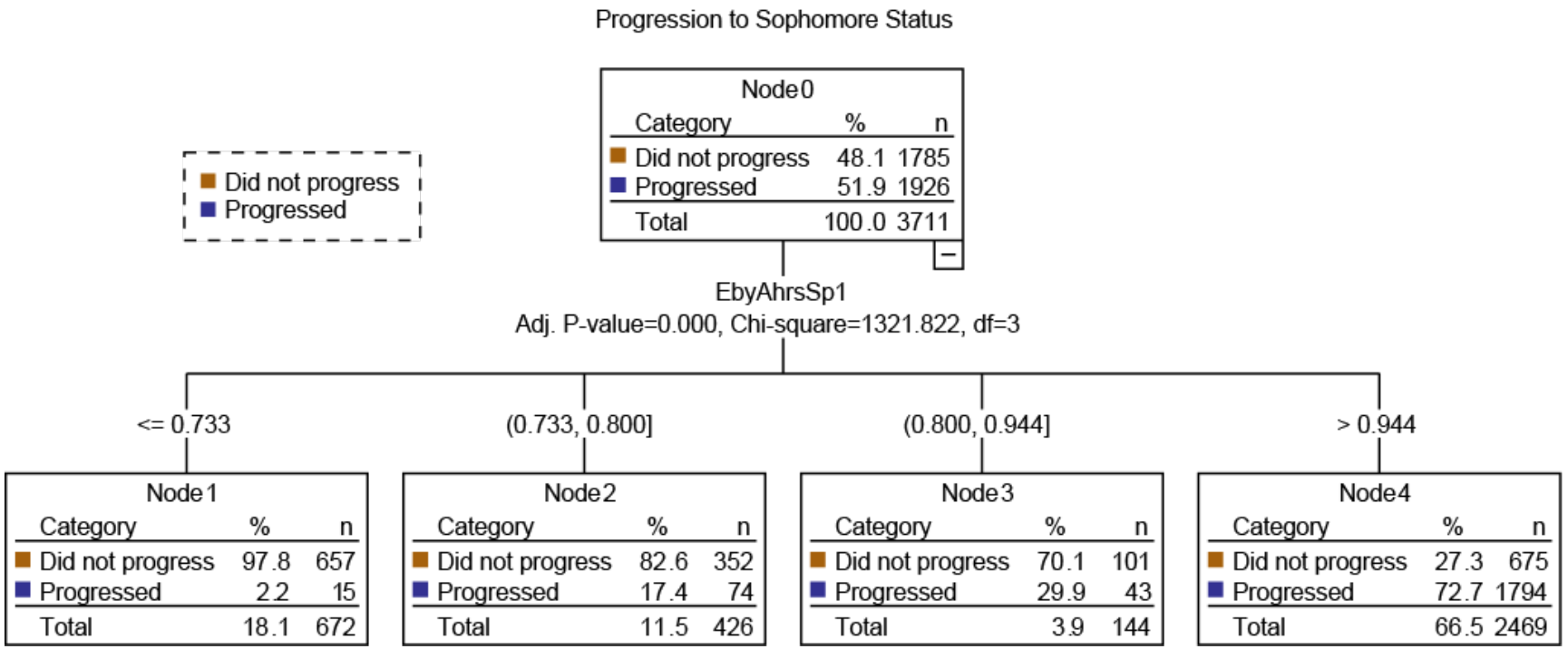
Junior Status

- 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

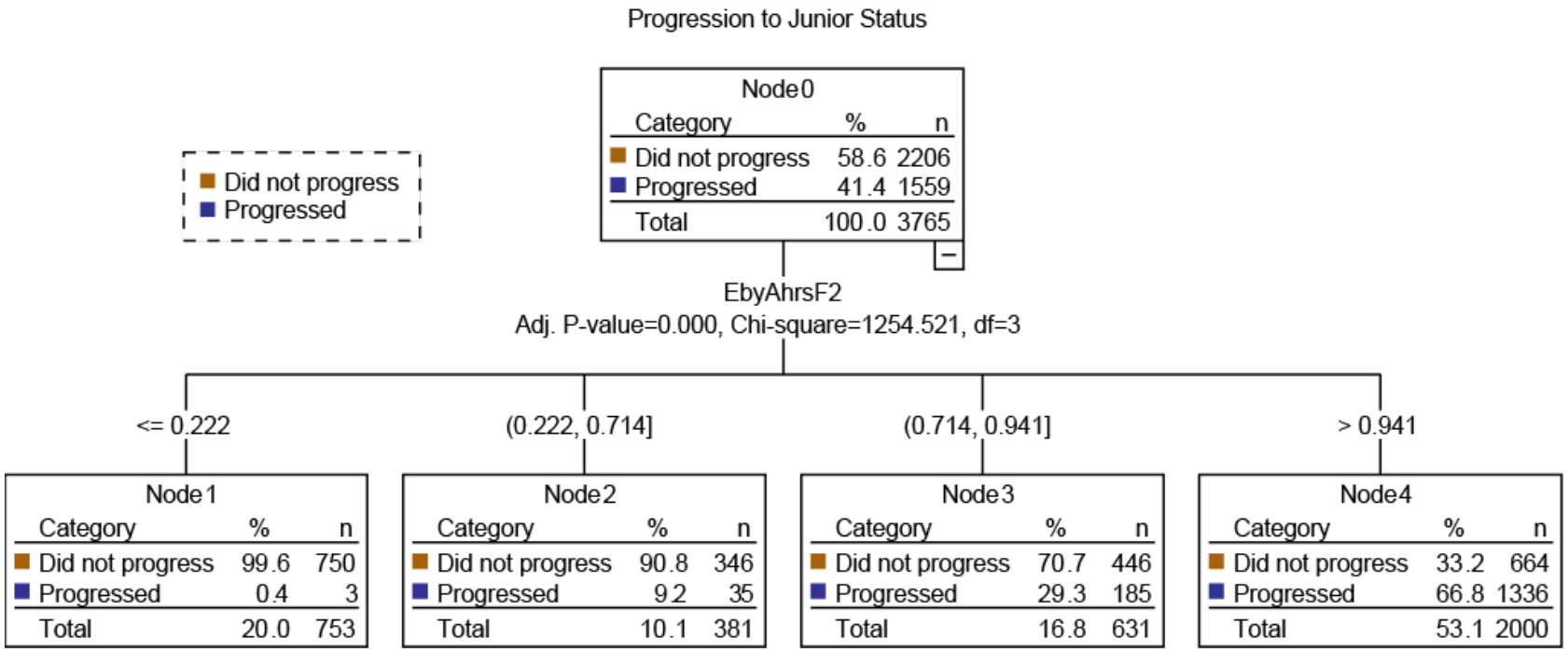
Earned by Attempted Credit Hours – Fall Year 1 (2002 Cohort)



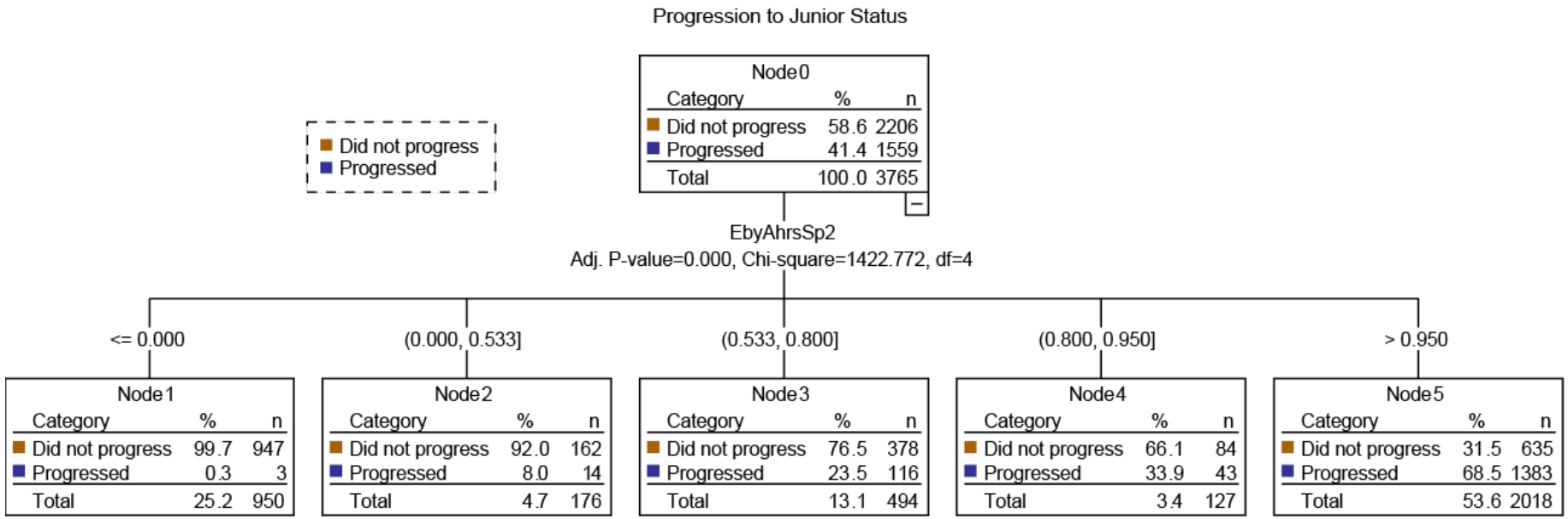
Earned by Attempted Credit Hours – Spring Year 1 (2002 Cohort)



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 4-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	**.749**	**.165**	**.000**	**2.115**
Math Benchmark	**.696**	**.093**	**.000**	**2.005**
Intercept	-1.848	.155	.000	.158

Nagelkerke R^2=.06

Prediction of 4-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.628	.167	.000	1.874
Math Benchmark	.464	.098	.000	1.591
High School GPA	**.810**	**.093**	**.000**	**2.249**
Intercept	-4.347	.333	.000	.013

Nagelkerke R^2=.10

Prediction of 4-Year Graduation Rate (2002 Cohort)

	b	*SE*	*p*	OR
English Benchmark	.509	.170	.003	1.664
Math Benchmark	.489	.104	.000	1.630
High School GPA	.715	.095	.000	2.044
Gender	**-.560**	**.118**	**.000**	**.571**
Minority	**-.535**	**.095**	**.000**	**.586**
Intercept	-3.586	.351	.000	.028

Nagelkerke R^2=.13

4-Year Graduation Rate

	b	*SE*	*p*	OR
English Benchmark	**.259**	**.195**	**.183**	**1.296**
Math Benchmark	**.543**	**.121**	**.000**	**1.721**
High School GPA	**.311**	**.111**	**.005**	**1.365**
Intercept	-.967	.409	.018	.380

Nagelkerke R^2=.45

Mid vs High	-1.720	.183	.000	.179
Mid-High vs High	-.704	.259	.007	.495
Intercept	-.967	.409	.018	.380

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
Intercept	.782	.406	.054	2.187

Nagelkerke R^2=.57

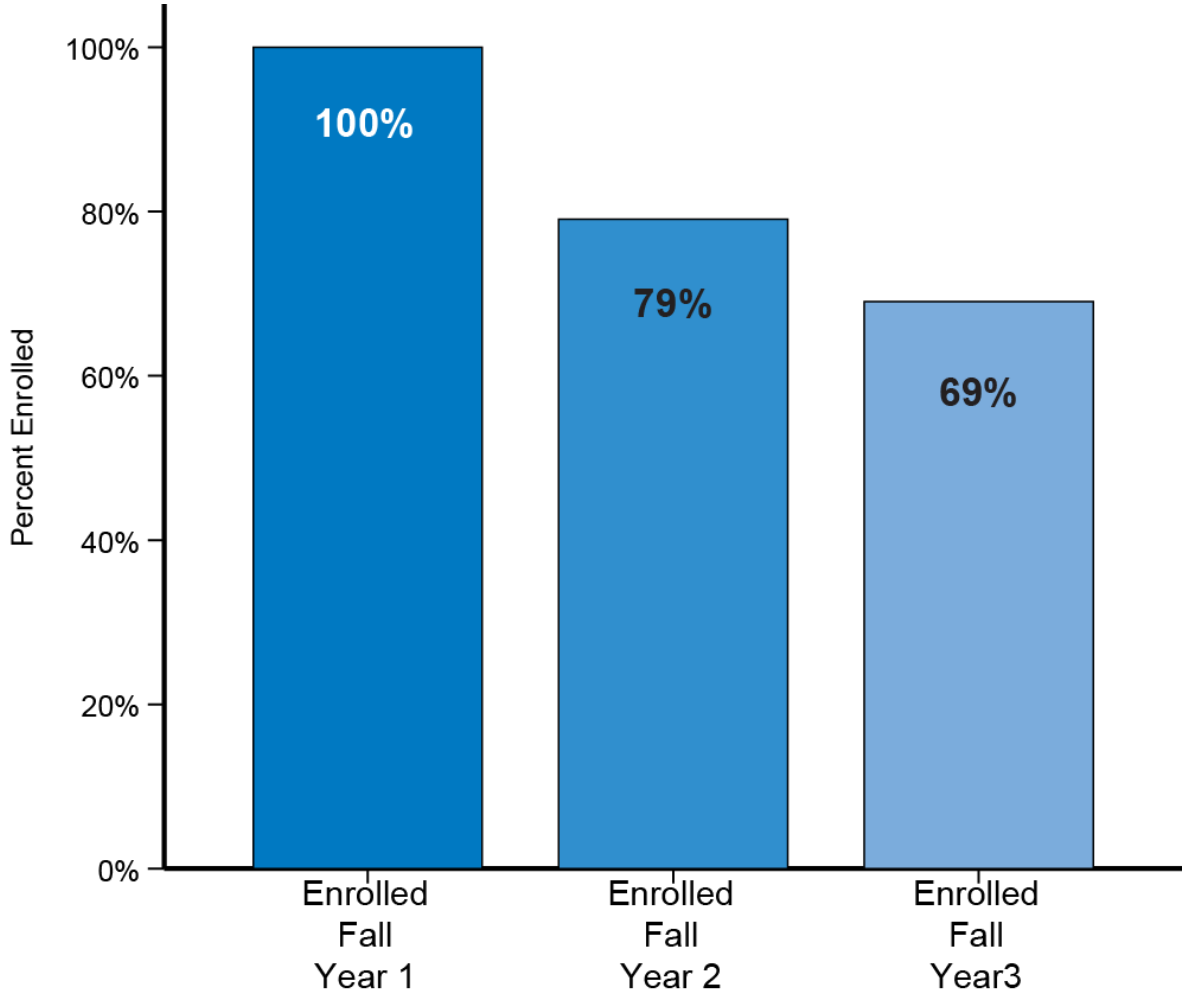
Mid vs High	-1.335	.138	.000	.263
Mid-High vs High	-.964	.244	.000	.381
Intercept	.782	.406	.054	2.187

Nagelkerke R^2=.57

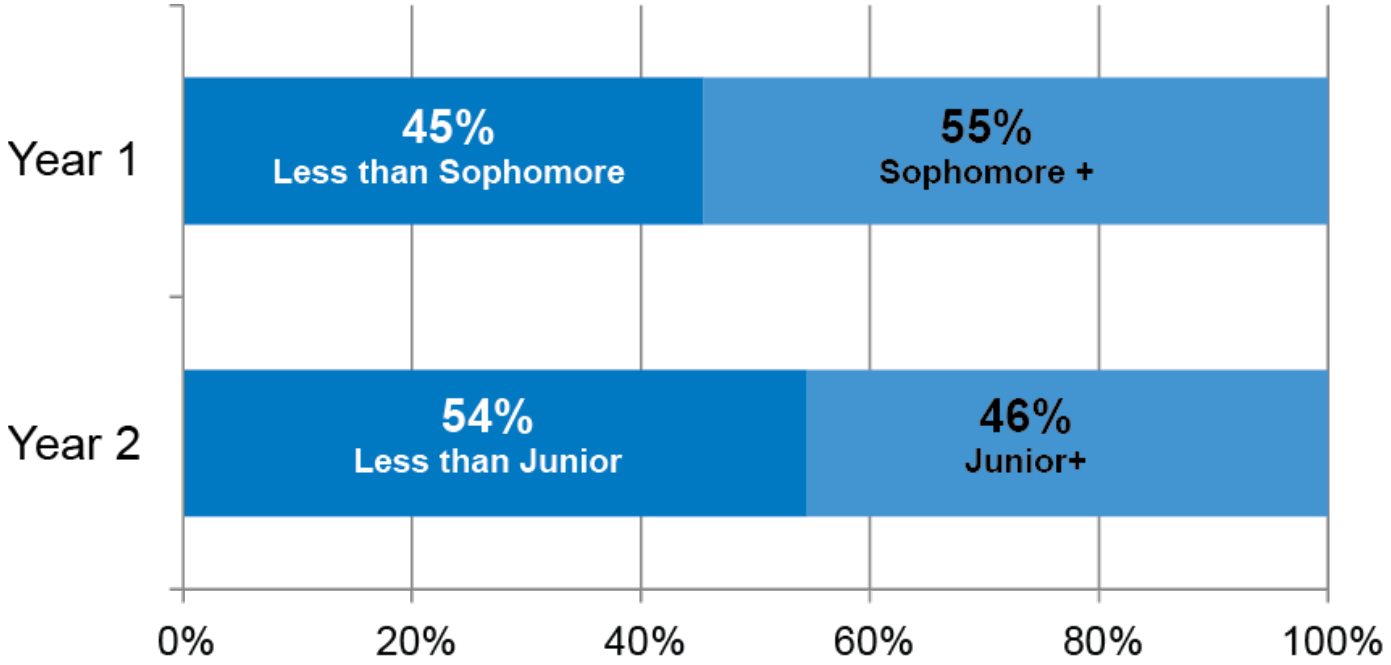
2008 Study Sample

- 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

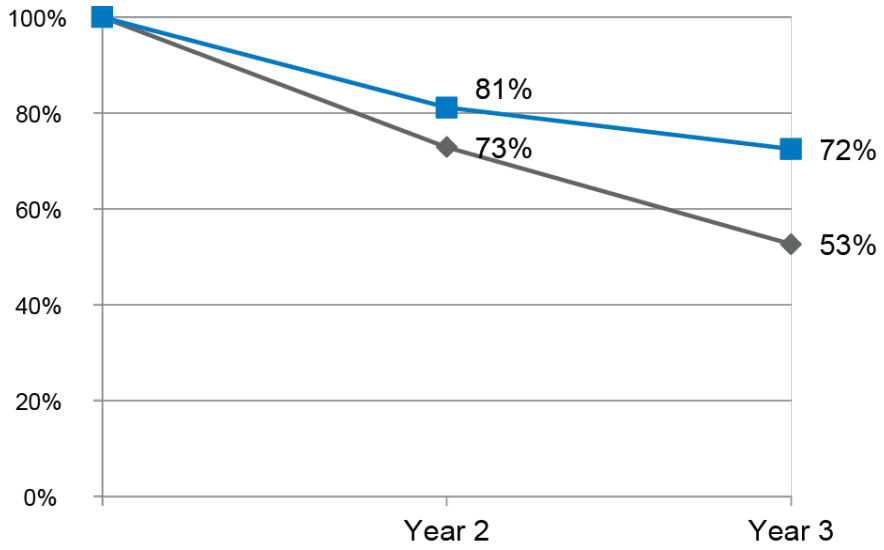
Retention (2008 Cohort)

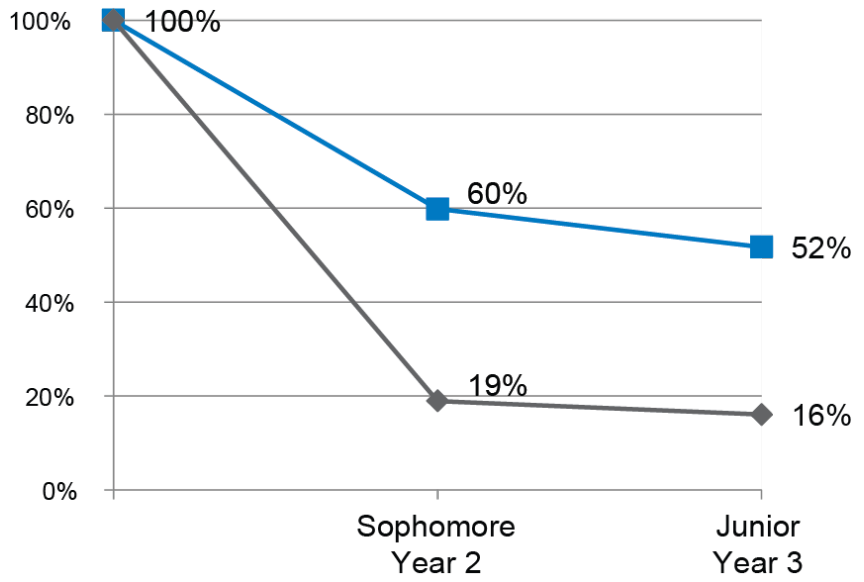


On Target Progression in Class Status (2008 Cohort)



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

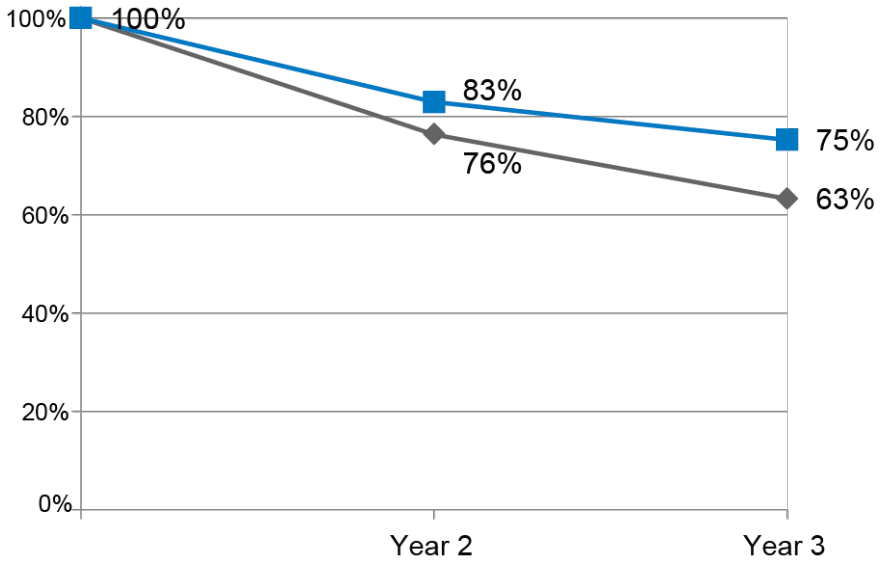


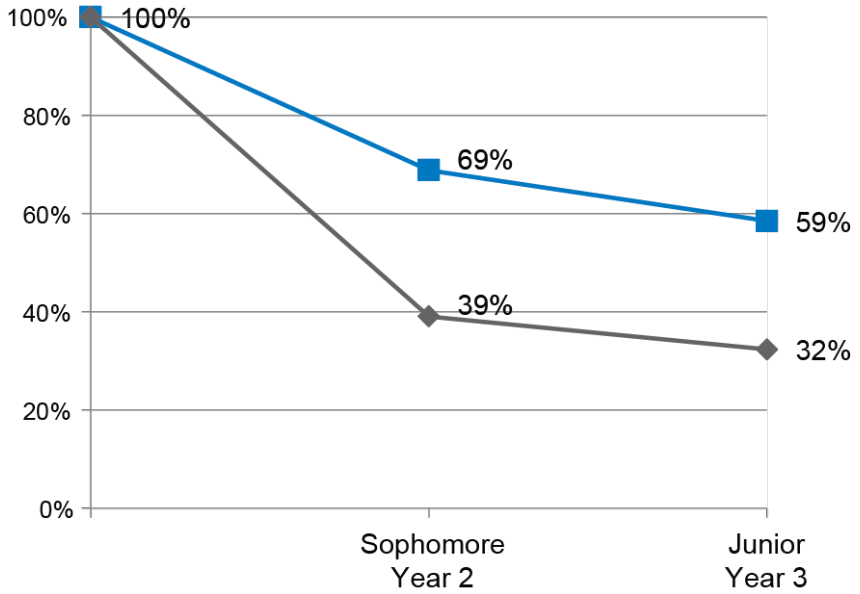


Met

Missed

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





Met

Missed

Predictors of Progression (2008 Cohort)

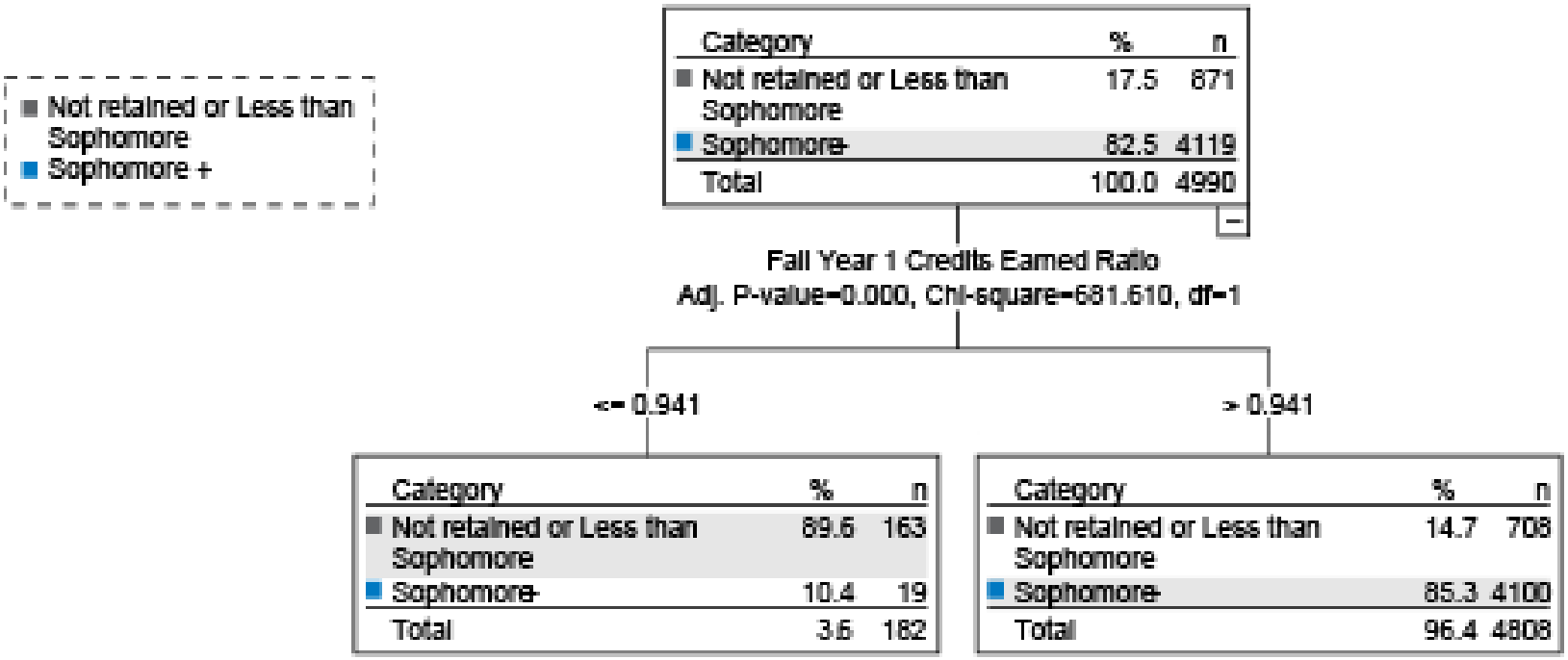
Sophomore Status

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

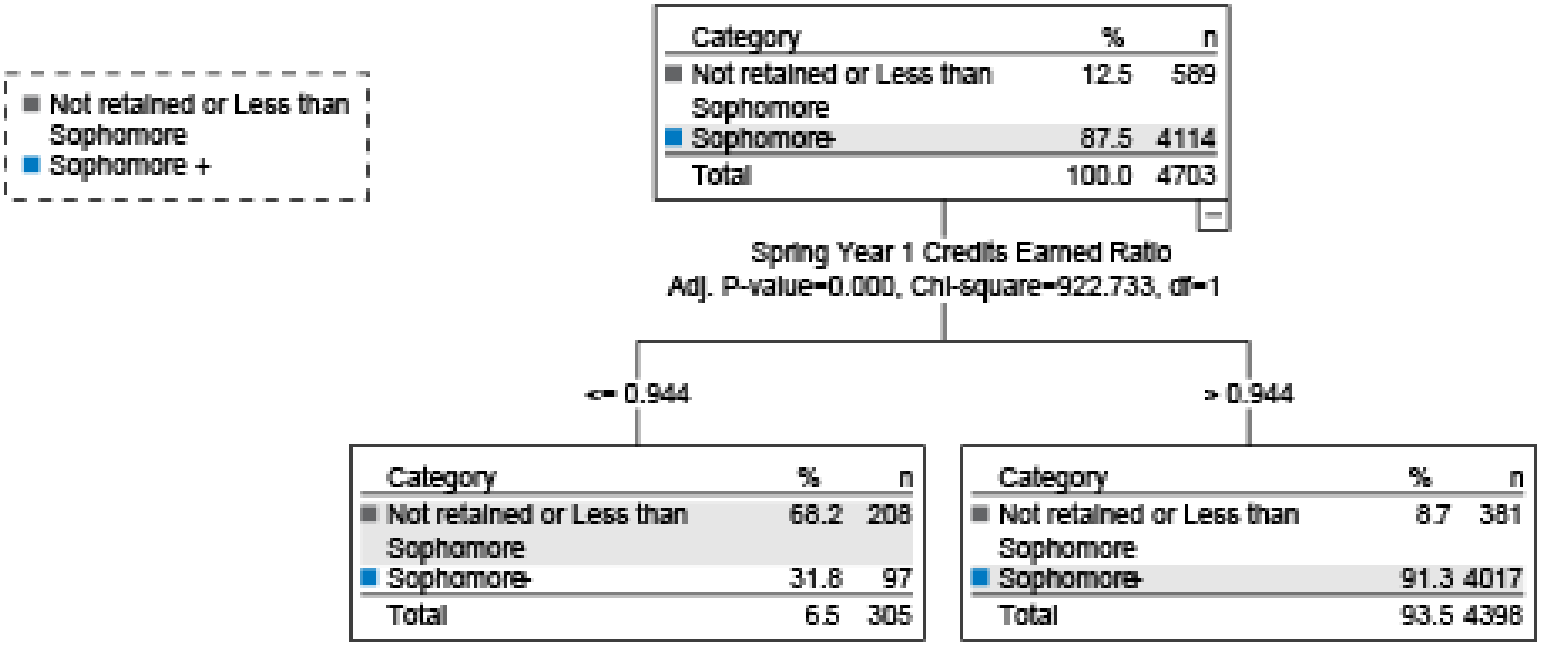
Junior Status

- 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

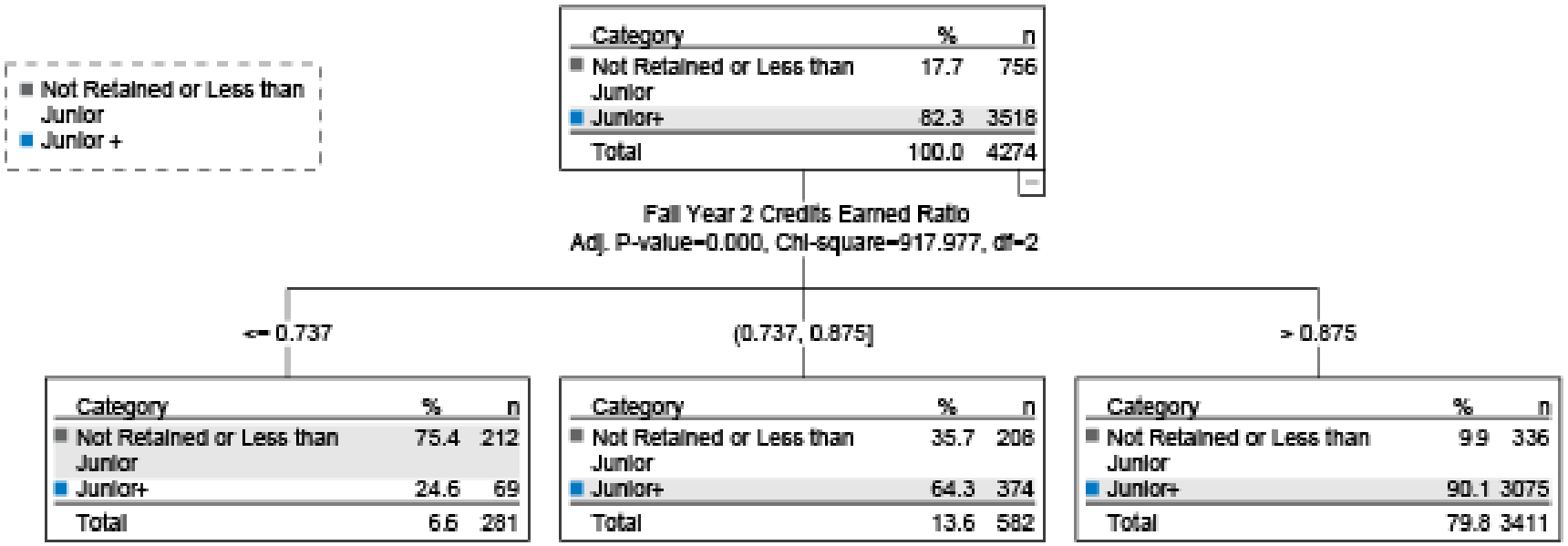
Earned by Attempted Credit Hours – Fall Year 1 (2008 Cohort)



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



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



Prediction of Progression to Sophomore (2008 Cohort)

	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 Cohort)

	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 Cohort)

	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 Cohort)

	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 Cohort

	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 Cohort

	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 Cohort)

	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 Cohort)

	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 should help to 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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