Overview

• About UMass Amherst
• What prompted our quest?
• The retention working group
• Data sources and variables
• Analyses and modeling
• Campus actions
• Conclusions
About UMass Amherst

- Flagship of the UMass system
- Only public Carnegie highest research university in MA
- Enrollment: 23,388 undergraduates in Fall 2017
  - Entering class of 4,714 last fall
- 76% of undergraduates are in-state
- 73% are White, 14% are URM
- 24% are first-gen, 22% are Pell grant recipients (entering class)
- Highly residential campus (~ 60% live on, including all first-years)
- Over 50 academic departments, over 100 undergraduate majors
What prompted our retention quest?

1. Chancellor identified 4-year graduation rate as key indicator
2. Gap between 4- and 6-year graduation rates
3. Gaps between continuation rates
4. US News Rankings
Retention Working Group - Membership

- Vice Provost for Undergraduate Education
  - Associate Provost for Student Success

- Associate Chancellor & Chief Planning Officer
  - (Interim) Director of Institutional Research
  - Planning Associate

- Associate Provost for Assessment and Educational Effectiveness
  - Director of Survey and Evaluation Research

- Director of Assessment (Student Affairs)
Retention Working Group – Activities

• Goal = Data-informed improvement of retention and graduation rates

• Analyzed and reviewed existing data
  – Group looked over an extensive set of bivariate relationships
  – Added select Freshman Survey data to the mix (e.g. senior year behaviors, UMass Amherst first-choice, intent to transfer)
  – Useful to get folks thinking about the range of characteristics and experiences that might matter

• Collect new data: Survey of sophomores and juniors
  – Low response rate, limited utility
Retention Working Group – Activities

• More comprehensively link existing survey data (NSSE, Climate Survey) to student database variables to model cohort retention
  – Important to incorporate data pertaining to students' campus experiences and attitudes?
• Attempt to more precisely discern and quantify the “who” and “why”
• Identify potential areas/targets for institutional action/intervention
Data Sources

- Longitudinal Student Database (LSDB)
  - Uses student census file as base to track cohorts of students by semester, since 1989
  - Added data from admissions, academic standing, financial aid, grades, degrees
  - Derive outcome variables

- Other ERP student data
  - Data not part of census but available (e.g. athlete, Greek life)

- CIRP Freshman Survey
  - Paper administration to nearly all entering FY students during summer orientation
  - Provides data on characteristics, experiences, attitudes, behaviors and expectations
Data Sources (continued)

• National Survey of Student Engagement (NSSE)
  – Administered every 3 years
  – Census of all first-years (and seniors)
  – First-year response rates:
    • 2014: 37% (n=1,793)
    • 2017: 53% (n=2,608)

• Campus Climate Survey
  – Census survey conducted November 2016
  – Response rate 38% (n=8,323)
  – Representativeness: women and students in the College of Natural Sciences slightly overrepresented
Modeling

• Focus on 2016 (1-year retention) and 2013 (4-year grad) cohorts
• First: model using only student database variables
• Second: model adding survey data into the mix
  – Challenge: non-response = missing data (mostly for Climate Survey and NSSE)
  – One strategy: Restrict analysis to cohort members who are survey respondents
  – Another strategy: Use Multiple Imputation to estimate missing survey variables
    • Item-missing data
    • Survey non-response
Modeling with Multiple Imputation

- Superior to single imputation (e.g. mean replacement) (Rubin, 2004)
Analysis Variables

Student Database
- SAT/ACT score
- High school GPA
- Sex
- Race/Ethnicity
- Residency
- First-gen status
- English native language
- Earned D or F
- Withdrawal from course
- School/College
- Honors
- Athlete
- Greek life

Freshman Survey
- Level of financial concern
- Institution first-choice?
- Intention to transfer
- Classroom disengagement in HS
- Drinking/partying
- Political views/behavior
- Mental health

Freshman Survey
- Pell grant status
- Exp. family contrib. (EFC)

NSSE Composites
- Supportive Environment
- Quality of Interactions
- Effectiveness of Teaching
- Student/Faculty Interactions

Climate Survey
- Connectedness overall
- Connectedness to faculty
- Sense of belonging
- Racial climate satisfaction
- Campus climate overall
- # of campus affiliations
- Total types of identity-based unfair treatment experienced
- Hours work for pay
# Cohorts Analyzed - Overview

- Focused on full-time first-year students

<table>
<thead>
<tr>
<th></th>
<th>Fall 2016</th>
<th></th>
<th>Fall 2013</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Size</td>
<td>4,643</td>
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<td>4,621</td>
<td></td>
</tr>
<tr>
<td>Average SAT</td>
<td>1225</td>
<td></td>
<td>1208</td>
<td></td>
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<tr>
<td>Average HS GPA</td>
<td>3.83</td>
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<td>3.73</td>
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<tr>
<td>% Female</td>
<td>48%</td>
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<td>49%</td>
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<tr>
<td>% Out of state</td>
<td>26%</td>
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<td>28%</td>
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<tr>
<td>% URM</td>
<td>13%</td>
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<td>11%</td>
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<tr>
<td>% First generation</td>
<td>25%</td>
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<td>25%</td>
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<tr>
<td>% Pell grant</td>
<td>21%</td>
<td></td>
<td>22%</td>
<td></td>
</tr>
</tbody>
</table>

- **CIRP**
  - Summer 2016
  - Fall 2016
- **Climate**
  - Fall 2016
- **NSSE**
  - Spring 2017
  - Summer 2013
  - Spring 2014
  - Fall 2016
## Fall 2016 Cohort – Bivariate Relationships

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>SAT</th>
<th>HS GPA</th>
<th>1-year retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,633</td>
<td>1225</td>
<td>3.83</td>
<td>4,196</td>
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<tr>
<td>In-State</td>
<td>3,412</td>
<td>1227</td>
<td>3.86</td>
<td>3,151</td>
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<tr>
<td>Out-of-State</td>
<td>857</td>
<td>1213</td>
<td>3.71</td>
<td>717</td>
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<tr>
<td>International</td>
<td>364</td>
<td>1224</td>
<td>3.75</td>
<td>328</td>
</tr>
</tbody>
</table>

- **1-year retention rates**
  - Total: 90.6%
  - In-State: 92.4%
  - Out-of-State: 83.7%
  - International: 90.1%

### Race/Ethnicity

- Asian
- White
- Not at all
- Occ
- Freq

### HS Classroom Disengagement

- Very
- Some what
- Not at all

### HS Partying

- Not at all
- Occ
- Freq

### Connectedness

- Very
- Some what
- Not at all

### School/College

- HFA
- SBS
- CNS
- ENG
- PHHS
- EDUC
- CICS
- ISOM
- NUR
Analyses – Correlations

• Correlation matrix of all potential variables

• Purpose is to eliminate highly correlated variables from analysis
Analyses – Fall 2016 Cohort Model Results

- Students (cases) with missing data excluded (cohort size = 4,633)

<table>
<thead>
<tr>
<th>Database variables only (n=4,512)</th>
<th>Demographic with survey indicator (n=4,512)</th>
<th>Climate survey respondents only (n=1,708)</th>
<th>NSSE survey respondents only (n=1,939)</th>
<th>Climate, NSSE and CIRP respondents (n=468)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residency</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Analysis not viable</td>
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<tr>
<td>First Generation</td>
<td>X</td>
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<tr>
<td>School/College</td>
<td>X</td>
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<tr>
<td>Greek Life</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Honors</td>
<td>X</td>
<td>X</td>
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<tr>
<td>D/F in course</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>W from course</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>Respond to NSSE</td>
<td></td>
<td>Connectedness Sense of belonging</td>
<td>HS GPA</td>
<td></td>
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<td></td>
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<td></td>
<td>Quality of Interactions</td>
<td></td>
</tr>
<tr>
<td>Database variables only (n=4,512)</td>
<td>Climate survey respondents – item imputed (n=1,987)</td>
<td>Climate survey respondents – full imputation (n=1,987)</td>
<td>Respondents to at least one survey – full imputation (n=4,199)</td>
<td>Full cohort – full imputation (n=4,633)</td>
</tr>
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<td>---------------------------------------------------------------</td>
<td>---------------------------------------------</td>
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<tr>
<td><strong>No Imputation</strong></td>
<td>22% of cases</td>
<td>78% of cases</td>
<td>89% of cases</td>
<td>90% of cases</td>
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<tr>
<td>Residency</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>First Generation</td>
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<td>X</td>
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<td>School/College</td>
<td>X</td>
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<tr>
<td>Greek Life</td>
<td>X</td>
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<tr>
<td>Honors</td>
<td>X</td>
<td>X</td>
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<tr>
<td>D/F in course</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>W from course</td>
<td>X</td>
<td>X</td>
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<td>X</td>
</tr>
<tr>
<td><strong>Connectedness</strong></td>
<td><strong>Sense of belonging</strong></td>
<td><strong>Pell EFC</strong></td>
<td><strong>Connectedness</strong></td>
<td><strong>Sense of belonging</strong></td>
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<tr>
<td></td>
<td><strong># of affiliations</strong></td>
<td><strong>Connectedness</strong></td>
<td><strong>Sense of belonging</strong></td>
<td><strong># of affiliations</strong></td>
</tr>
<tr>
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<td><strong>Sense of belonging</strong></td>
<td><strong># of affiliations</strong></td>
<td><strong>Quality of interactions</strong></td>
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<td><strong>Quality of interactions</strong></td>
<td><strong>Intent to transfer</strong></td>
<td><strong>Quality of interactions</strong></td>
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<td></td>
<td></td>
<td><strong>Intent to transfer</strong></td>
</tr>
</tbody>
</table>
Fall 2013 Cohort – Bivariate Relationships

<table>
<thead>
<tr>
<th></th>
<th>No. Entering</th>
<th>Average SAT</th>
<th>HS GPA</th>
<th>Continued to Year 2</th>
<th>Grad in 4 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>4,608</td>
<td>1208</td>
<td>3.73</td>
<td>89.8%</td>
<td>73.7%</td>
</tr>
<tr>
<td>Residency</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>In-State</td>
<td>3,346</td>
<td>1214</td>
<td>3.79</td>
<td>92.3%</td>
<td>76.1%</td>
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<tr>
<td>Out-of-State</td>
<td>166</td>
<td>1181</td>
<td>3.60</td>
<td>80.7%</td>
<td>66.9%</td>
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<tr>
<td>International</td>
<td>1,096</td>
<td>1191</td>
<td>3.58</td>
<td>83.5%</td>
<td>67.4%</td>
</tr>
</tbody>
</table>

† Students are considered full-time if they enroll for 12 or more credits in their first semester.

All Students

- HSGPA: 3.73
- 4-year graduation rate: 73.7%
Fall 2013 Cohort - Challenges

• Different profile than more recent incoming cohorts
  – Lower HS GPA and SAT
  – Fewer international students
  – Included undeclared students

• Climate Survey data is from year 4 (compared to year 1 for 2016 cohort)
  – students who were not retained to year 4 had no chance of participating
    → Some non-response is not at random
<table>
<thead>
<tr>
<th>Database variables only (n=4,558)</th>
<th>NSSE survey respondents – item imputed (n=1,710)</th>
<th>NSSE survey respondents – full imputation (n=1,710)</th>
<th>Full cohort – full imputation, no climate survey data (n=4,608)</th>
<th>Full cohort – full imputation, with climate survey data (n=4,608)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No imputations</strong></td>
<td>19% of cases</td>
<td>57% of cases</td>
<td>84% of cases</td>
<td>94% of cases</td>
</tr>
<tr>
<td>SAT</td>
<td>X</td>
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<td>Sex</td>
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<tr>
<td>Residency</td>
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<td>First Generation</td>
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<td>Pell Grant</td>
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<td>W from course</td>
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<td>D/F in course 1st year</td>
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<td>Demonstrating in HS</td>
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<td>Demonstrating in HS</td>
<td>EFC</td>
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<tr>
<td>Hours partying in HS</td>
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<td>Hours partying in HS</td>
<td>Athlete</td>
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<td>EFC</td>
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<td>Financial concerns</td>
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<tr>
<td>Smoking in HS</td>
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<td>Parental status</td>
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<tr>
<td>Intention to transfer</td>
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<td>Acad engagement in HS</td>
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<tr>
<td>Athlete</td>
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Campus Action So Far

- Increased interest in and focus on retention and graduation across campus
- Early alert systems (pilots in Fall 2017/Spring 2018)
- Senior completion committee
- Drive to collect more information on student engagement and experience (e.g. card swipes for events, rec center, dining hall, study abroad, student leadership roles, students working on campus)
Future Directions

• Duplicate analyses for additional cohorts to validate
• Follow these cohorts to graduation
• Identify and add to the mix additional student data: non-cognitive variables and student experience
• Share results with campus stakeholders
Conclusions

• More challenging and complicated than it may seem...
Questions?

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• Elizabeth Williams (williams@acad.umass.edu)