

# MINING BIG DATA:

## Survey Factors as Arsenal to Solve the Retention Puzzle

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# AGENDA

- **who we are:** background on the University of Central Florida and the office of Operational Excellence and Assessment Support (OEAS)
- **setting the stage:** theoretical framework and context
- **exploratory analysis and modeling:** identifying survey factors associated with at-risk outcomes
- **a case study:** putting what we have learned into practice

# UNIVERSITY OF CENTRAL FLORIDA

- large public metropolitan research university with over 63,000 enrolled students
- Carnegie Classification: Doctoral Universities - Highest Research Activity (R1)
- 12 colleges including a medical school
- 212 degree programs (93 bachelor's, 84 master's, 3 specialist, 31 doctoral, 1 professional)
- approximately 50% of UCF students are transfer students

# OPERATIONAL EXCELLENCE AND ASSESSMENT SUPPORT (OEAS)

## *OFFICE FUNCTIONS*

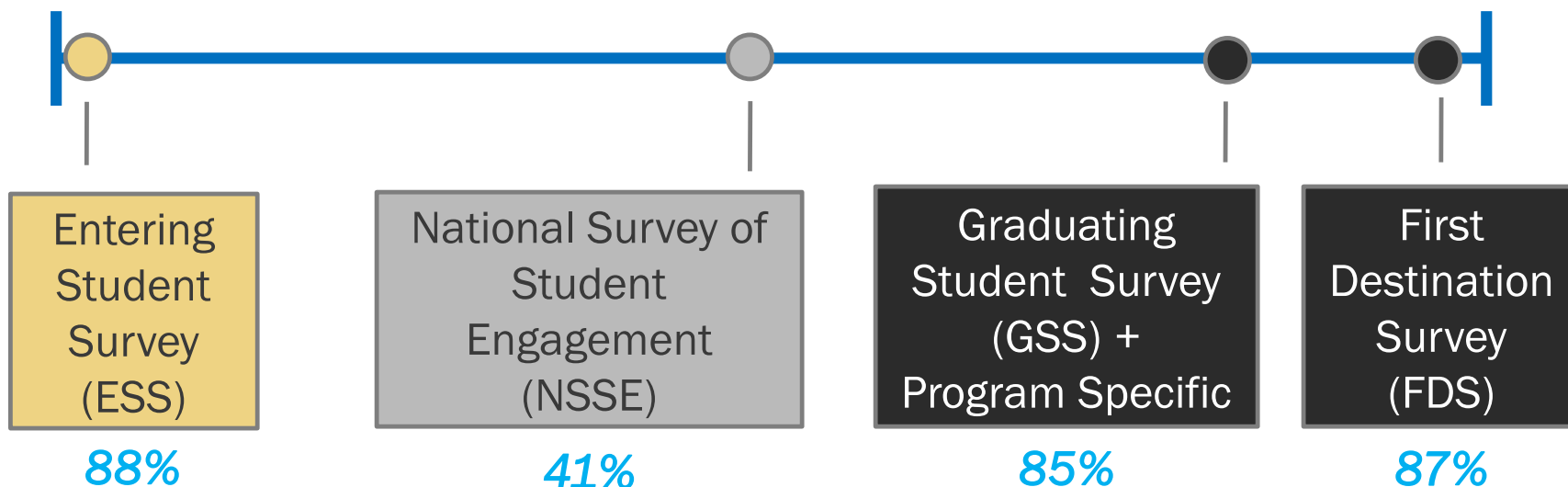
- OEAS supports efforts to improve the quality of student learning outcomes and the effectiveness and efficiency of University operations through assessment and analytics
  - guidance in institutional effectiveness assessment
  - analytical and survey studies
  - continuous quality improvement studies
  - technology integration
  - decision support

# STUDENT SURVEY CYCLE AT UCF

- Administered once a year to all incoming undergraduates
- Administered every 3 years to all undergraduate first-year and seniors
- Administered every semester to all graduating students
- Continuous collection of official student records

Admitted  
to UCF

Graduated  
from UCF



*Typical undergraduate survey response rate*

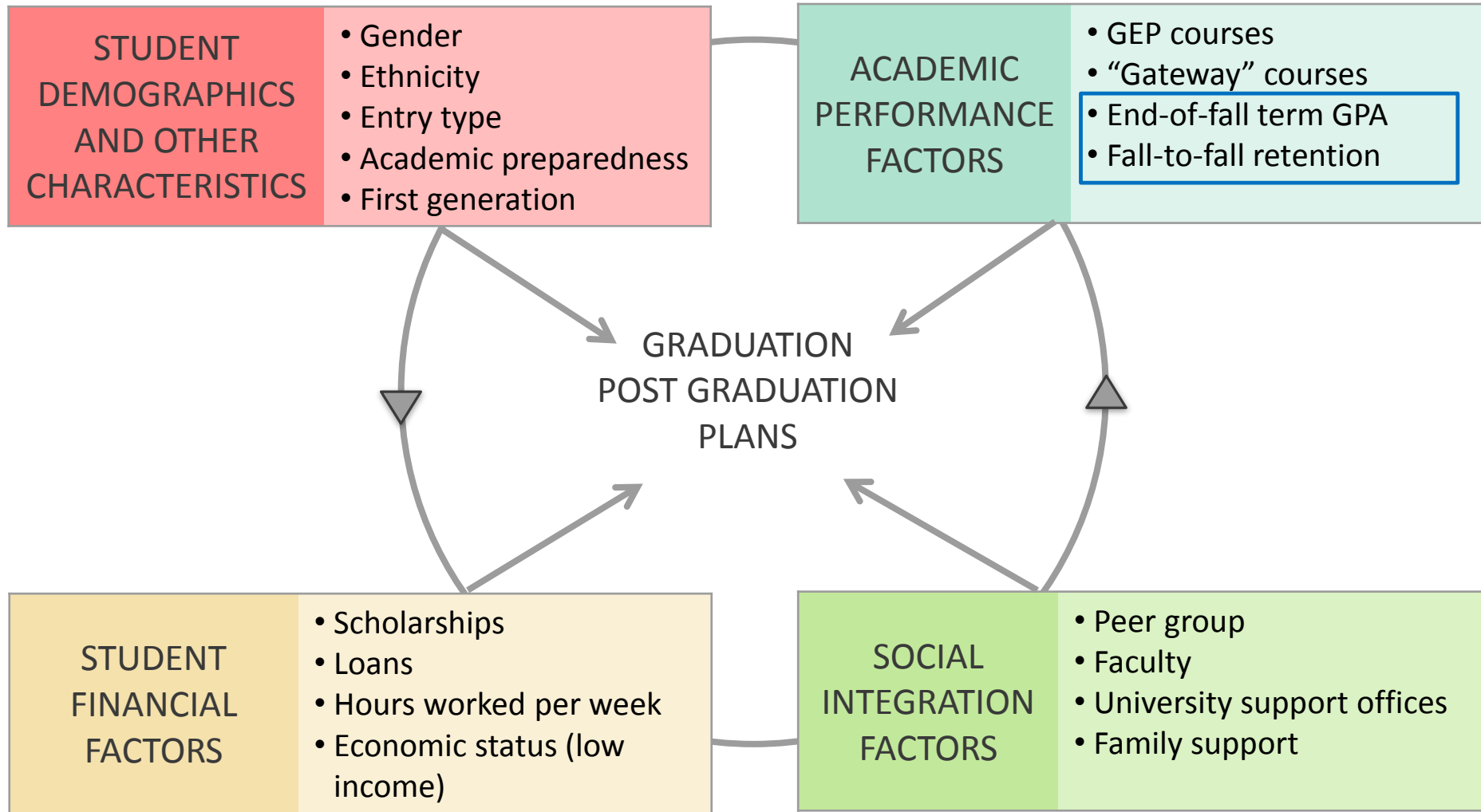
# SETTING THE STAGE: THEORETICAL FRAMEWORK AND CONTEXT

# STUDENT SUCCESS MODEL\*

- factors considered for the student success model are supported in the literature (Tinto, Astin & Scherrei, Berger & Braxton)
- recent conversations at many levels have focused on goal attainment – as defined by improved graduation rates, successfully attaining post graduation goals etc.
- the student success model is dynamic, complex and should include interactive factors

*\* Adapted from Tinto's model and other work related to student success.*

# STUDENT SUCCESS MODEL\*

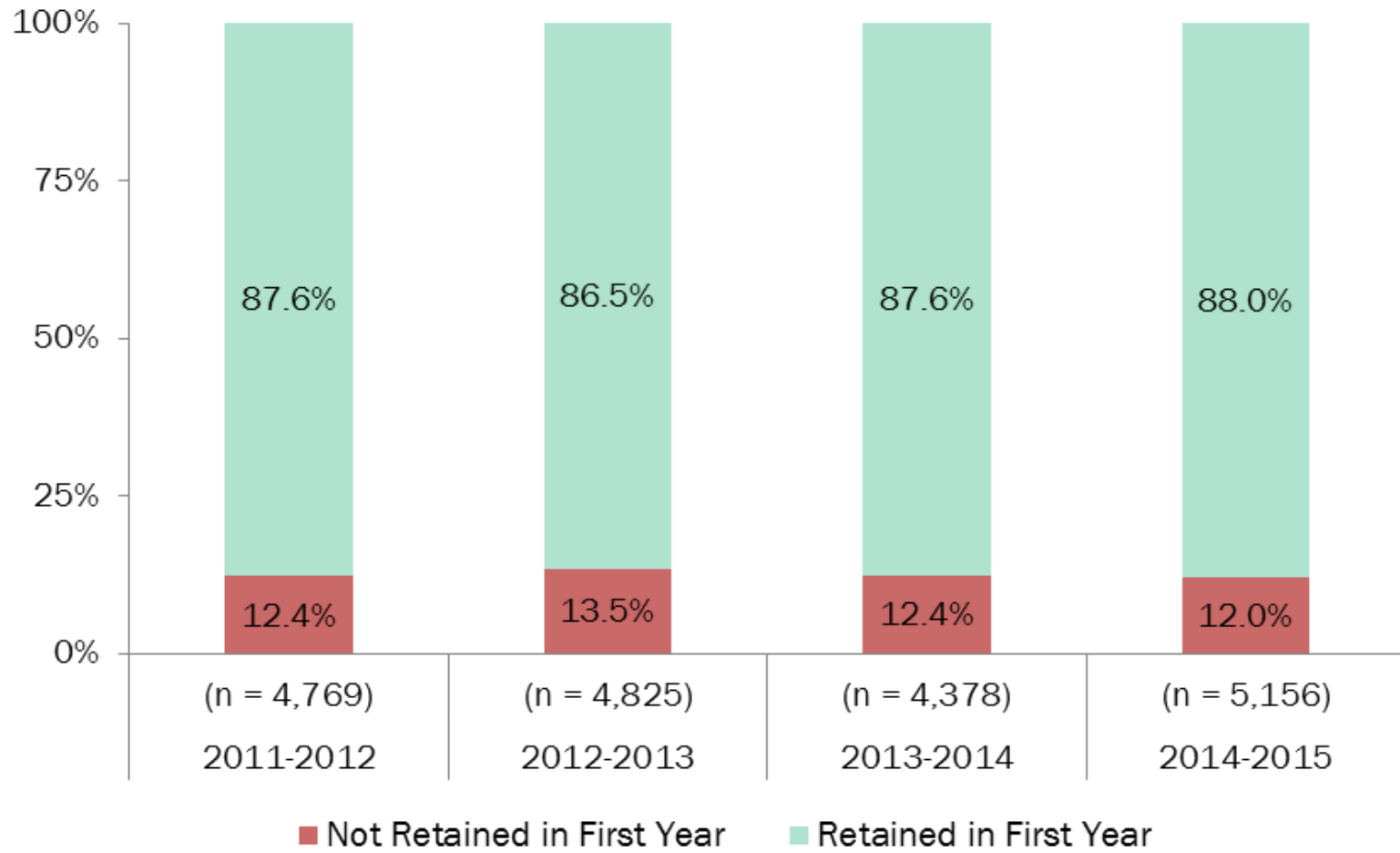


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# HISTORICAL RETENTION AND ATTRITION RATES

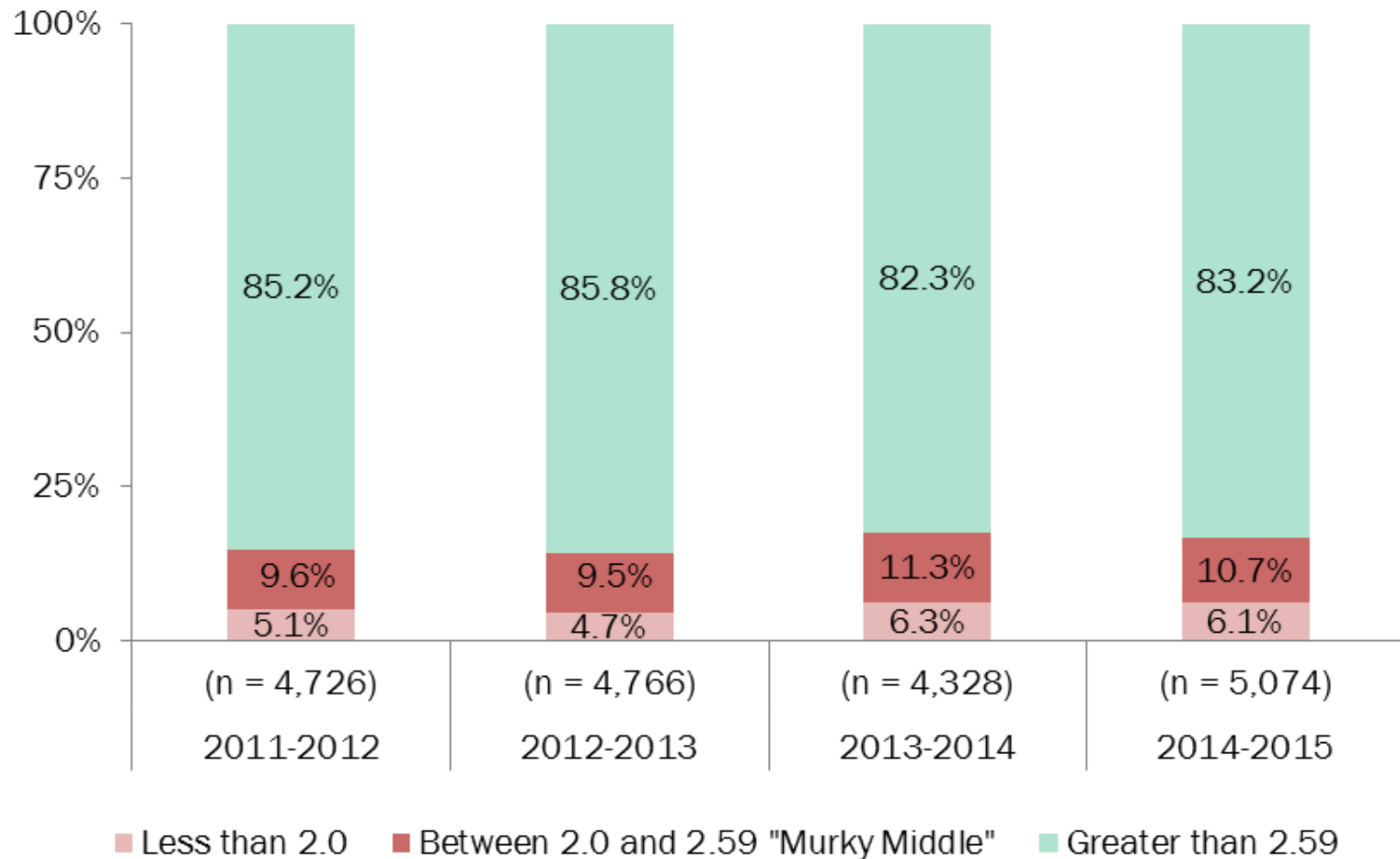
FTIC First Year Retention and Attrition Rates  
2011-2012 to 2014-2015



*Overall FTIC First Year Attrition Rate = 12.6%*

# HISTORICAL END OF FIRST FALL CUMULATIVE GPA

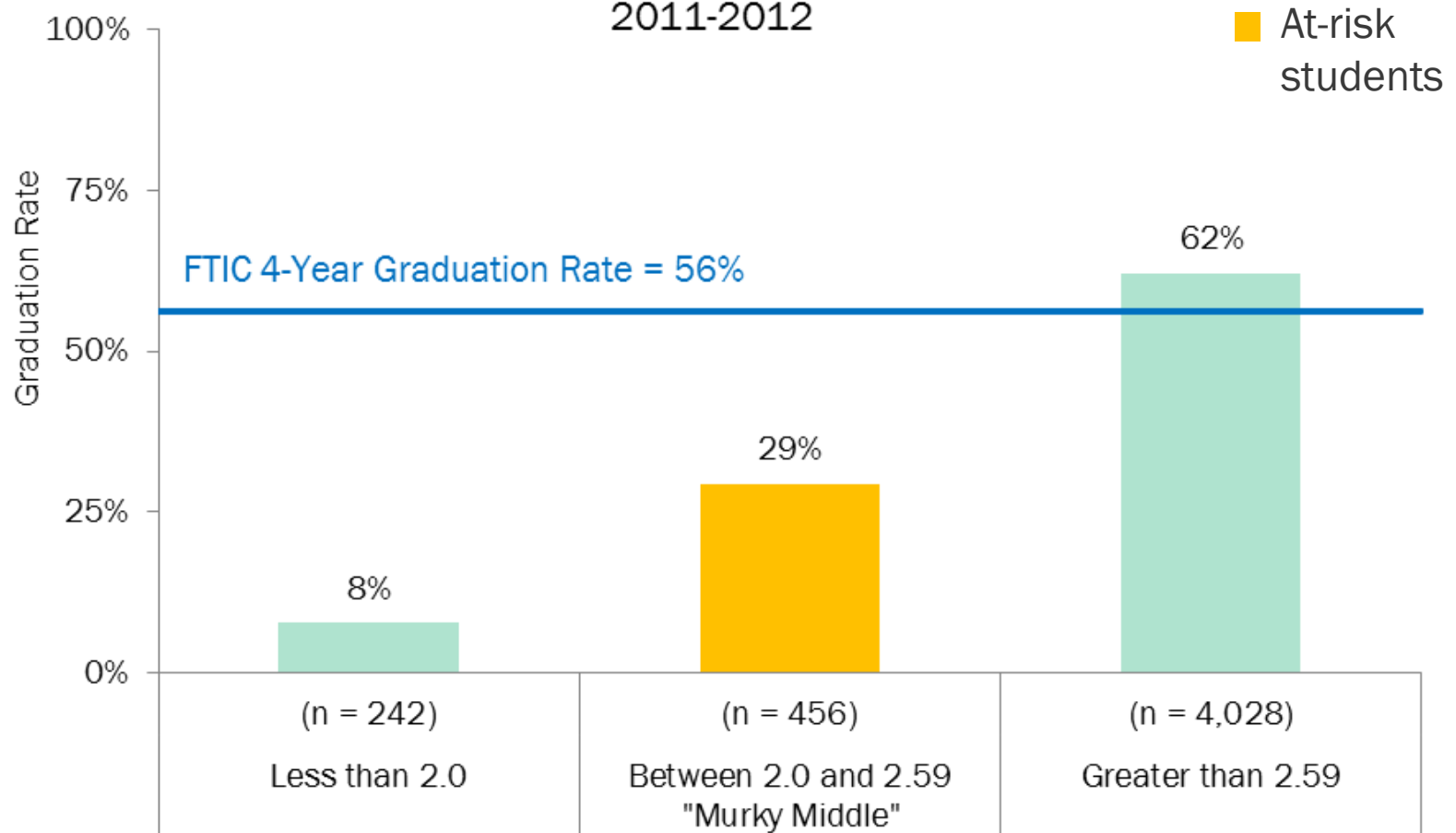
FTIC End of Fall Cumulative GPA  
2011-2012 to 2014-2015



*Overall FTIC End of Fall UCF Cum GPA 2.0-2.59 = 10.3%*

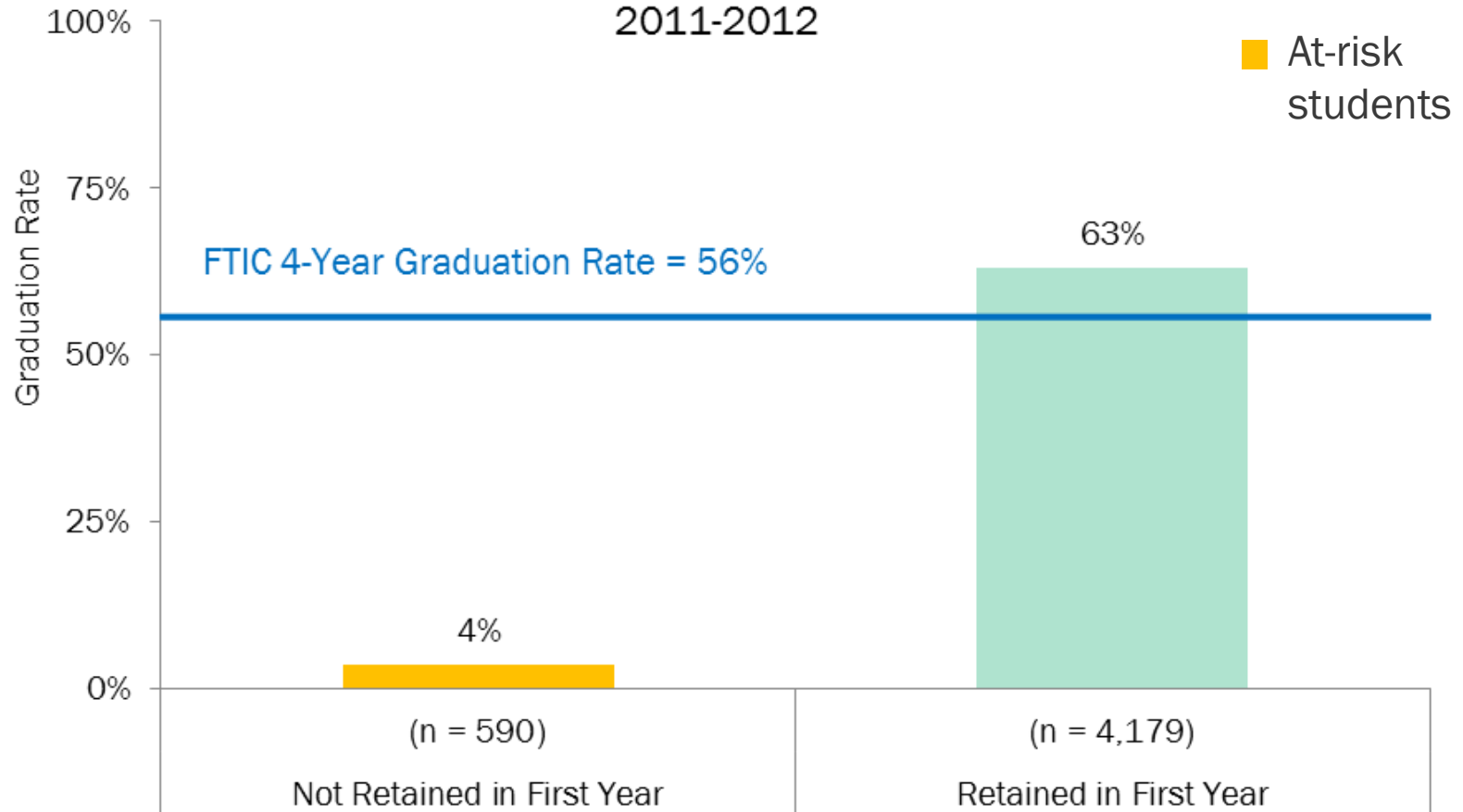
# HOW GRADUATION RATES ARE IMPACTED BY END OF FIRST FALL CUMULATIVE GPA

FTIC 4-Year Graduation Rates by  
End of Fall Cumulative GPA  
2011-2012



# HOW GRADUATION RATES ARE IMPACTED BY FIRST YEAR RETENTION

FTIC 4-Year Graduation Rates by First Year Retention  
2011-2012



# DESIRED CHARACTERISTICS OF FACTORS THAT HELP IDENTIFY THE AT-RISK STUDENTS

- factors used to identify at-risk students are most impactful if they are:
  - **comprehensive** – should have information on “majority” of students
  - easily available in a **timely** manner – sooner it is available for student support offices the sooner they can act on it
  - **actionable** with specifics – Student’s name, email id, phone number
  - able to be **validated** with direct evidence

# EXPLORATORY ANALYSIS AND MODELING: IDENTIFYING SURVEY FACTORS ASSOCIATED WITH AT-RISK OUTCOMES

# ENTERING STUDENT SURVEY (ESS)

- administered during face-to-face summer/fall orientation sessions every year since 2009-2010
- most recent First-Time-in-College (FTIC) administration (2015-2016) had a response rate of 90%
- topics on the survey instrument include:

Measures of Resilience

Academic Engagement Expectations at UCF

Social Engagement Expectations at UCF

Academic Engagement in High School

Self Evaluation of Abilities

Importance of Abilities

Importance of Academic Advising

Comfort with Academic Advising

Academic Policies and Procedures

Degree Requirements

Campus Resources

Alcohol, Drugs and Health

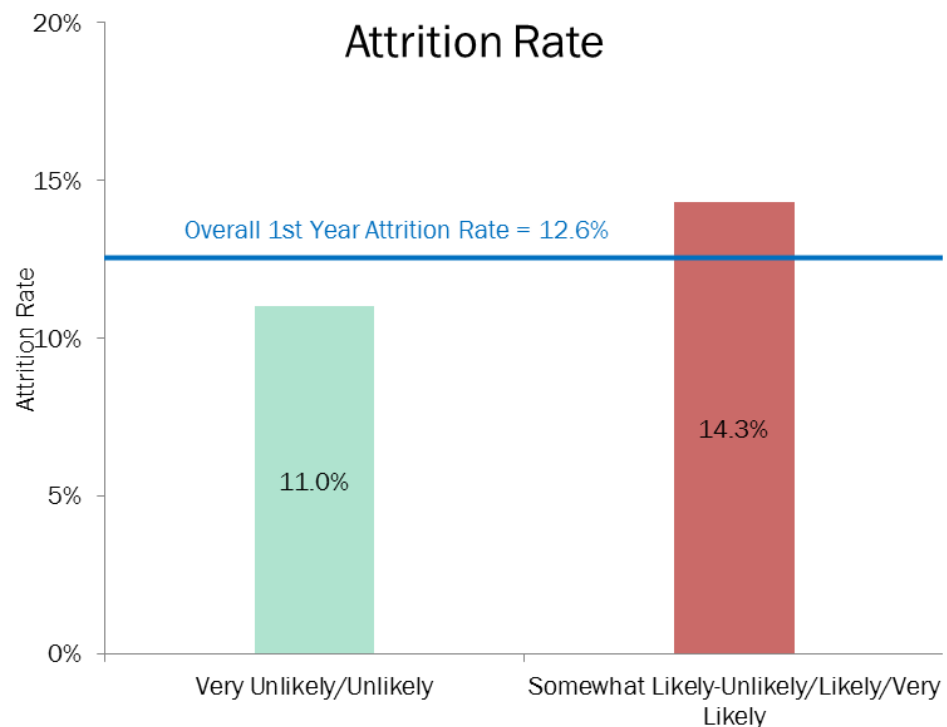
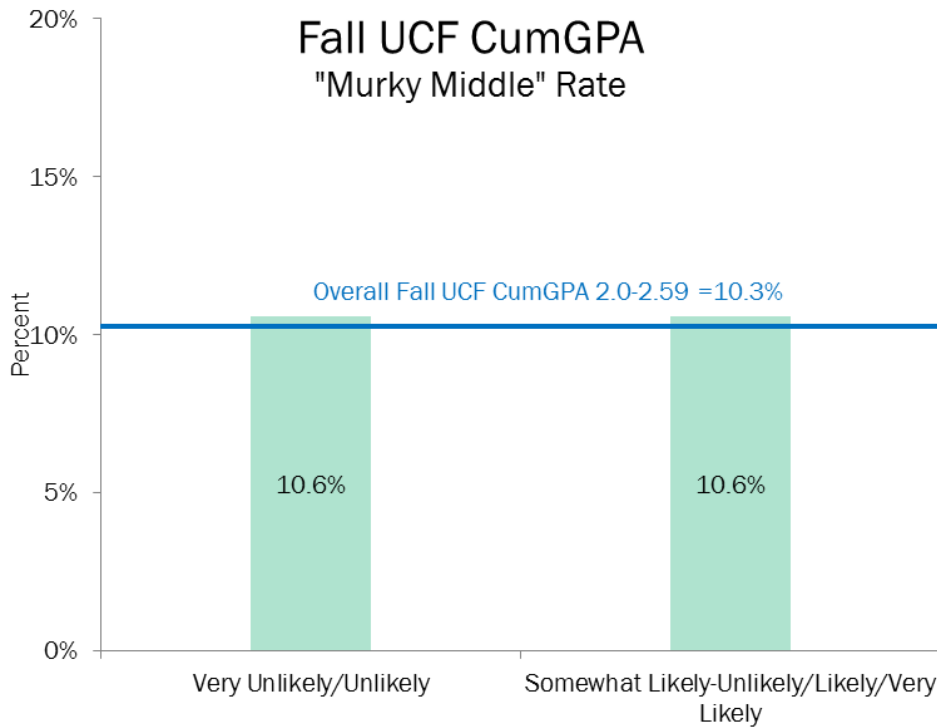
College Expenses

Demographics and Student History

# ESS ITEM: LIKELY TO TRANSFER

## 2011-2012 TO 2014-2015

Likelihood that you will: Transfer to another college or university	Number of Respondents	Fall UCF CumGPA 2.0 - 2.59		Attrition in their first year	
		Count	%	Count	%
Very Unlikely/Unlikely	10,335	1,097	10.6%	1,138	11.0%
Somewhat Likely-Unlikely/Likely/Very Likely	1,929	206	10.6%	277	14.3%

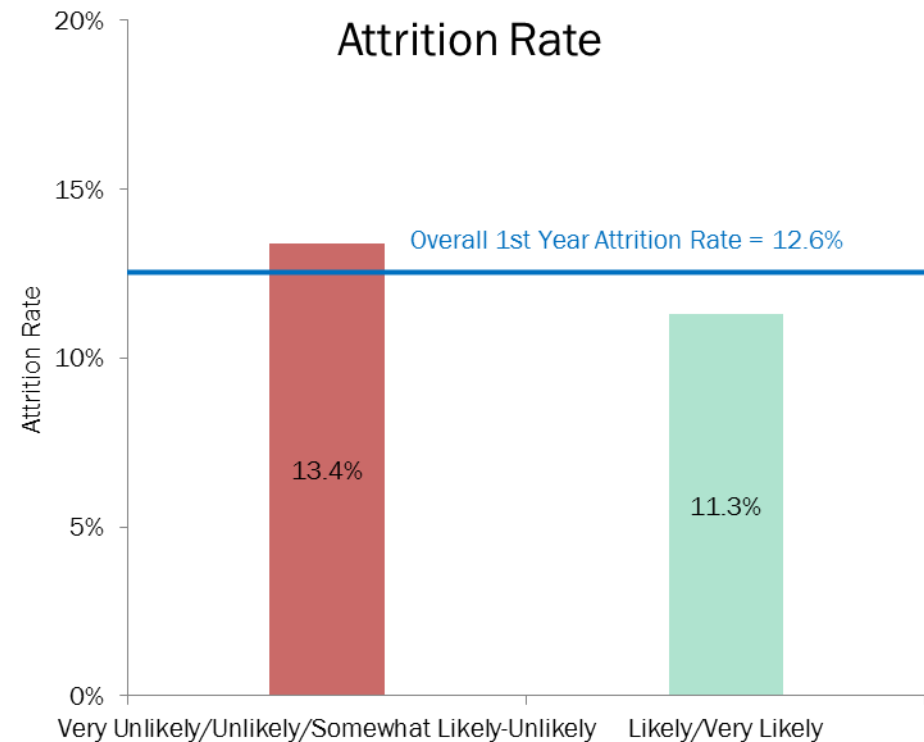
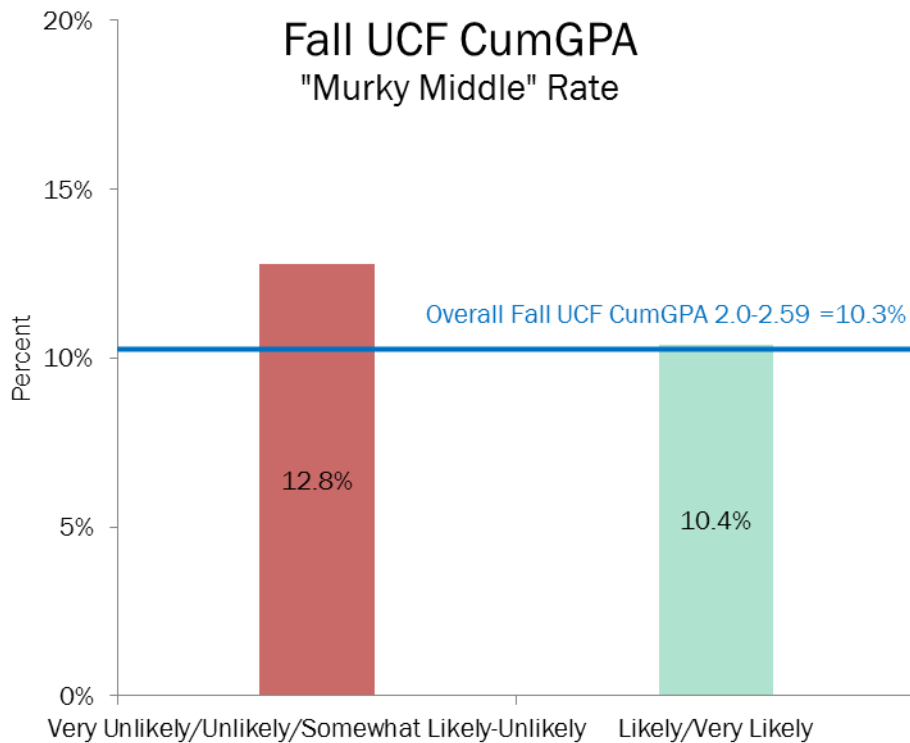




# ESS ITEM: LIKELY TO MAKE AT LEAST A 'B' AVERAGE

## 2011-2012 TO 2014-2015

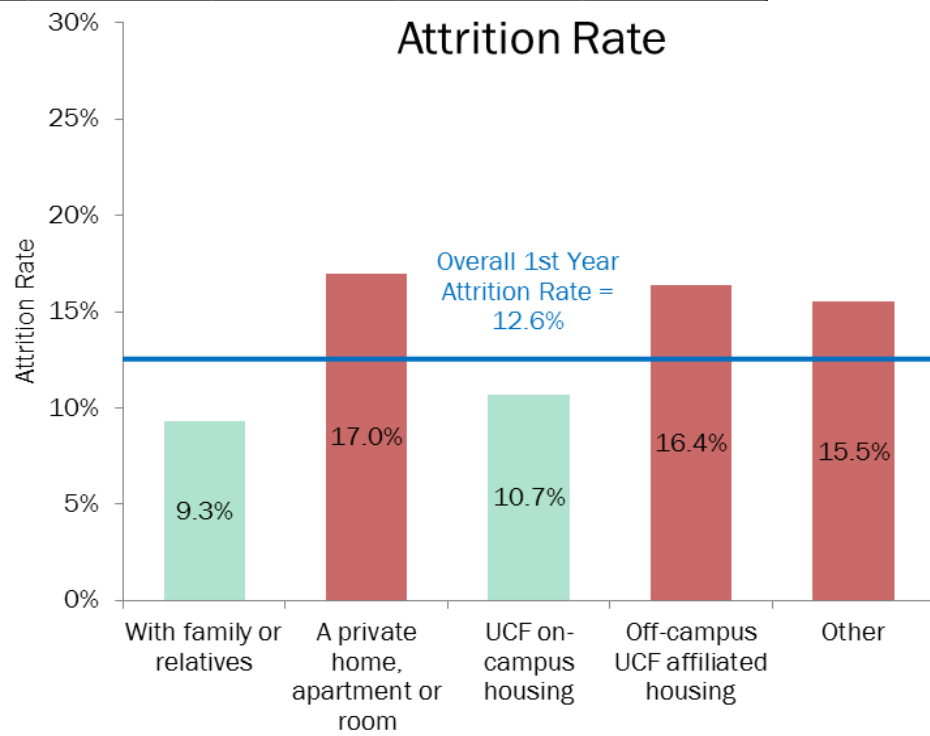
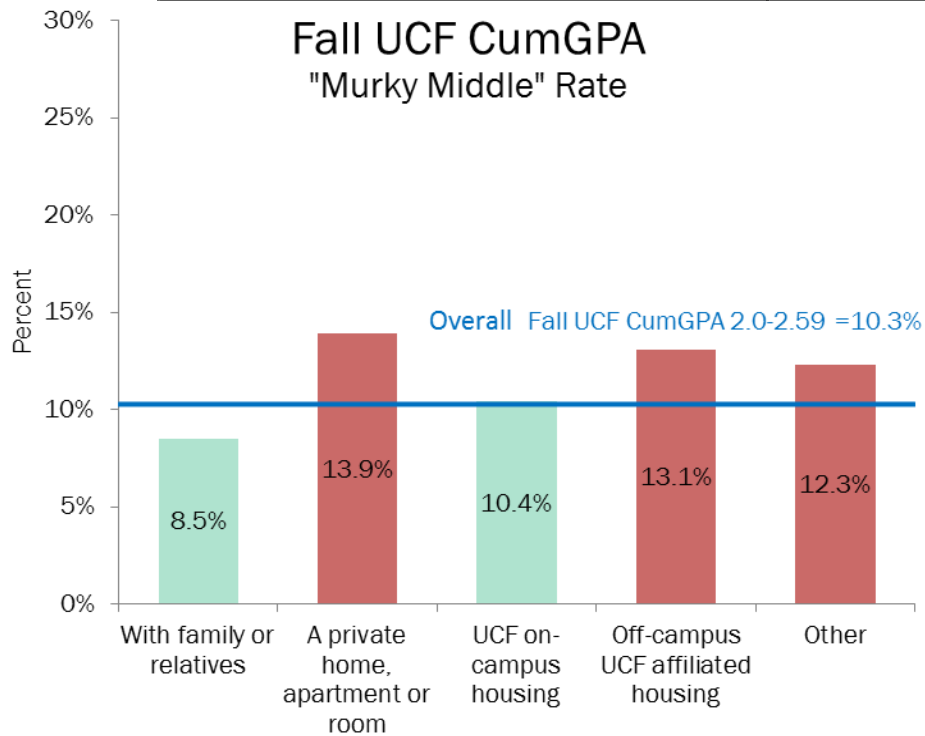
Likelihood that you will: Make at least a 'B' average	Number of Respondents	Fall UCF CumGPA 2.0 - 2.59		Attrition in their first year	
		Count	Row %	Count	Row %
Very Unlikely/Unlikely/Somewhat Likely-Unlikely	902	116	12.8%	121	13.4%
Likely/Very Likely	11,383	1,192	10.4%	1,288	11.3%



# ESS ITEM: WHERE DO YOU PLAN TO LIVE?

## 2011-2012 TO 2014-2015

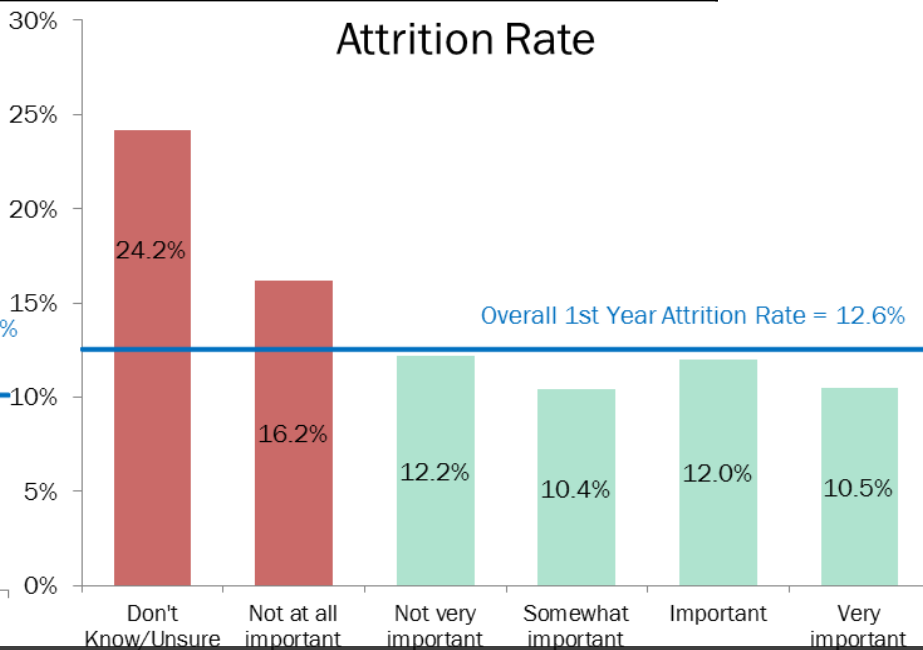
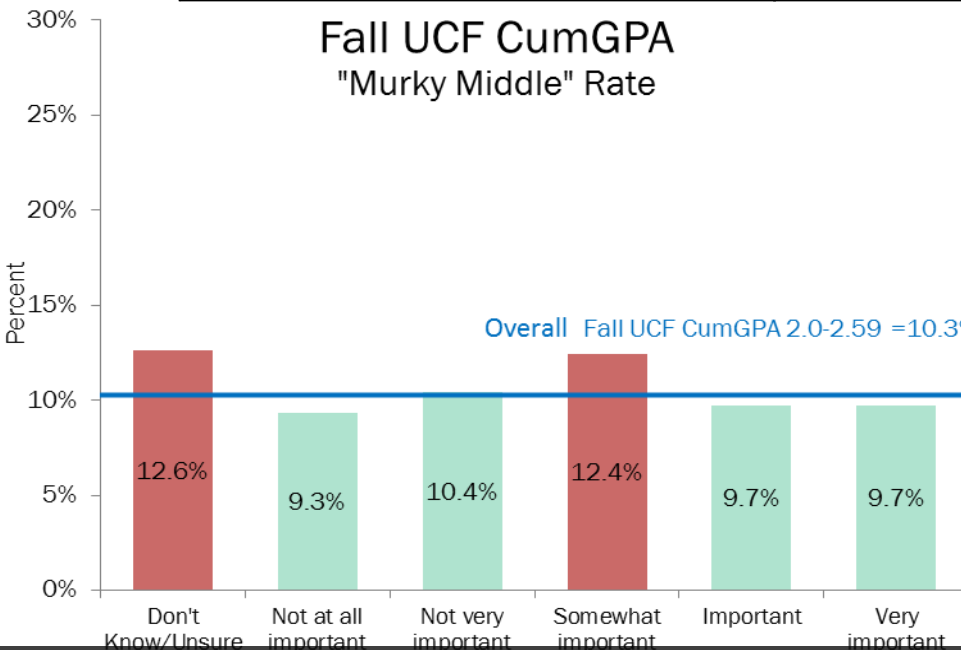
18. During the fall semester, where do you plan to live?	Number of Respondents	Fall UCF CumGPA 2.0 - 2.59		Attrition in their first year	
		Count	Row %	Count	Row %
With family or relatives	1,845	157	8.5%	172	9.3%
A private home, apartment or room	1,312	183	13.9%	224	17.0%
UCF on-campus housing	8,606	900	10.4%	928	10.7%
Off-campus UCF affiliated housing	267	35	13.1%	44	16.4%
Other	308	38	12.3%	48	15.5%



# ESS ITEM: PERCEIVED IMPORTANCE OF ETHICAL PRACTICES AFTER GRADUATION

## 2011-2012 TO 2014-2015

Perceived importance of ability after graduation: Ethical practices	Number of Respondents	Fall UCF CumGPA 2.0 - 2.59		Attrition in their first year	
		Count	Row %	Count	Row %
Don't Know/Unsure	95	12	12.6%	23	24.2%
Not at all important	43	4	9.3%	7	16.2%
Not very important	172	18	10.4%	21	12.2%
Somewhat important	708	88	12.4%	74	10.4%
Important	2,048	199	9.7%	247	12.0%
Very important	4,234	412	9.7%	446	10.5%



# ALL 20 ABILITIES LISTED IN THE PERCEIVED IMPORTANCE SECTION OF THE ESS

- Writing effectively
- Understanding written information
- Speaking effectively
- Listening more closely to others
- Using email to communicate with a teacher/instructor
- **Your computer skills**
- **Your math skills**
- Organizing your time effectively
- Thinking logically/resolving analytical problems
- Working independently/learning on your own
- **Working cooperatively in a group**
- Gaining a broad education about different fields
- Respecting different philosophies and cultures
- **Your research skills**
- Appreciating the arts
- **Ethical practices**
- **Using the web to find information**
- Professional practices
- Pursuit of life-long learning
- Learning in an online virtual environment

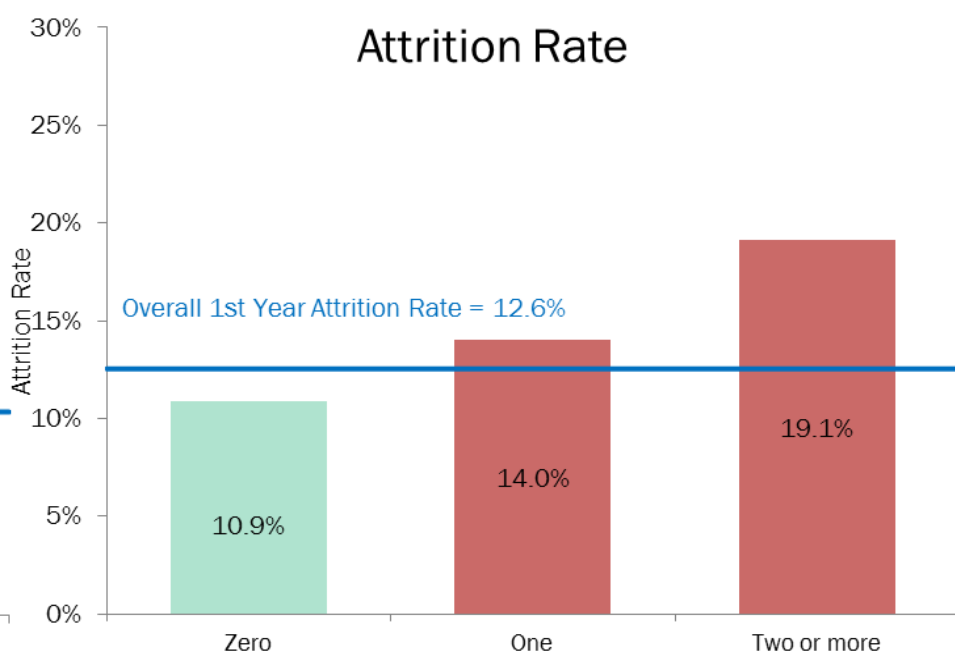
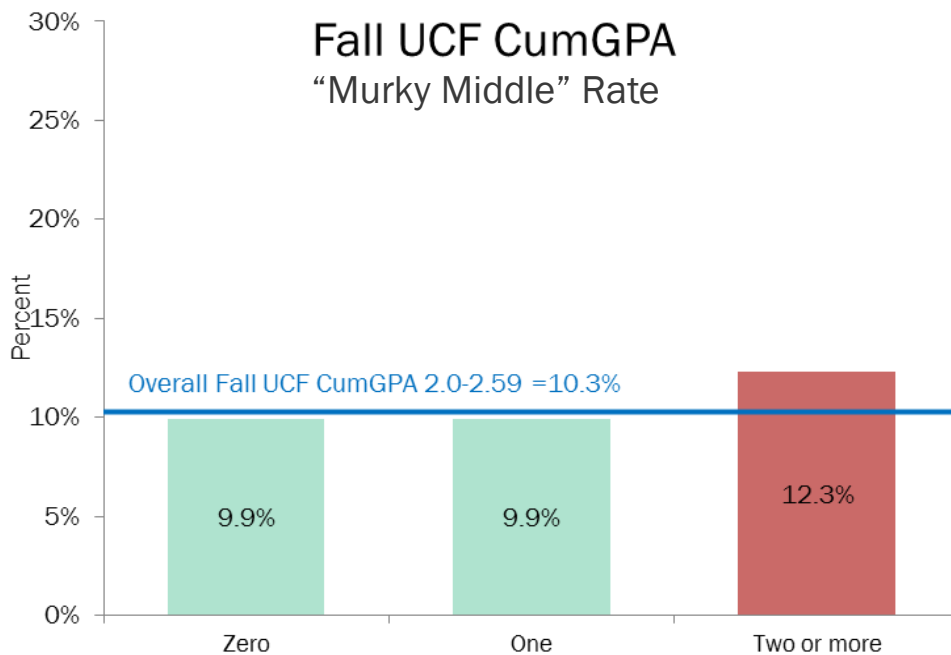
*Highlighted in blue are the abilities associated with UCF CumGPA or attrition when the response was 'Don't know/unsure'*

# CREATION OF A PERCEIVED IMPORTANCE OF ABILITIES INDEX

- counted the number of times a student endorsed “Don’t know/unsure” for any of the 20 abilities
- 94% of students (6,916 of 7,354) did not endorse “Don’t know/unsure”
- 4.1% of students (292 of 7,354) only endorsed 1 out of 20 abilities as “Don’t know/unsure”
- 2.3% of students (146 of 7,354) endorsed 2 or more abilities as “Don’t know/unsure”
- created an index for students ratings of the twenty perceived importance of ability items

# ESS ITEM: PERCEIVED IMPORTANCE UNCERTAINTY INDEX 2011-2012 TO 2014-2015

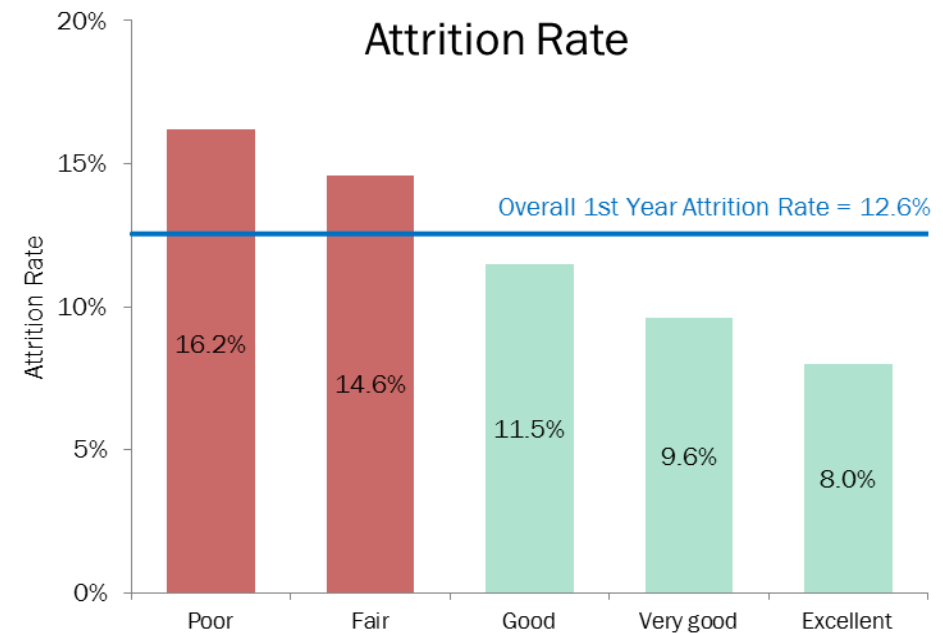
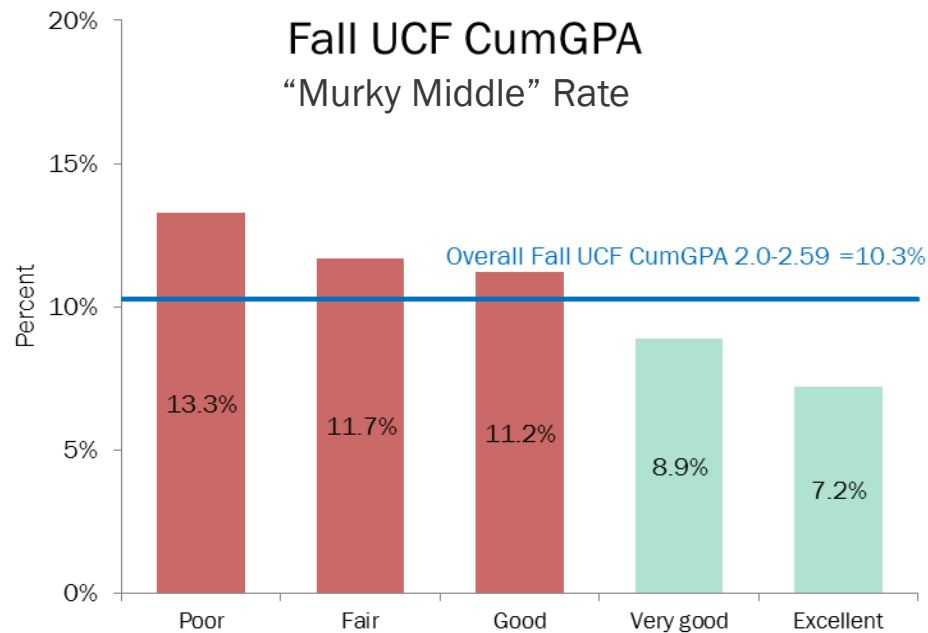
Perceived Importance Uncertainty Index: Number of abilities rated as "Don't know/unsure" with respect to importance	Number of Respondents	Fall UCF CumGPA 2.0 - 2.59		Attrition in their first year	
		Count	Row %	Count	Row %
Zero	6,916	691	9.9%	754	10.9%
One	292	29	9.9%	41	14.0%
Two or more	146	18	12.3%	28	19.1%



# ESS ITEM: SELF EVALUATION FOR TIME MANAGEMENT

## 2011-2012 TO 2014-2015

Self evaluation: Organizing your time effectively	Number of Respondents	Fall UCF CumGPA 2.0 - 2.59		Attrition in their first year	
		Count	Row %	Count	Row %
Poor	375	50	13.3%	61	16.2%
Fair	1,223	144	11.7%	179	14.6%
Good	2,573	290	11.2%	297	11.5%
Very good	1,965	176	8.9%	189	9.6%
Excellent	1,306	95	7.2%	105	8.0%



# LOGISTIC REGRESSION

- factors identified from exploratory analysis were used to build logistic regression models to predict first year retention
- data from 2011-2012, 2012-2013 and 2013-2014 and were used for model building and the 2014-2015 survey data were used for model validation and diagnostics
- a few demographic and characteristic variables were identified as significant during exploration (gender, college), but were eventually overpowered by other survey factors during the modeling process
- multiple models were built, three candidate models were compared which included some or all of the following predictors:
  - likely to transfer (*TNSFRLKLY\_NEW*)
  - where do you plan to live? (*LIVE\_RISK*)
  - self evaluation for time management (*TIMEMGMTSKLS\_RISK*)
  - end of first fall Cum GPA (*EOF\_GPA\_COLL*)



# CANDIDATE MODEL DIAGNOSTICS

Diagnostic	Model 1	Model 2	Model 3
Significant* Predictors that Entered the Model	EOF_GPA_COLL	TNSFRLKLY_NEW ; LIVE_RISK ; TIMEMGMTSKLS_RISK	EOF_GPA_COLL ; TNSFRLKLY_NEW ; TIMEMGMTSKLS_RISK
Likelihood Ratio Test (p-value)	< 0.0001	< 0.0001	< 0.0001
AIC Statistic	8597.74	1575.36	1261.12
C Statistic	0.697	0.59	0.738
Hosmer and Lemeshow Statistic (p-value)	0.9995	0.8737	0.9149
Overall Correctly Predicted (Accuracy)	82.6%	46.5%	48.7%
Retained Students Accurately Predicted (Sensitivity)	76.2%	44.5%	45.6%
Retained Students Inaccurately Predicted (False Positive Rate)	34.9%	55.0%	54.4%
Non-Retained Students Accurately Predicted (Specificity)	53.0%	58.0%	71.5%
Non-Retained Students Inaccurately Predicted (False Negative Rate)	47.0%	42.0%	28.5%

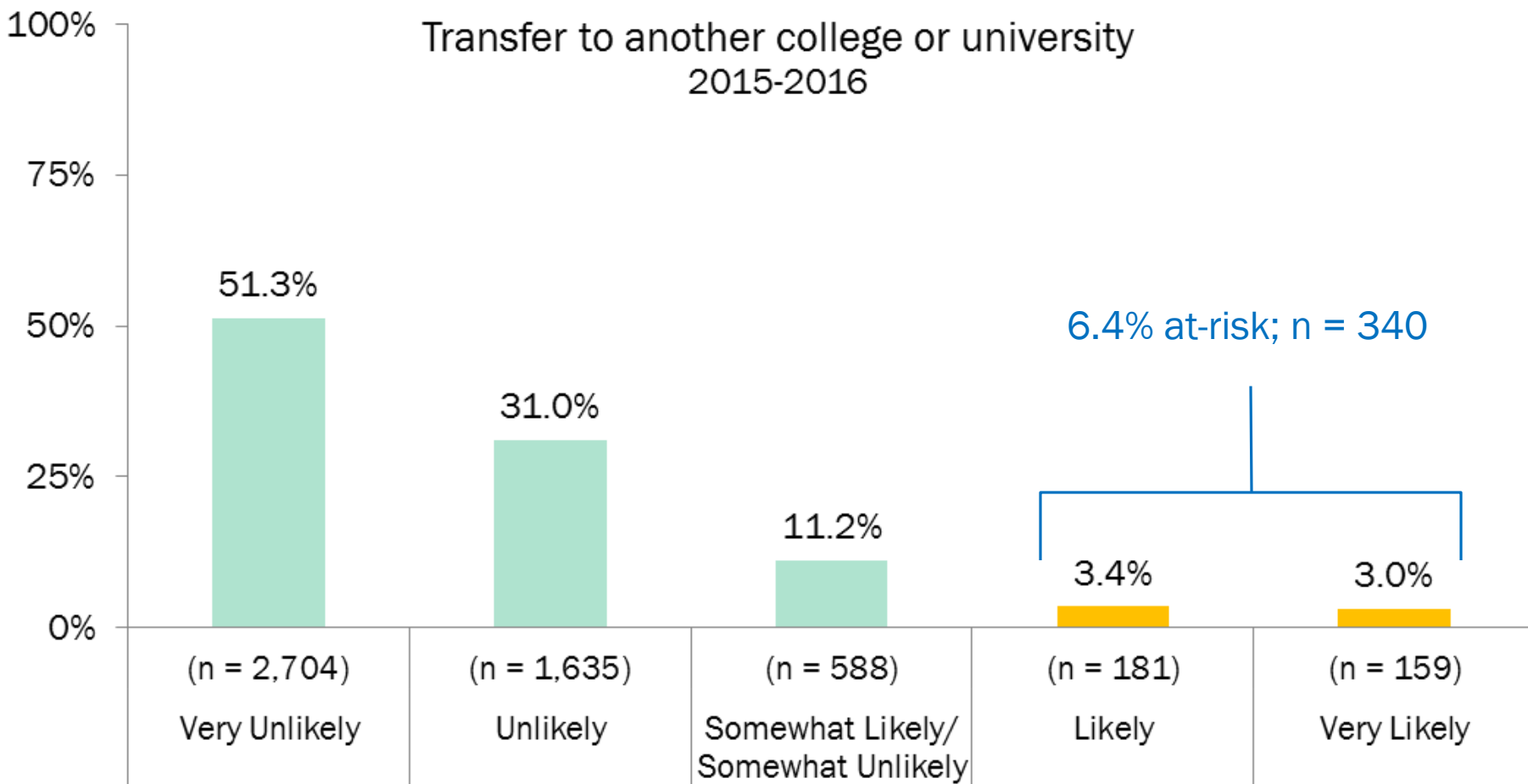
\* All predictors listed in each of the candidate models were found statistically significant using a Wald Chi-Square Test at a 0.05 significance level

# A CASE STUDY:

PUTTING WHAT WE HAVE LEARNED INTO PRACTICE

# AT-RISK STUDENTS IDENTIFIED FOR THE 2015-2016 ENTERING COHORT

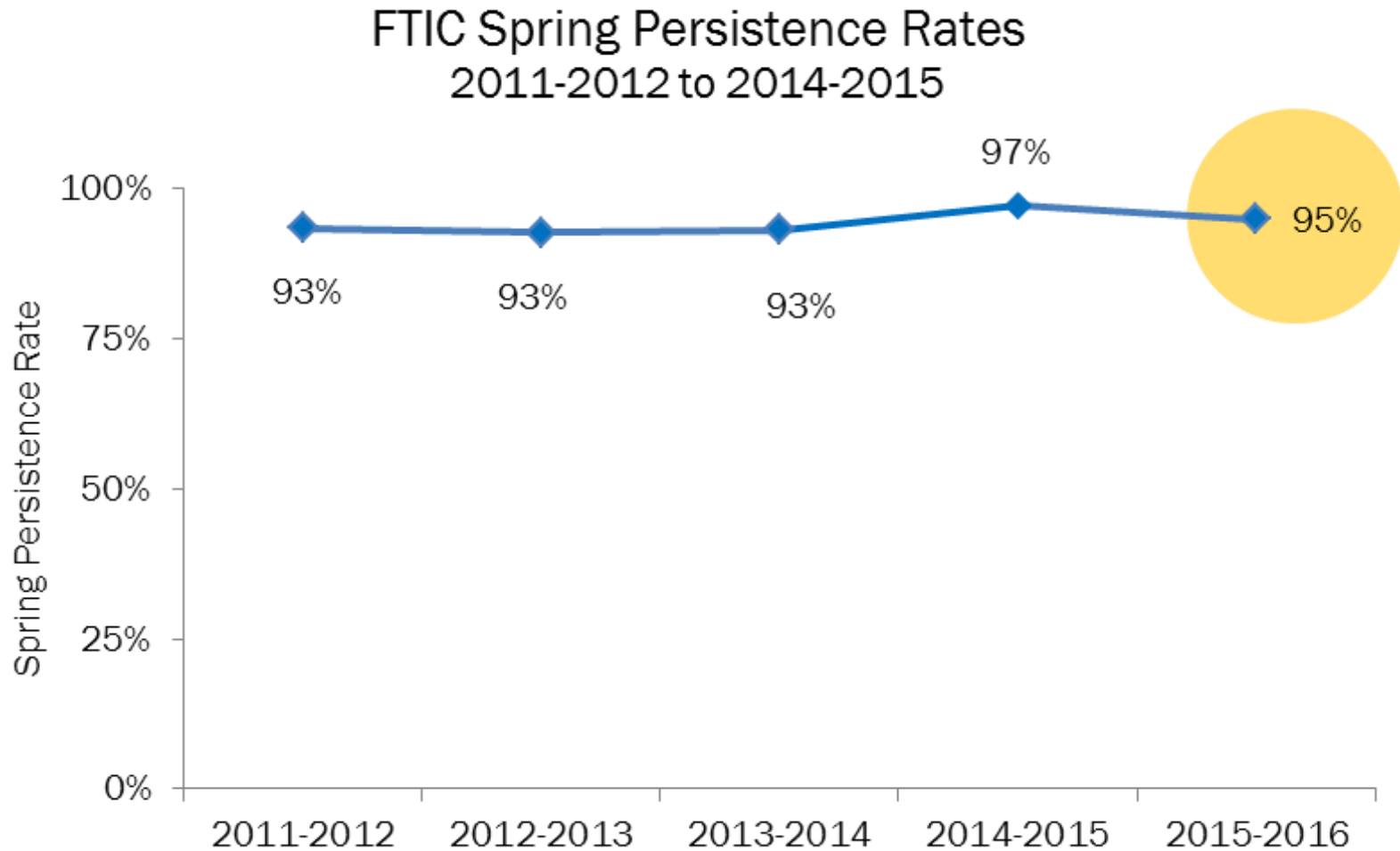
During the coming school year, what is the likelihood that you will:



# STRATEGIES IMPLEMENTED FOR THE 2015-2016 FTIC ENTERING COHORT

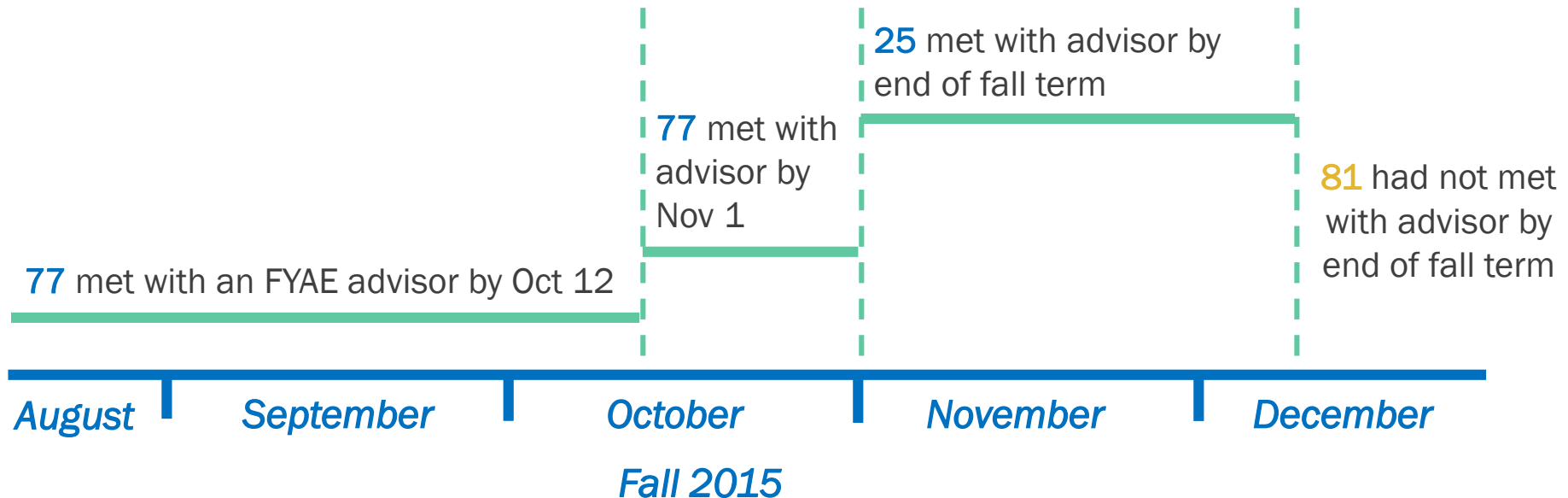
- a list of 340 students identified as at-risk (likely to transfer ESS responses) were provided to two partnering offices:
  - First Year Advising and Exploration (FYAE) – 260
  - Sophomore and Second Year Center (SSYC) – 80
- advisors from FYAE and SSYC worked closely with the targeted student groups to increase retention and student success
- OEAS tracked certain outcomes to evaluate the impact these strategies had:
  - first year retention (will be assessed in fall 2016)
  - Cum GPA
  - persistence into spring 2016

# HISTORICAL FTIC SPRING PERSISTENCE RATES AT UCF HAVE BEEN CONSISTENTLY HIGH



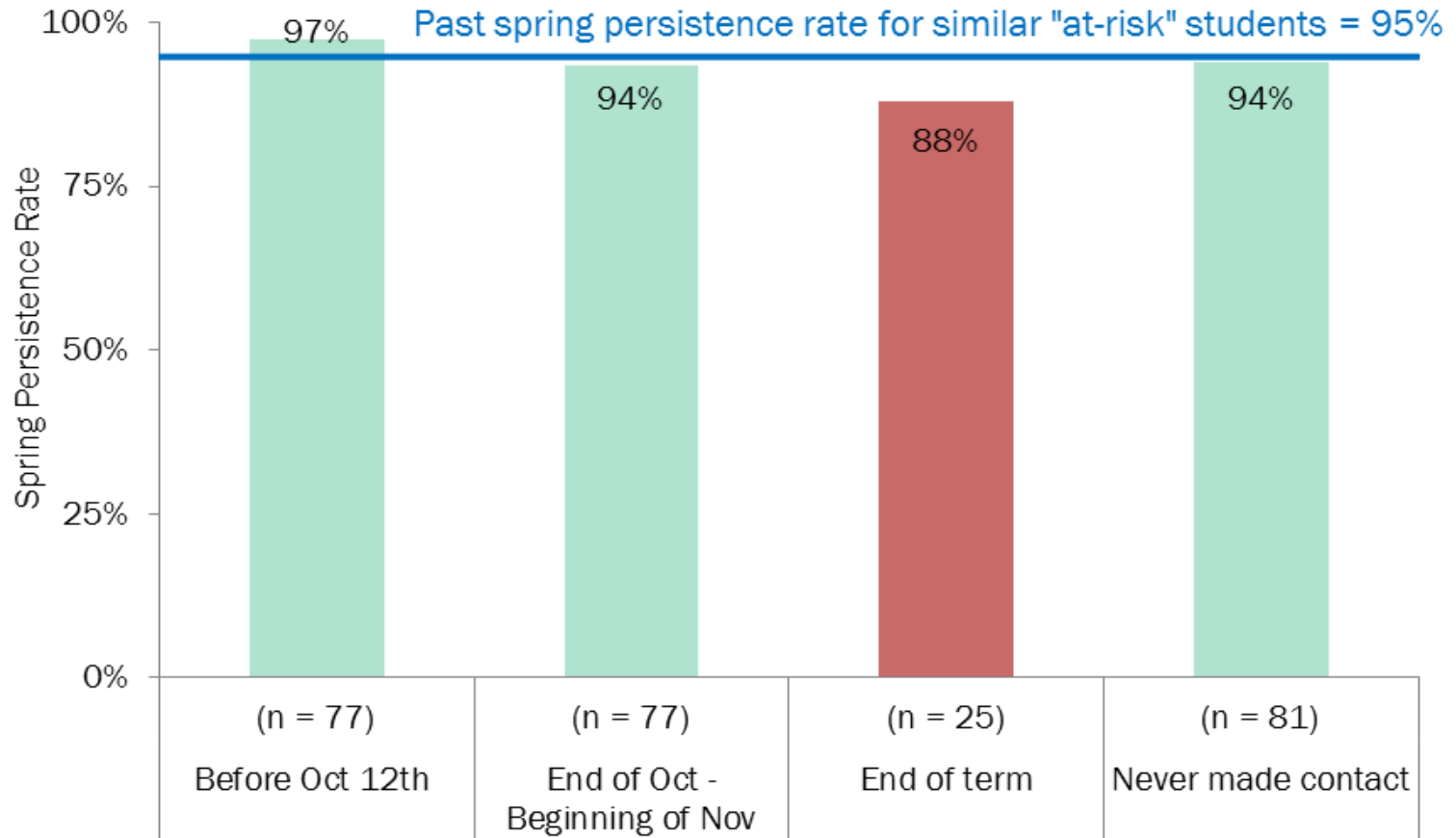
# EVALUATION OF ADVISING STRATEGIES

- FYAE provided OEAS detailed documentation of the outreach and communication strategies used by advisors
  - Excel file was maintained for all 260 at-risk students
    - when students made contact with advisors
    - how advisors were contacted (walk-in, appointment)



# WHEN STUDENTS MADE CONTACT WITH ADVISORS

FTIC Spring Persistence Rates for Targeted 2015-2016 At-Risk Students



*Past spring persistence rates include 2011-2012 to 2014-2015 entering cohorts.*

# LESSONS FOR DECISION SUPPORT

To move the needle on learning, persistence, retention, and completion:

- evidence on student beliefs and behaviors matters
- integration of student level IR data and student survey data creates evidence to spur innovation
- match data capture time with student pathway point and outcomes in play
- proactively pursue partners at your institution and evaluate outcomes of innovation initiatives



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