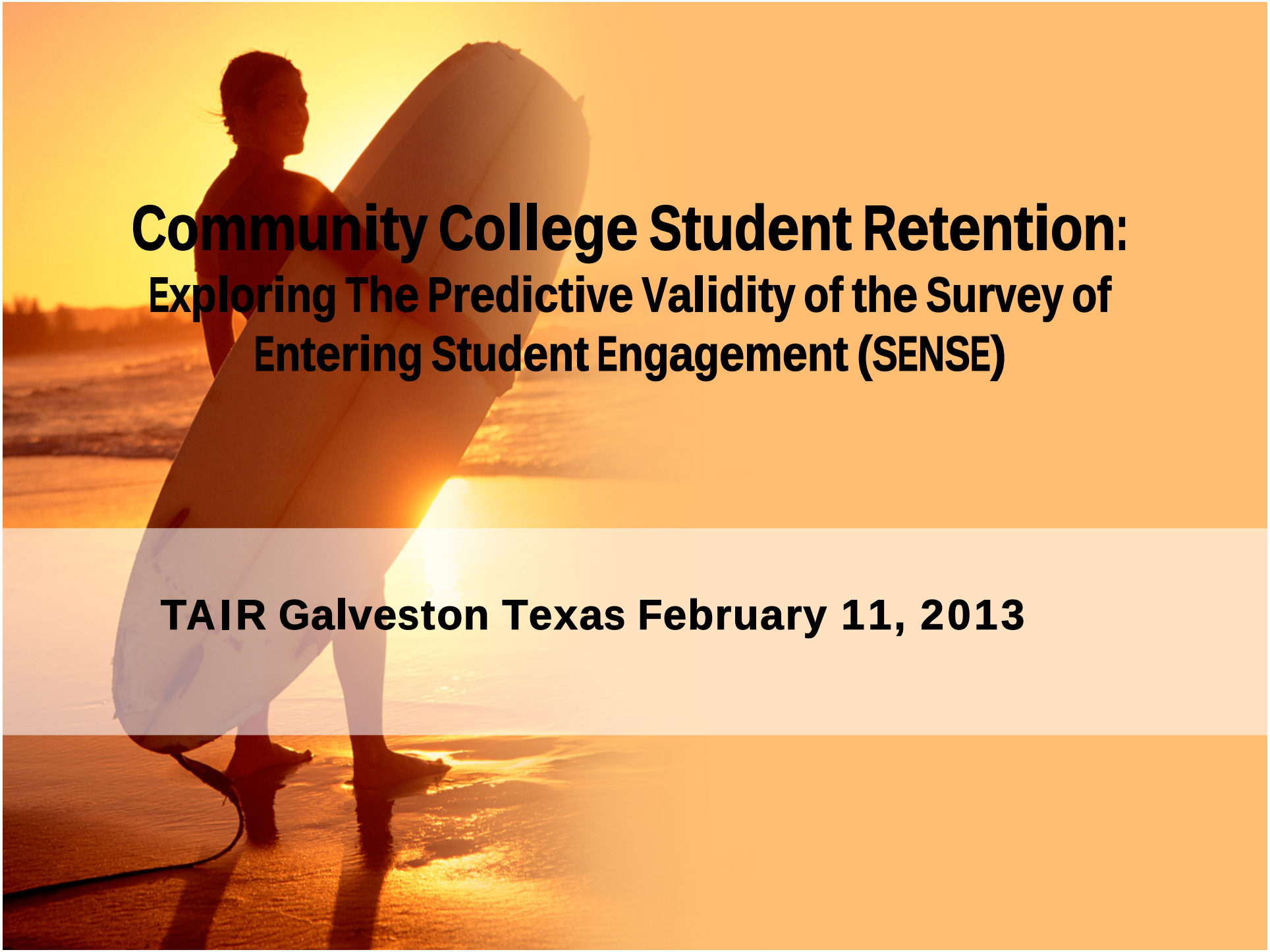

Community College Student Retention:
Exploring The Predictive Validity of the Survey of Entering Student Engagement (SENSE)

TAIR Galveston Texas February 11, 2013

Let's Explore

- Does SENSE predict student success and persistence?
- Do the first few weeks of a student's collegiate career predict what path a student will follow?
- What variables/factors do we think of when we talk about student success?
- What statistical tools can we use to make a case? What makes sense?

History of SENSE

- SENSE survey developed by
  - Community College Leadership program at UT Austin
  - Technical Advisory Panel
- Focus
  - “SENSE focuses on institutional practices and student behaviors in the earliest weeks of college ”

Why Entering Students?

Why the Focus up Front?

"Evidence shows that if students can successfully complete 12 to 15 credit hours (the equivalent of one semester) then they are more likely to attain further milestones and, ultimately, certificates and degrees."

(SENSE)

Source: http://www.ccsse.org/sense/

Question for you?

Do you know your Fall to Spring retention for FTIC students?

Six SENSE Benchmarks

- Early Connections
- High Expectations and Aspirations
- Clear Academic Plan and Pathway
- Effective Track to College Readiness
- Engaged Learning
- Academic and Social Support Network

Six SENSE Benchmarks

Early Connections

Example 18a. The very first time I came to this college I felt welcome

Example: 18p. At least one college staff member (other than an instructor) learned my name.

High Expectations and Aspirations

Example: 18b. The instructors at this college want me to succeed.

Example: 19c. Turn in an assignment late

Six SENSE Benchmarks

Clear Academic Plan and Pathway

Example 18e. An advisor helped me to select a course of study, program, or major

Example 18f. An advisor helped me to set academic goals and to create a plan for achieving them

Effective Track to College Readiness

Example 12a. Before I could register for classes, I was required to take a placement test... to assess my skills in reading, writing, and/or math

Example 21a. I learned to improve my study skills (listening, note taking, highlighting readings, working with others, etc.)

Six SENSE Benchmarks

Engaged Learning

Example 19a. Ask questions in class or contribute to class discussions

Example 19g. Work with other students on a project or assignment during class

Academic and Social Support Network

Example 18l. All instructors clearly explained academic and student support services available at this college

Example 18q. At least one other student whom I didn't previously know learned my name

SENSE Published Research

SENSE Published Research?

- Mauppin, S. F. (2012). *Early College Connections: An Investigation of First-Year, Persisting, Full-Time and Part-Time Students' Perceptions at a Suburban Community College*

- Napoles, G. F. (2009). *Factors Associated with Engagement Levels Amogn Entering and Returning Hispanic College Students*

- Tamimi, A (2011). *A Look at Engagement Strategies that Promote Persistence and Retention of Entering Students at the Community College of Qatar*

Sources: http://repositories.lib.utexas.edu/handle/2152/ETD-UT-2012-05-5159
http://repositories.lib.utexas.edu/handle/2152/7664
http://repositories.lib.utexas.edu/handle/2152/ETD-UT-2011-08-3890

ACC and SENSE

- SENSE administration at ACC Fall 2011
  - SENSE administered between 9-12-11 and 9-26-11
  - Updated the survey to encourage collection of student ids
  - Entering students percent of target achieved = 39%
    - 579 surveys/1,500 (target)

Fall 2011 ACC SENSE Benchmark Results

Survey of Entering Student Engagement - Austin Community College

2011 Benchmark Scores Report - Main Survey

All Students

	Your College	ExLarge Colleges		2011 Cohort	
Benchmark	Score	Score	Difference	Score	Difference
Early Connections	50.8	46.8	4.0	50.0	0.8
High Expectations and Aspirations	50.3	49.2	1.1	50.0	0.3
Clear Academic Plan and Pathway	59.7	47.6	12.2	50.0	9.7
Effective Track to College Readiness	56.0	51.2	4.8	50.0	6.0
Engaged Learning	51.8	49.4	2.5	50.0	1.8
Academic and Social Support Network	52.6	49.3	3.3	50.0	2.6

Using SENSE to predict Persistence

We wanted to see if the SENSE survey, along with other demographic information, could predict whether or not a student will persist into subsequent terms

Binary Data

When the response variable is denoted as "*success*" or "*failure*"

(e.g. Persist ("success") and Non-Persist ("failure"))

Logistic Regression

"For binary data, we are interested in analyzing the relationship between the *probability of the response being success* and the explanatory variables, rather than analyzing the relationship between the value of the response variable and the explanatory variables." (Larson)

Source: http://statmaster.sdu.dk/courses/st111/module14/index.html

Pulling Together the Dataset

Step 1 in any analysis is to pull together the dataset

Our Process…

- Downloaded Fall 2011 SENSE data with student ids that were requested as an optional field
- Pulled 600+ rows with identifiable ids
- Filtered to eliminate duplicates and students not meeting entering student criteria
- Filtered SRVAGAIN to be equal to 2

Have you taken this survey in another class this semester/quarter? (2=No)

- Filtered TERMSENR to be 1

How many semesters/quarters have you been enrolled at this college?
(1 = This is my first semester/quarter)

Pulling Together the Dataset

- Brought dataset to 323 unique Entering Students for Fall 2011
- Merged ACC Demographic and Course Data for Fall 2011, Spring 2012, and Fall 2012
- Decided to use 5 demographic variables in research with SENSE (Gender, Ethnicity, Full-Time/Part-Time, Pell Status, and Developmental Education Mandated Status)

Pulling Together the Dataset

Considering that our dataset consisted of 323 students and that SENSE has over 100 questions, we decided to use the 6 raw benchmarks SENSE calculates.

(Scaled between 0 and 1)

- Early Connections (EARLYCON)
- High Expectations and Aspirations (HIEXPECT)
- Clear Academic Plan and Pathway (ACADPLAN)
- Effective Track to College Readiness (COLLREAD)
- Engaged Learning (ENGAGLRN)
- Academic and Social Support Network (ACSOCSUP)

Fall 2011 SENSE and ACC FTIC Demographic Information

Fall 2011 Gender Distribution

	SENSE		ACC FTIC	
	Count	%	Count	%
Male	136	42.1%	3,192	49.0%
Female	187	57.9%	3,318	51.0%
Total	***323***		***6,510***	

Fall 2011 Full-Time/Part-Time Distribution

	SENSE		ACC FTIC	
	Count	%	Count	%
Part-Time	223	69.0%	4,179	64.2%
Full-Time	100	31.0%	2,331	35.8%
Total	***323***		***6,510***	

Fall 2011 Pell Distribution

	SENSE		ACC FTIC	
	Count	%	Count	%
Non-Pell	55	17.0%	3,658	56.2%
Pell	268	83.0%	2,852	43.8%
Total	***323***		***6,510***	

Fall 2011 Ethnicity Distribution

	SENSE		ACC FTIC	
	Count	%	Count	%
White	105	32.5%	2,473	38.0%
Black	43	13.3%	566	8.7%
Hispanic	115	35.6%	2,230	34.3%
Other	60	18.6%	1,241	19.1%
Total	***323***		***6,510***	

Fall 2011 Developmental Education Mandated Distribution

	SENSE		ACC FTIC	
	Count	%	Count	%
Non-Developmental Ed Mandated	116	35.9%	3,960	60.8%
Developmental Ed Mandated	207	64.1%	2,550	39.2%
Total	***323***		***6,510***	

Other Important Variables

Fall 2011 to Spring 2012 Persistence

Fall 2011 to Spring 2012 Persistence				
	SENSE		ACC FTIC	
	Count	%	Count	%
Non-Persistence	70	21.7%	1,886	29.0%
Persistence	253	78.3%	4,624	71.0%
Total	***323***		***6,510***	

Fall 2011 to Fall 2012 Persistence

Fall 2011 to Fall 2012 Persistence				
	SENSE		ACC FTIC	
	Count	%	Count	%
Non-Persistence	163	50.5%	3,473	53.3%
Persistence	160	49.5%	3,037	46.7%
Total	***323***		***6,510***	

Other Important Variables

Fall 2011 Term GPA and Spring 2012 Term GPA

Fall 2011 Term GPA Distribution				
	SENSE		ACC FTIC	
	Count	%	Count	%
Withdrew / Incomplete	13	4.0%	606	9.3%
0.00	26	8.0%	815	12.5%
0-0.99	17	5.3%	264	4.1%
1-1.99	42	13.0%	796	12.2%
2-2.99	94	29.1%	1,648	25.3%
3-3.99	96	29.7%	1,748	26.9%
4.00	35	10.8%	633	9.7%
Total	***323***		***6,510***	

Spring 2012 Term GPA Distribution				
	SENSE		ACC FTIC	
	Count	%	Count	%
Non-Persistence	70	21.7%	1,886	29.0%
Withdrew / Incomplete	28	8.7%	461	7.1%
0	27	8.4%	510	7.8%
0-0.99	9	2.8%	159	2.4%
1-1.99	33	10.2%	562	8.6%
2-2.99	66	20.4%	1,233	18.9%
3-3.99	70	21.7%	1,264	19.4%
4	20	6.2%	435	6.7%
Total	***323***		***6,510***	

Included other variable for Success/Non-Success

>2.0 Term GPA = “Success”

<2.0 Term GPA = “Non-Success”

Variables for Logistic Regression

Continuous Variables

- 6 SENSE benchmarks (0 to 1)
- Fall 2011 Term GPA (0 to 4)
- Spring 2012 Term GPA (0 to 4)

Classification Variables

- Fall 2011 to Spring 2012 Persistence (0 or 1=persist)
- Fall 2011 to Fall 2012 Persistence (0 or 1=persist)
- Fall 2011 Success (0 or 1=success)
- Fall 2011 Full-Time/Part-Time Status (0 or 1=full-time)
- Fall 2011 Pell Status (0 or 1=pell awarded)
- Fall 2011 Developmental Education Mandated (0 or 1= developmental education mandated at least 1 area)
- Gender (0 or 1=female)
- Ethnicity (1=White, 2=Black, 3=Hispanic, 4=Other)

Predicting Fall to Spring Persistence

Using SAS to Analyze Data

Looking at Proc Logistic results

SAS CODE

```
proc logistic data=tairdata descending simple;
        class f11_ftpt f11_success f11_pell f11_dev gender ethnic / param=glm;
        model f11_s12_persist (event='1') = f11_ftpt f11_success f11_pell f11_dev
                gender ethnic earlycon hiexpect acadplan collread engaglrn acsocsup
                / selection=none rsq lackfit;
run;
```

SAS Simple Statistics

"Simple statistics display univariate statistics for the analysis variables" (SAS)

What do they tell us?

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
F11_S12_Persist	323	0.79257	0.4061	256	0	1
F11_ftpt	323	0.3096	0.46305	100	0	1
F11_Success	323	0.69659	0.46044	225	0	1
F11_PELL	323	0.82972	0.37646	268	0	1
F11_DEV	323	0.64087	0.48049	207	0	1
Gender	323	0.57895	0.49449	187	0	1
Ethnic	323	2.40248	1.1252	776	1	4
EARLYCON	323	0.51854	0.21257	167.4875	0	1
HIEXPECT	323	0.85846	0.12542	277.28373	0.32143	1
ACADPLAN	322	0.68222	0.19318	219.675	0.05	1
COLLREAD	323	0.81023	0.18385	261.70417	0.125	1
ENGAGLRN	323	0.32156	0.16496	103.86445	0	0.91667
ACSOCSUP	322	0.81579	0.13999	262.68452	0.42857	1

SAS Proc Logistic Results (Fall to Spring Persistence)

1 - Testing Hypothesis

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	58.7575	14	<.0001
Score	58.9525	14	<.0001
Wald	46.812	14	<.0001

2 - Testing Variable Effects

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
F11_ftpt	1	4.0886	0.0432
F11_Success	1	26.8542	<.0001
F11_PELL	1	7.1353	0.0076
F11_DEV	1	3.4506	0.0632
Gender	1	0.2756	0.5996
Ethnic	3	0.8505	0.8374
EARLYCON	1	1.4231	0.2329
HIEXPECT	1	0.8504	0.3564
ACADPLAN	1	0.0599	0.8067
COLLREAD	1	6.2842	0.0122
ENGAGLRN	1	1.1223	0.2894
ACSOCSUP	1	0.0216	0.8832

3 - Testing Overall Model

Goodness-of-Fit		
Test		
Chi-Square	DF	Pr > Chi Sq
9.242	8	0.3223

What variables are significant (p-value<0.05)?

- **Fall 2011 Success (>2.0 GPA)**
  - Why not Fall 2011 Term GPA
- Fall 2011 Full-Time/Part-Time
- Fall 2011 Pell
- College Readiness

Checking Validity of Regression Model

Goodness of Fit for Binary Response Models

"*Hosmer and Lemeshow (2000) proposed a statistic that they show, through simulation, is distributed as chi-square when there is no replication in any of the subpopulations."*

***P*-value of the "goodness of fit" tests are greater than 0.05.**
Goodness-of-fit tests are conducted to see whether the model adequately fits the actual situation. Low *p*-values indicate a significant difference of the model from the observed data. Hence, the *p*-values should be above 0.05 to show that there are no significant differences between the predicted probabilities (from the model) and the observed probabilities (from the raw data). (Chieh)

Sources:
http://support.sas.com/documentation/cdl/en/statug/63033/HTML/default/viewer.htm#statug_logistic_sect039.htm
http://www.isixsigma.com/tools-templates/regression/making-sense-binary-logistic-regression-tool/

SAS Proc Logistic Results (Fall to Fall Persistence)

1 - Testing Hypothesis

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	113.1173	15	<.0001
Score	99.5788	15	<.0001
Wald	75.1879	15	<.0001

3 - Testing Overall Model

Hosmer and Lemeshow Goodness-of-Fit		
Test		
Chi-Square	DF	Pr > Chi Sq
5.6468	8	0.6867

2 - Testing Variable Effects

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
F11_Success	1	19.7474	<.0001
S12_Success	1	24.7738	<.0001
F11_ftpt	1	3.7473	0.0529
F11_PELL	1	0.278	0.598
F11_DEV	1	6.4232	0.0113
Gender	1	0.0283	0.8663
Ethnic	3	8.6119	0.0349
EARLYCON	1	1.1073	0.2927
HIEXPECT	1	0.0136	0.9071
ACADPLAN	1	0.199	0.6555
COLLREAD	1	1.3515	0.245
ENGAGLRN	1	0.4007	0.5267
ACSOCSUP	1	0.2053	0.6504

What variables are significant (p-value<0.05)?

- **Fall 2011 Success (>2.0 GPA)**
- **Spring 2012 Success (>2.0 GPA)**
- Fall 2011 Dev Ed Mandated
- Ethnicity

What's in Common and What Makes Sense?

Grades Matter…

Having Term GPA above 2.0 increases odds of persisting in college

What about SENSE?

Effective Track to College Readiness showed significance, but grades appear much more significant, so let's predict success.

SAS Proc Logistic Results (Fall 2011 Success)

1 - Testing Hypothesis

Testing Global Null Hypothesis: BETA=0			
Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	55.2327	13	<.0001
Score	53.8577	13	<.0001
Wald	43.5407	13	<.0001

2 - Testing Variable Effects

Type 3 Analysis of Effects			
Effect	DF	Wald Chi-Square	Pr > ChiSq
F11_ftpt	1	0.4338	0.5101
F11_PELL	1	0.0818	0.7748
F11_DEV	1	0.296	0.5864
Gender	1	3.8515	0.0497
Ethnic	3	5.9011	0.1165
EARLYCON	1	1.3811	0.2399
HIEXPECT	1	32.8734	<.0001
ACADPLAN	1	0.0189	0.8906
COLLREAD	1	0.9742	0.3236
ENGAGLRN	1	0.0632	0.8015
ACSOCSUP	1	3.482	0.062

3 - Testing Overall Model

Hosmer and Lemeshow Goodness-of-Fit		
Test		
Chi-Square	DF	Pr > Chi Sq
8.8974	8	0.351

What variables are significant (p-value<0.05)?

- Gender
- **High Expectations**

SENSE Predictive Validity Results

- High Expectations were strongly significant in increasing the likelihood of student success (>2.0 GPA) which in turn increase the likelihood of student persistence

High Expectations and Aspirations

1. The instructors at this college want me to succeed (18b)
2. I have the motivation to do what it takes to succeed in college (18t)
3. I am prepared academically to succeed in college (18u)
4. During the first three weeks of your first semester or quarter at this college, how often did you:
    1. Turn in an assignment late (19c)
    2. Not turn in an assignment (19d)
    3. Come to class without completing readings or assignments (19f)
    4. Skip class (19s)

What Now?

- Should focus be on within term success?
- Compare previous and future SENSE data.
- Have any of you run any analysis on SENSE?
- Is logistic regression the appropriate methodology given some of the variables involved? Correlation and auto-correlation issues?
- If using logistic regression, why not use a hierarchical selection method or other method?
- Structural equation model with High Expectations influencing within term success?

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