

# Using Hierarchical Generalized Linear Modeling (HGLM) to Establish the Determinants of Out-Migration

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# The Problem

- Thirty percent of high school graduates who matriculate to four-year colleges do so at out-of-state institutions
- Illinois has maintained a negative net migration rate since the 1960s
- Illinois ranks 49 out of 50 in net migration with estimated loss of 9,773 freshmen

# Why does this issue warrant concern?

- The Illinois outmigration rate is much higher than the national average
- Illinois does not benefit from a large import of out-of-state students to counter those leaving
- A higher percentage of students deemed most ready for college attended out-of-state colleges than all other types of students
- The economic impact is substantial
- Research suggests that a majority of out-migrants never return to work in their home state

# Purpose of Study

- Further analyze Illinois outmigration phenomenon/problem
- Investigate the effect of individual student characteristics, financial need variables, and high school-level characteristics on whether a student enrolls in-state or out-of-state

# Theoretical Framework

- Used Perna and Thomas (2006) Conceptual Model of Student Success
- Suggests that any type of student outcome is influenced by contextual factors.
  - Internal
  - Family
  - School
  - Social, economic, and policy
- Researchers propose that individual, family, and HS context may affect student outmigration.

# Peripheral Analysis

- **Academic Preparedness**

- Evidence suggests students that are most ready for college are also most likely to outmigrate.

- **Gender and Race**

- No difference in outmigration patterns between gender, but race appears to be a factor with a higher percentage of African-Americans outmigrating.

- **Financial Assistance**

- Research has shown that lower tuition and availability of merit scholarships help keep students in state. Illinois has some of the most expensive public institutions in the country. No merit program.

- **Family Income**

- Higher percentage of students from high-income families (\$80k +) migrate out of state.

# Data Source

- Random sample taken from the Illinois high school graduating class of 2003 (N=115,677) who initially enrolled at a four-year college the fall semester following HS graduation.
- The sample included 4,700 students randomly selected from the 37,165 four-year college entrants (12.6%) with complete information.
  - Enrollment and degree completion info came from National Student Clearinghouse.
  - Student-level factors were gleaned from Illinois standardized tests (ACT).
  - High school-level information was taken from the state's HS report card.

# Method of Analysis

- Hierarchical generalized linear model (HGLM) approach to predict the likelihood of student outmigration.
  - Students nested within high schools



# The Null Model

- Tested whether the propensity to out-migrate varies across high schools.
  - Significant  $z$  for the intercept (outmigration)
  - Suggest that it varies by school
  - This helped to justify the use of a multilevel model with students nested within schools
- Then calculated the the interclass correlation (ICC) to describe the proportion of the variability between schools.
  - Found that 9.5% of the variability in outmigration lies between schools

# Hypothesized Model

- **Internal Context**

- ACT Performance
- Race
- Gender

- **Family Context**

- Expectation to receive financial aid
- Expectation for work
- Family income

- **High school context**

- Index of Teacher Academic Capital (ITAC)
- Average high school composite ACT

# Grand Mean Centering

- All variables were centered around their grand mean.
- Heck, Thomas, and Tabata (2012) stated grand mean centering, “recenters the individual’s standing on the predictor against the mean for the predictor in the sample.”

# Descriptive Statistics of Sample

- M/F Ratio – 44.3%/55.7%
- Race/Ethnicity – 16% Non-Asian Minority
- 82% expected to receive financial aid
- 69% expected to work
- 14% low family income (<\$30K)
- 30% of study sample out-migrated

## Descriptive Statistics ( $n=4,700$ )

	Minimum	Maximum	Mean	SD
HS ITAC	-2.12	2.39	0.89	0.63
HS Composite ACT	13.30	26.30	20.98	2.22
ACT English	8.00	36.00	23.76	5.14
ACT Math	11.0	36.00	24.05	5.18
ACT Reading	9.00	36.00	24.04	5.54
ACT Science	9.00	36.00	23.40	4.58
Enrolled In-State Four-Year College	.00	1.00	.6952	.46

# Final Model

Model Term	Coefficient	S.E.	t	P
<b>Level 2 Predictors</b>				
HS-ITAC	-.082	0.101	-0.810	0.418
HS-Composite ACT	0.134	0.033	4.090	<0.001
<b>Level 1 Predictors</b>				
Male	-0.038	0.067	-0.567	0.571
Non-Asian Minority	0.163	0.115	1.412	0.158
Financial Aid	-0.206	0.093	-2.211	0.027
Work	-0.371	0.073	-5.060	<0.001
Low Family Income	-0.238	0.108	-2.206	0.027
ACT English	-0.001	0.011	-0.111	0.911
ACT Math	0.025	0.011	2.147	0.032
ACT Science	-0.001	0.013	-0.071	0.943
ACT Reading	0.002	0.009	0.198	0.843

# HGLM Analysis

- Students from high schools with higher aggregate academic performance were much more likely to out-migrate
- No gender difference
- No race/ethnicity difference
- Students with fewer financial resources had significantly lower odds of out-migrating
- Higher ACT mathematics scores associate with increased odds of out-migrating

# Discussion

- The findings with respect to HS context were consistent with previous research on outmigration and affirms the importance of considering contextual variables.
- Proposed ways to slow student outmigration:
  - Use of state merit-based scholarship programs
  - Increased state appropriations to lower tuition costs
  - Increase enrollment capacity at IL universities to increase acceptance rates
  - Incentivize in-state enrollment growth