



Understanding Multiple Developmental Education Pathways for Underrepresented Student Populations: Findings from NYC

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May 28, 2015

Research Funded by the 2014 AIR Dissertation Grant

What's Missing from Existing Research?

A comprehensive picture of developmental education enrollment pathways and patterns

- Research has shown mixed or negative results for students who enroll in traditional remedial/developmental courses.
 - Bettinger and Long (2005, 2009)
 - Calcagno and Long (2008)
 - Jaggars and Stacey (2014)
- Significant time and resources are being dedicated to research/evaluation projects focusing on alternative developmental education pathways
- Yet little/no understanding of how pathways/programs function within a larger and complex developmental education landscape

Why is existing research limited?

FEW GOOD DATA SOURCES!

- Very few federal guidelines or requirements for collecting data on non-credit programs and students
- At CUNY there were 247,698 non-credit course registrations in 2012-13; for context, total degree enrollment for the entire university in Fall 2012 was 269,114

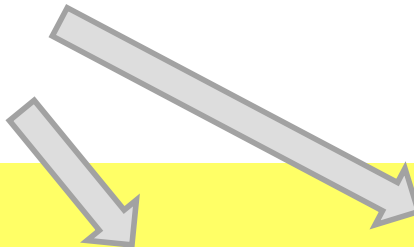
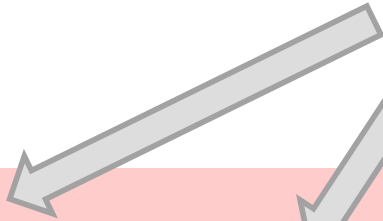
How can we understand the entire landscape of developmental education routes that students take after their initial application to college?



**Application and Admission to
CUNY Community College**



**Flagged as
Needing
Developmental
Education**

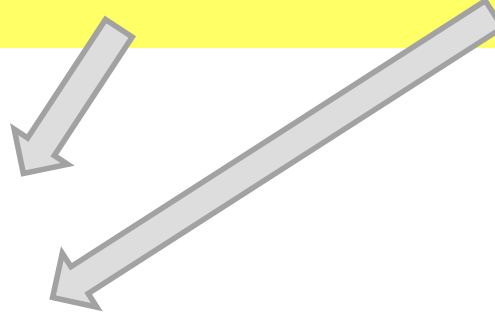
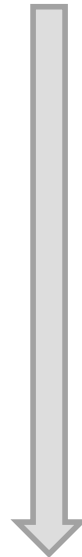
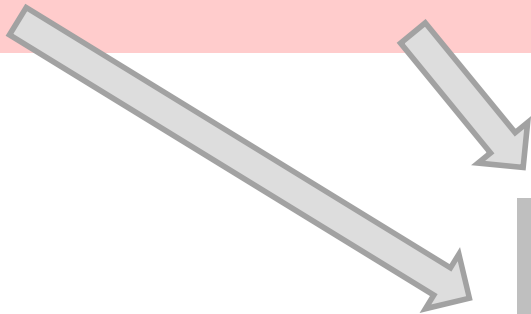


**Non-CUNY
Colleges**

**Summer
Immersion
Programs**

**CUNY
Start**

**Language
Immersion
Program**



**CUNY
Community
College
Enrollment**

Research questions

1. How do the characteristics of students who are identified as needing developmental or remedial education at CUNY's community colleges compare across the developmental courses and pathways in which they enroll?
2. What are the impacts of developmental education pathways at CUNY overall and, specifically, for nontraditional-aged students, students whose native language is not English, black and Hispanics males, and low-income students?
3. Are there specific community college developmental education pathways that lead to relatively better academic outcomes for various student populations? After accounting for other variables, are some approaches and structures more effective than others at supporting students' advancement through developmental courses, credit accumulation, and ultimately graduation?

Study “Road Map” & Theoretical Framework

- Descriptive quantitative analyses
- Multivariate logistic regression
 - Traditional approach
 - Inverse propensity score weighting
 - Interaction terms for subgroup analyses
- Discrete-time hazard model
 - Traditional approach with two samples (samples dependent on outcomes of focus)
 - Interaction terms for subgroup analyses
- Qualitative data collection and analyses
 - 32 interviews with college faculty and staff

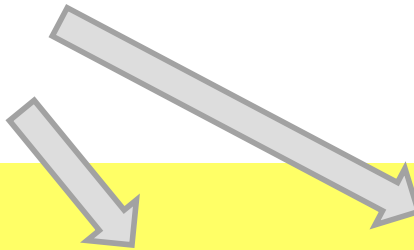
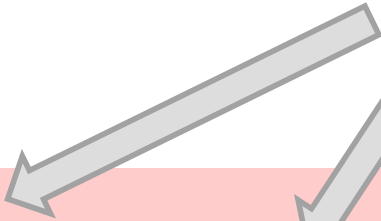
Sample: Applicants to Six CUNY Community Colleges

| | |
|--|----------------|
| Total CC Applicants | 262,362 |
| Applicants Flagged as Needing Dev Ed | 142,444 |
| % Female | 55.0 |
| % Hispanic | 42.0 |
| % Black | 28.4 |
| % Age 25+ | 13.5 |
| % ESL | 17.6 |
| % U.S. Citizen | 68.8 |
| % Born outside the U.S. | 38.8 |
| % Submitted SAT | 34.6 |
| % Community college was 1 st choice | 63.2 |
| Avg. Neighborhood household income | \$46,801 |

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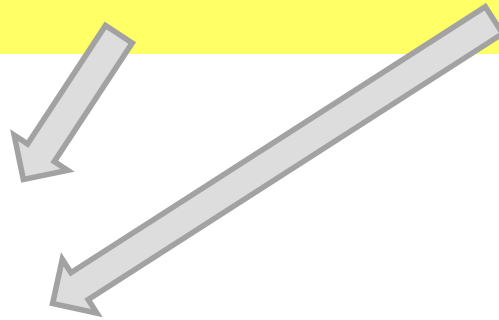
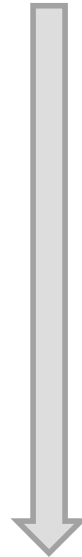
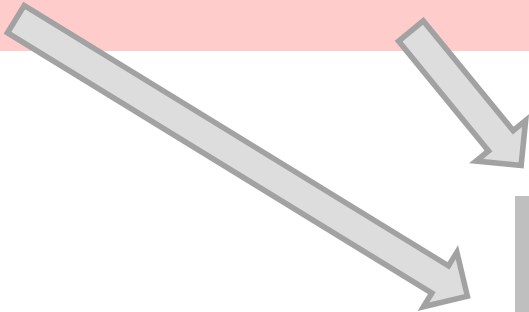


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Findings: Descriptive Analysis

Developmental pathway enrollment distribution: Fall applicants, 2006 through 2013

| | <i>Frequency</i> | <i>Percent</i> | <i>Percent of Enrolled</i> |
|--|------------------|----------------|----------------------------|
| Total fall applicants in need of developmental education and allocated to community colleges | 109,132 | 100.0 | -- |
| 1a. No summer → fall CUNY community college enrollment | 55,635 | 51.0 | 67.3 |
| 1b. Summer → fall CUNY community college enrollment | 15,650 | 14.3 | 18.9 |
| 2a. No summer → CLIP | 2,701 | 2.5 | 3.3 |
| 2b. Summer → CLIP | 1,368 | 1.3 | 1.7 |
| 3a. No summer → CUNY Start | 1,431 | 1.3 | 1.7 |
| 3b. Summer → CUNY Start | 193 | 0.2 | 0.2 |
| 4a. No summer → fall CUNY four-year college enrollment | 1,610 | 1.5 | 1.9 |
| 4b. Summer → fall CUNY four-year college enrollment | 1,570 | 1.4 | 1.9 |
| 5a. No summer → fall non-CUNY college enrollment | 2,363 | 2.2 | 2.9 |
| 5b. Summer → fall non-CUNY college enrollment | 87 | 0.1 | 0.1 |
| 6a. No summer → no known fall postsecondary enrollment | 23,975 | 22.0 | -- |
| 6b. Summer → no known fall postsecondary enrollment | 2,549 | 2.3 | -- |

First Multivariate Approach

$$Y_i = \beta_0 + \beta_1(SUM_i) + \beta_2(ENG_i) + \beta_3(INT_i) + \beta_4(Z_i) + \beta_5(TERM_i) + \beta_6(COLL_i) + \varepsilon_i$$

| | |
|----------|---|
| SUM_i | Summer immersion |
| ENG_i | English language immersion (CLIP) |
| INT_i | Intensive pre-matriculation program (CUNY Start) |
| Z_i | Vector of covariates (academic background, demographics, and other student characteristics) |
| $TERM_i$ | Term-specific dummy variable |
| $COLL_i$ | College-specific dummy variable |

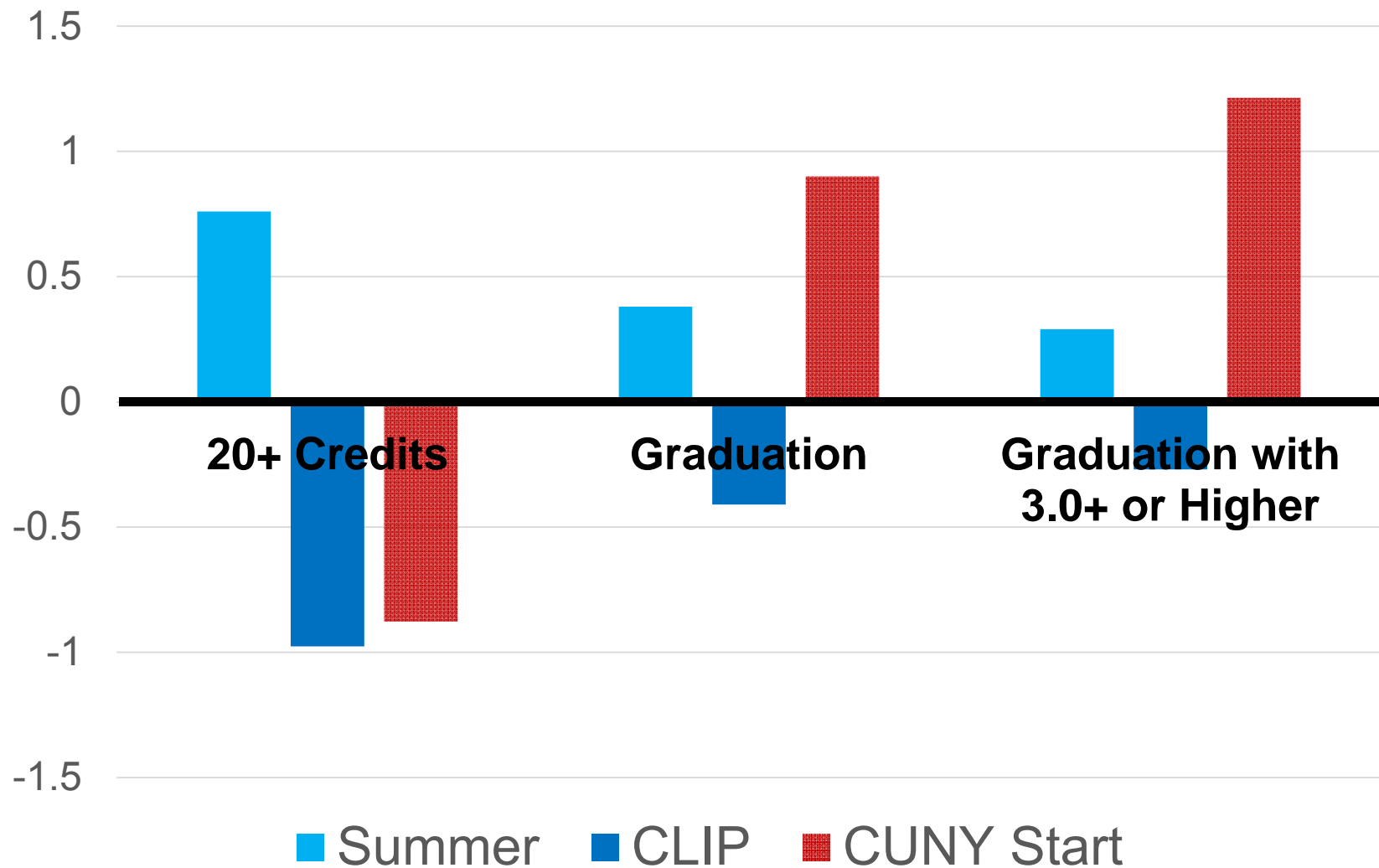
Multivariate Analysis Results

| Variable | 20 Credits by First Year | | Degree Completion in Three Years | | Degree Completion with a 3.0+ GPA in Three Years | |
|---------------|---------------------------|--|----------------------------------|--|--|--|
| | (1) Odds Ratio (SE) | (2) Propensity Score Weighted Odds Ratio (SE) | (3) Odds Ratio (SE) | (4) Propensity Score Weighted Odds Ratio (SE) | (5) Odds Ratio (SE) | (6) Propensity Score Weighted Odds Ratio (SE) |
| Summer/winter | 1.774 (0.033)*** | 1.759 (0.019)*** | 1.362 (0.038)*** | 1.377 (0.022)*** | 1.289 (0.048)*** | 1.288 (0.028)*** |
| CLIP | 0.018 (0.458)*** | 0.024 (0.191)*** | 0.498 (0.110)*** | 0.589 (0.053)*** | 0.637 (0.117)*** | 0.731 (0.057)*** |
| CUNY Start | 0.106 (0.285)*** | 0.123 (0.094)*** | 1.790 (0.154)*** | 1.906 (0.054)*** | 1.966 (0.188)*** | 2.216 (0.066)*** |
| Observations | 65,355 | | 52,016 | | 52,016 | |

Note: All models include variables for all student characteristics listed in Table 15; CUNY Assessment Test scores (z-scores) in reading, writing, and math; variables for the number of days between taking an exam and enrolling at a college; dummy variables indicating the imputation of high school standardized GPA; and fixed effects for institution and term of application.

* Significant at 10%. **Significant at 5%. ***Significant at 1%.

Multivariate Analysis Results

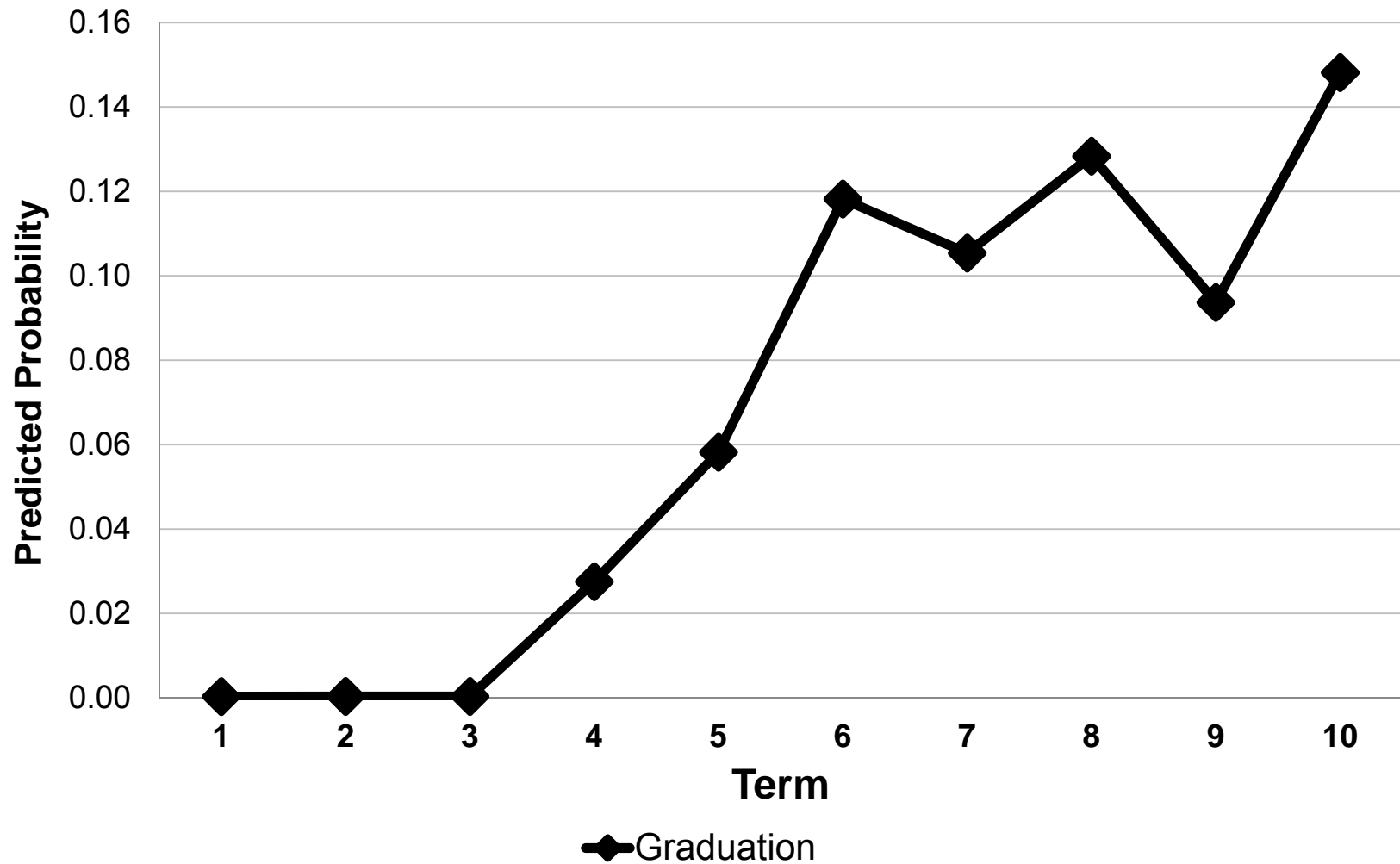


Results by Subgroup

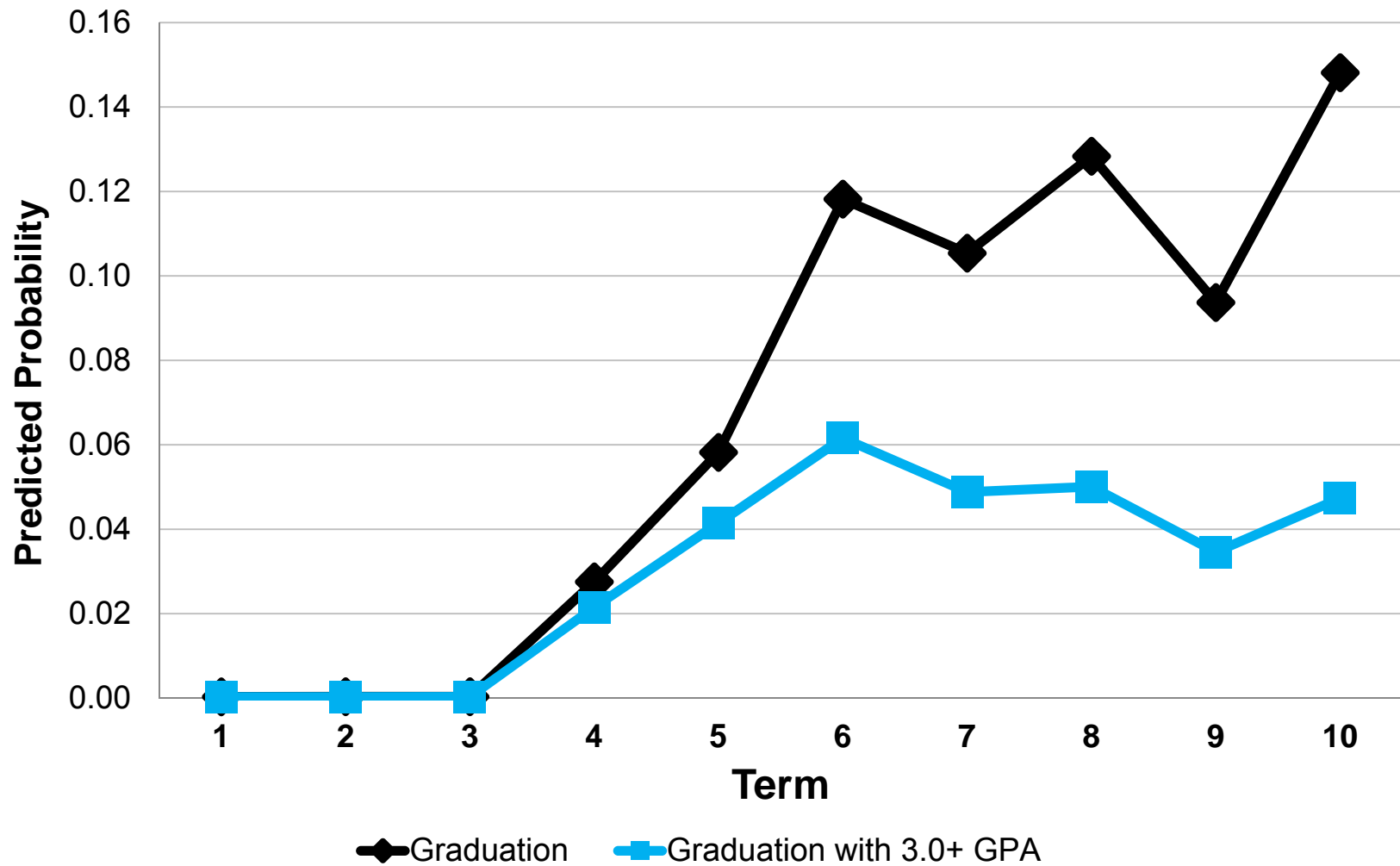
Results suggest that:

- Effects for summer/winter differed by age
- The same pattern of variation by age emerged for CLIP
- For all of the three developmental education pathways, the effect for black and Hispanic males on degree completion does not differ significantly from other students
- Summer/winter not as effective for students whose native language was not English
- Summer/winter and CLIP slightly more effective for students from lower-income neighborhoods.

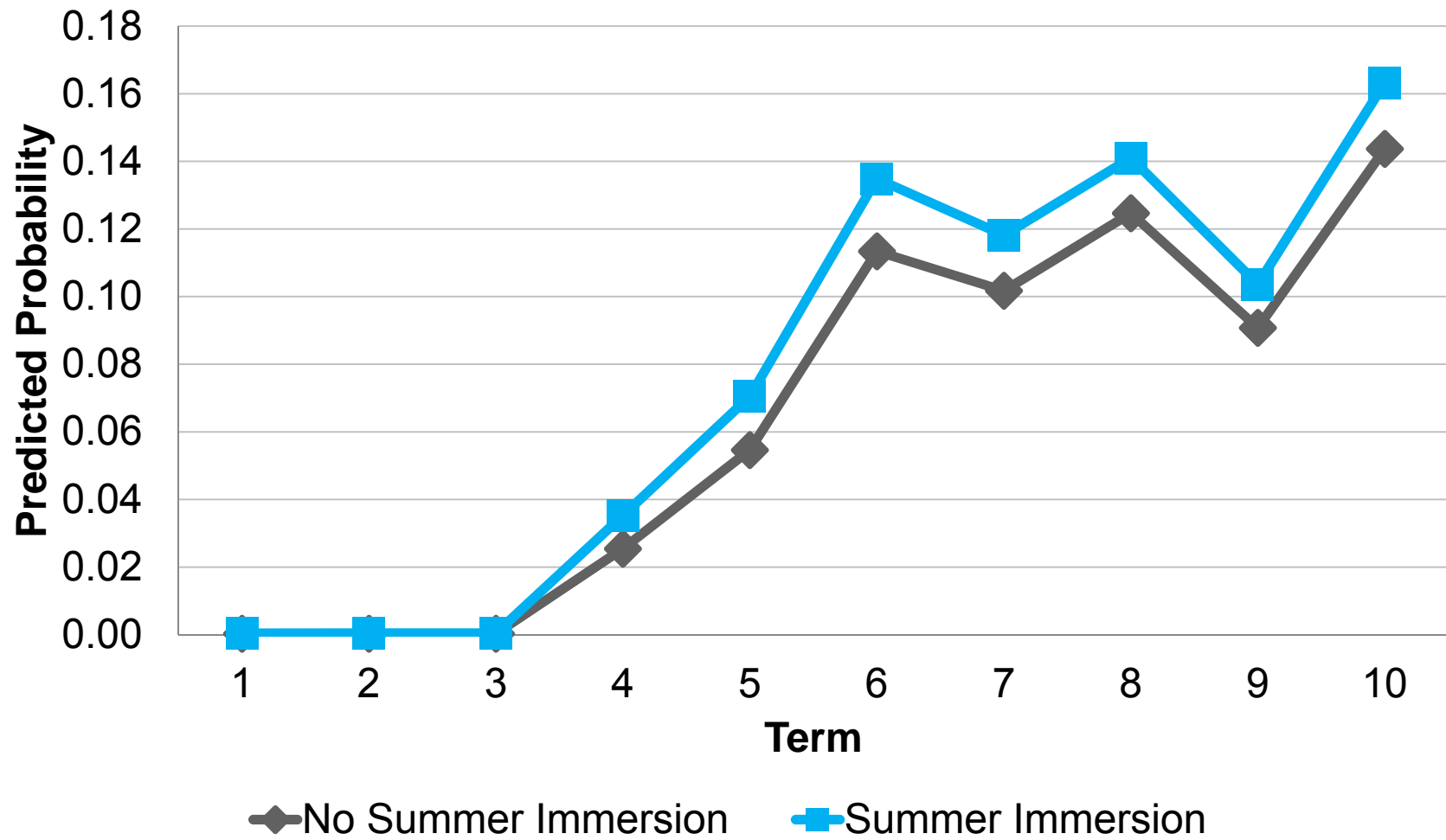
Discrete-time Hazard Approach



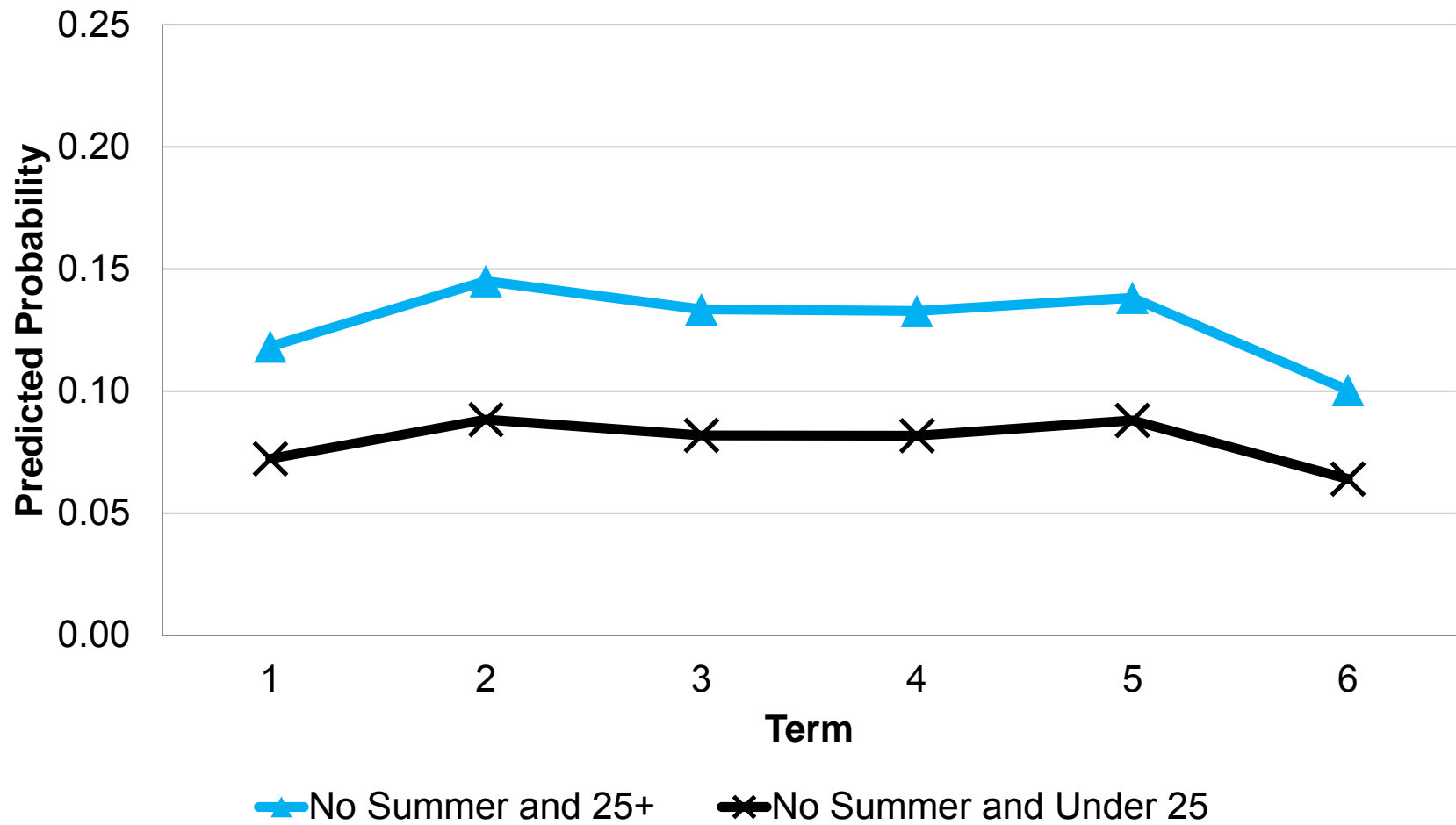
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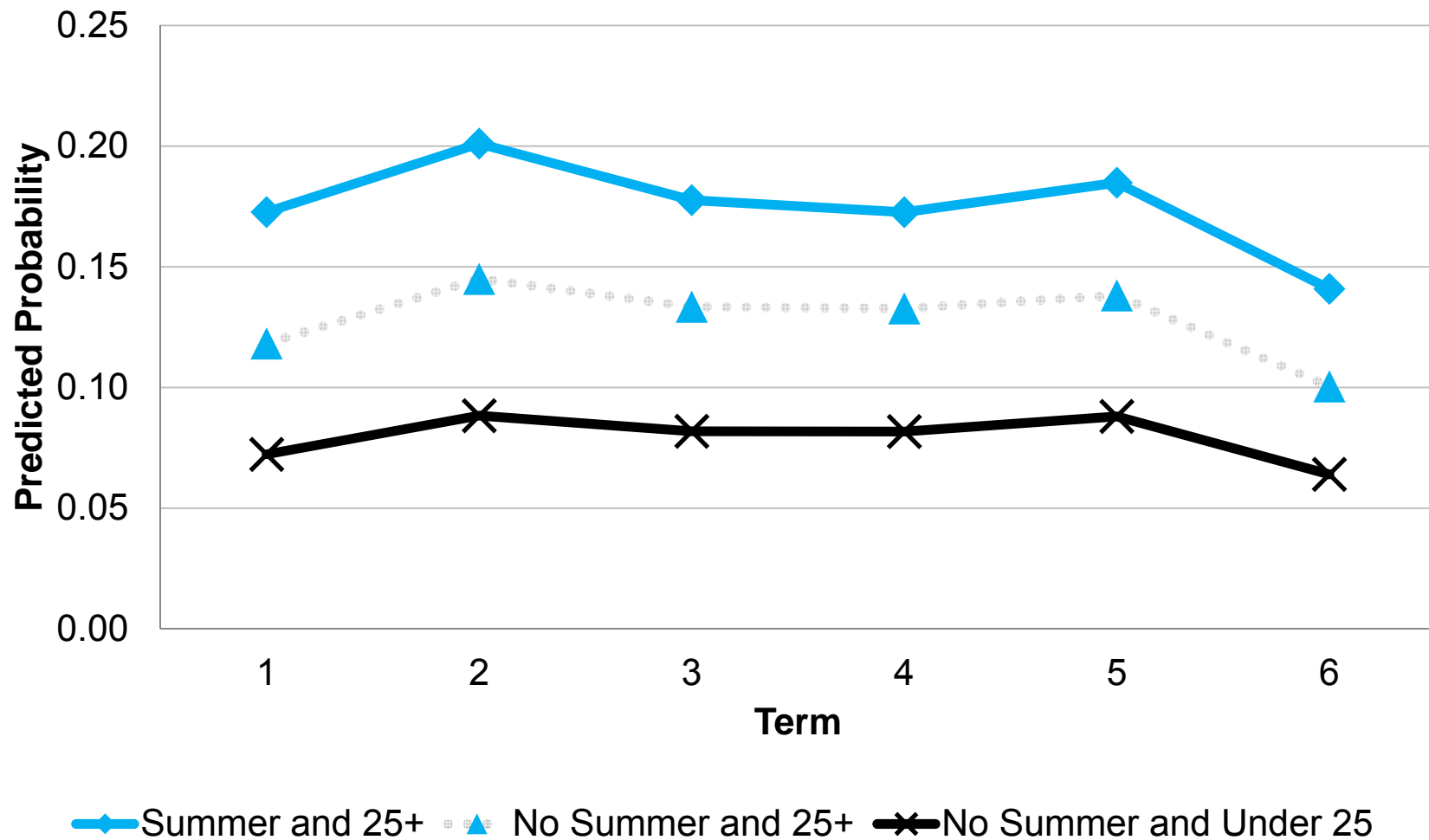
Differences emerge in the predicted probability of degree completion



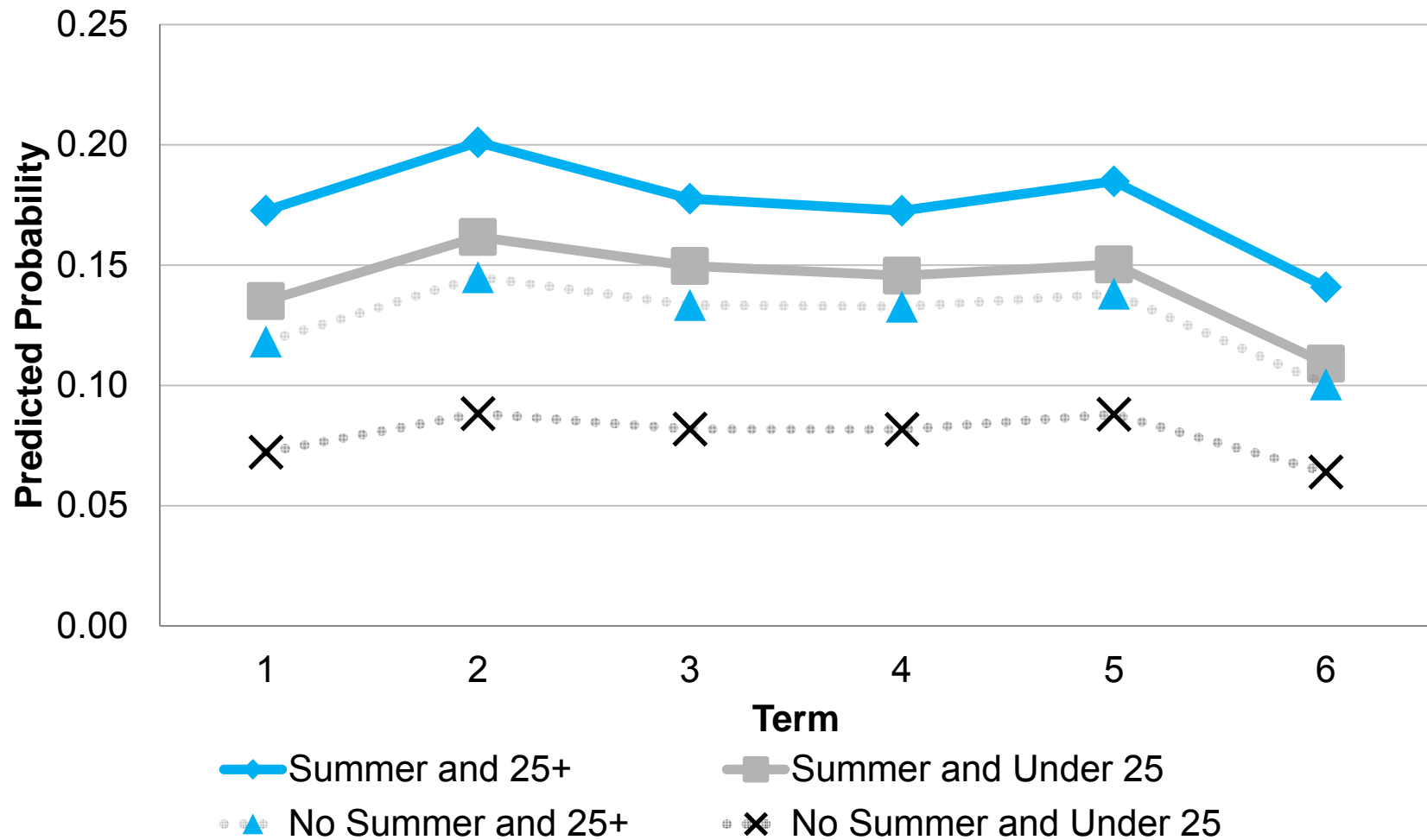
Differences also emerge in the predicted probability of completing math dev. ed



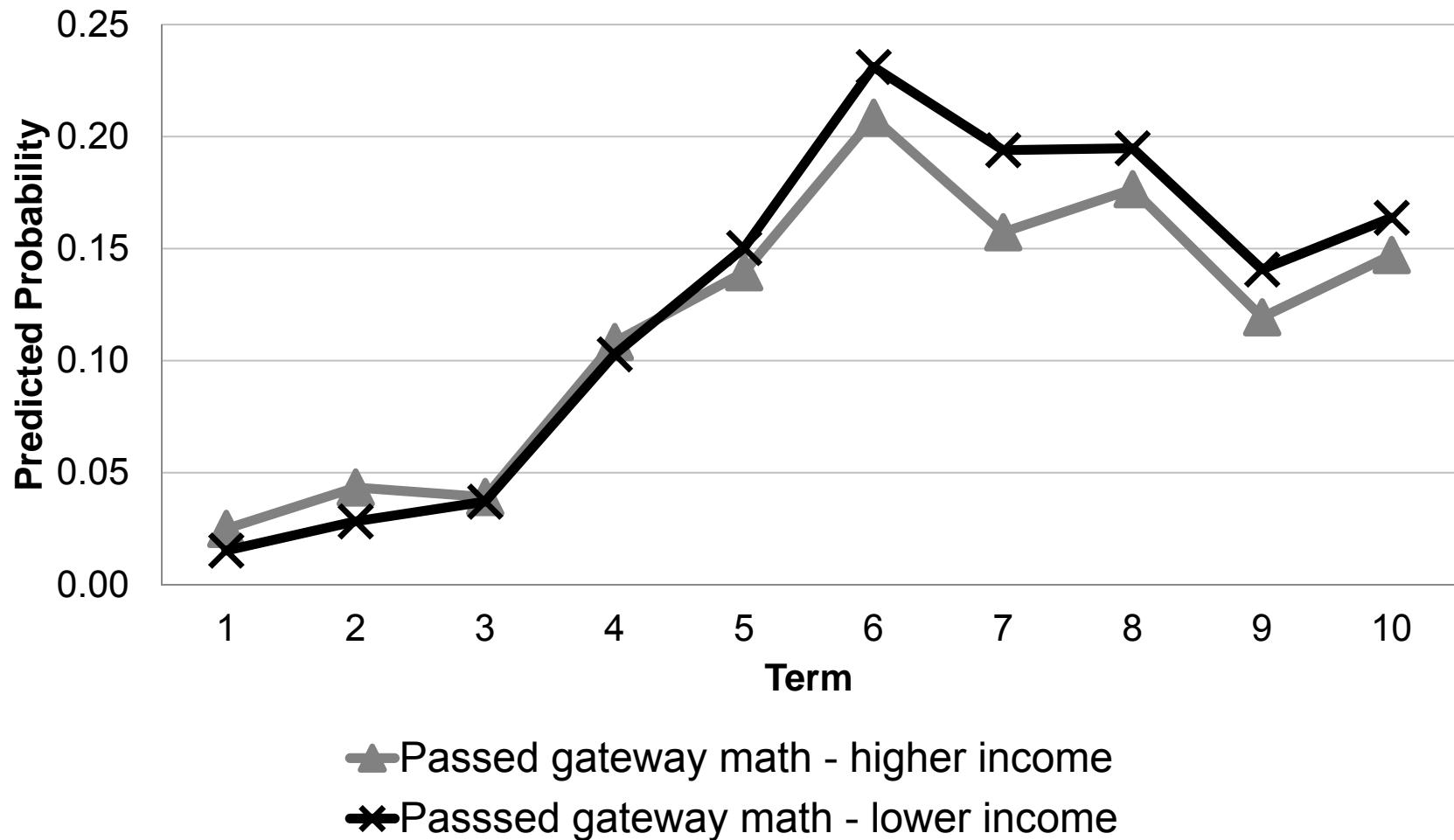
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Differences also emerge in the predicted probability of completing math dev. ed



Differences by incomes in the estimated effect of passing gateway math on graduation



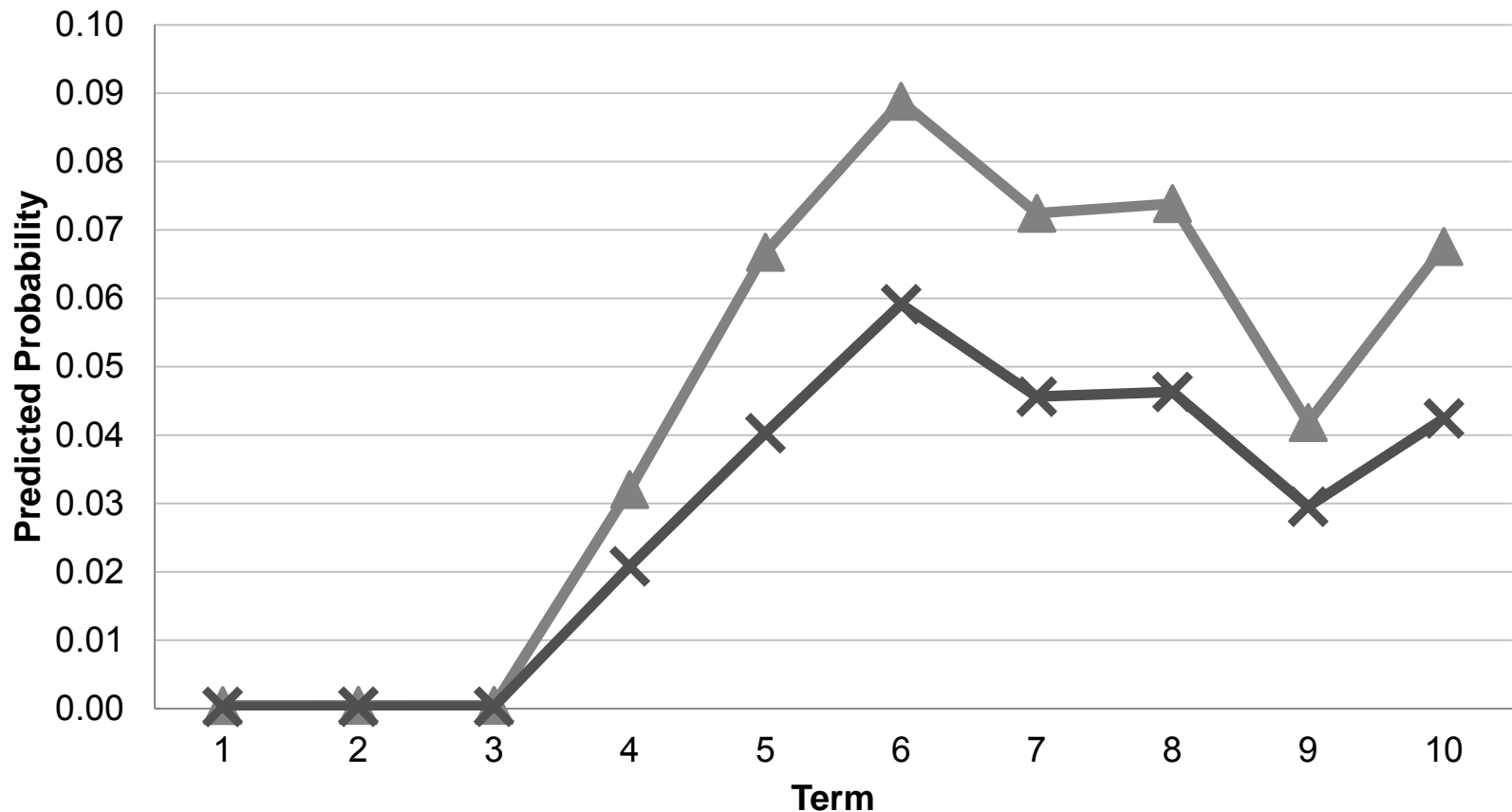
Results of Qualitative Data Analyses

- The Significance of Failing the CUNY Assessment Test
- A Spirit and Desire for Experimentation
- Hidden Pathways
- Academic Momentum

Summary of Findings

- The Absence of Any Postsecondary Enrollment
- The Role of Summer Course-Taking Prior to Matriculation
- Alternative Routes through Developmental Education:
 - CLIP and CUNY Start
- Revisiting the Academic Momentum Framework

Research Across Pathways Must Recognize Diversity of Those Pathways



- ▲ Graduation with 3.0+ GPA: Students with prior CLIP experience
- ✕ Graduation with 3.0+ GPA: Students with no prior CLIP experience

Next Steps for Research

- ESL Students and the Role of English Language Immersion
- Evaluation of CUNY Start
- Cost-Effectiveness
- Unpacking the Theoretical Framework of Momentum

Policy/Practice Recommendations

- Address deficiencies in data collection for non-credit pathways
- Develop clear communication strategies that can inform students, advisors, and faculty of developmental education landscape of institutions
- Sharing of resources and lessons learned across programs/sectors
- Support experimentation and innovation



Contact

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Extra Slides

Momentum

$$M = \beta_0 + \beta_1(PUSH) + \beta_2(PULL)$$

Momentum (M) is a function of an asymmetric model in which the momentum causing/maintaining-“push” of certain forces through educational pathways is combined with the “pull” of other forces that cause/maintain momentum by guiding students toward a clear goal or milestone. The asymmetry should be stressed because the power of the “push,” β_1 , can have a different magnitude than that of the “pull,” β_2 .

Initial developmental education pathways by subsequent term enrollment

| | | Subsequent (Second) Term Enrollment | | | | | | | TOTAL |
|-------------------------------|-----------------------------------|-------------------------------------|---------------------------|---------------------------------|------------------------|----------------------------|----------------------------|------------------------------------|-------|
| | | % | % | % | % | % | % | % | |
| Initial Pathway of Enrollment | | CUNY Community College | Alternative Pathway: CLIP | Alternative Pathway: CUNY Start | CUNY Four-Year College | Non-CUNY Community College | Non-CUNY Four-Year College | No Known Post-secondary Enrollment | |
| No Summer/Winter Immersion | CUNY community college | 77.2 | 0.1 | 0.1 | 0.1 | 0.4 | 0.3 | 21.7 | 100.0 |
| | CLIP | 10.6 | 62.7 | 0.3 | 0.6 | 0.3 | 0.2 | 25.4 | 100.0 |
| | CUNY Start | 69.6 | 0.3 | 4.3 | 1.3 | 0.5 | 0.4 | 23.6 | 100.0 |
| | CUNY four-year college | 0.9 | 0.1 | 0.0 | 77.7 | 0.4 | 0.5 | 20.5 | 100.0 |
| | Non-CUNY community college | 2.5 | 0.1 | 0.0 | 0.2 | 81.0 | 1.0 | 15.1 | 100.0 |
| | Non-CUNY four-year college | 2.1 | 0.1 | 0.0 | 0.3 | 0.4 | 87.1 | 10.0 | 100.0 |
| | No known postsecondary enrollment | 22.3 | 1.9 | 1.0 | 1.3 | 1.3 | 1.1 | 71.0 | 100.0 |
| Summer/Winter Immersion | CUNY community college | 86.4 | 0.1 | 0.1 | 0.3 | 0.2 | 0.2 | 12.7 | 100.0 |
| | CLIP | 14.3 | 60.9 | 0.4 | 0.8 | 0.1 | 0.1 | 23.4 | 100.0 |
| | CUNY Start | 70.0 | 0.0 | 4.5 | 1.6 | 0.4 | 0.4 | 23.1 | 100.0 |
| | CUNY four-year college | 0.2 | 0.4 | 0.0 | 89.7 | 0.3 | 0.4 | 8.9 | 100.0 |
| | Non-CUNY community college | 0.0 | 0.0 | 0.0 | 0.0 | 80.5 | 0.0 | 19.5 | 100.0 |
| | Non-CUNY four-year college | 2.0 | 0.0 | 0.0 | 0.0 | 0.0 | 86.0 | 12.0 | 100.0 |
| | No known postsecondary enrollment | 18.1 | 3.2 | 1.0 | 2.7 | 0.6 | 0.8 | 73.7 | 100.0 |

Discrete-time Hazard Approach

