College Preparedness Benchmarks for the Grade 12 NAEP Mathematics Assessment

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Burhan Ogut| George Bohrnstedt | Markus Broer

College Preparedness

- Growing interest in ensuring that students are prepared for college and a career when they finish high school

- Prior research identified school attendance, GPA, test scores, and college entry exams as important predictors

- Where does NAEP fit in?
  - Assesses what students know and can do in the Nation
  - NAEP is in a unique position to inform whether students are prepared for college

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Prior Studies

- Studies commissioned by the National Assessment Governing Board (NAGB) indicate that NAEP can in fact be used to predict college preparedness (Fields, 2014)
  - Defined as being ready to enroll in postsecondary education without remedial coursework and succeed in entry-level, credit-bearing college courses
    - » Earning 2.67 (B-) or better GPA at the end of the first year of college
  - In 2019, 37 percent of the 12th-grade students who took mathematics or reading assessments met the college preparedness benchmark
  - Data used only from Florida
  - Students who attended out-of-state or nonpublic colleges in Florida could not be followed

Purpose

- Determine how college preparedness measures that include college GPA relate to NAEP achievement levels (as well as to the NAEP preparedness indicator) in order to

- Contribute to the discussion about appropriate national benchmarks for tracking the college preparedness of the nation's students

- Provide critical validity evidence for NAEP's achievement levels

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College Preparedness

- Measured in several ways
  - Enrolled without remediation
  - Enrolled without remediation with a first-year college GPA or 2.7 or higher and
  - Enrolled in a 2-or 4-year college with a first-year college GPA or 2.7 or higher.

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Research Question

- What is the relationship between performance on the grade 12 NAEP mathematics assessment and college preparedness?

  – What is the probability of preparedness for students scoring at the NAEP Advanced, Proficient, and Basic levels on the grade 12 mathematics assessment?

  – What is the probability of preparedness for students scoring at NAEP's college and career preparedness indicator point on the grade 12 mathematics assessment?

  – What is the probability of preparedness for students performing below the NAEP Basic level on the grade 12 mathematics assessment?

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Methods

Data

- High School Longitudinal Study
  - Base year 2009-10 (9th grade)
  - First follow up 2011-12 (11th grade)
  - Second Follow up 2016
  - Postsecondary Transcripts (2017-18)

- Two subsets
  - An overlap sample of students of HSLS that also took 2013 NAEP grade 12 mathematics assessment (About 3500 students)
  - All HSLS students for whom NAEP scores could be imputed (about 12000 students)

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Method

- Twenty NAEP plausible value scale scores are imputed for students in HSLS:09, as described in Ogut, Bohrnstedt, and Broer (2015).

- Examine relationship between NAEP performance and college preparedness using ordered logistic regressions

- Compute probabilities of preparedness at NAEP proficiency levels and college preparedness indicator point

- Compare probabilities of preparedness by student groups

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Results

Sample

| Group	Percent	Not Enrolled	Less than 2-year	2- or 4-year with remediation or GPA < 2.7	2- or 4-year without remediation and GPA ≥ 2.7
White	54	0.29	0.02	0.24	0.45
Black	12	0.41	0.04	0.31	0.24
Hispanic	21	0.38	0.04	0.30	0.29
Asian	4	0.19	0.01	0.25	0.55
Other race	9	0.36	0.06	0.29	0.29
Female	50	0.27	0.04	0.27	0.42
Male	50	0.38	0.03	0.26	0.33

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Predicting College Preparedness

Variables	Model 1		Model 2		Model 3		Model 4		Model 5	
NAEP achievement	0.039	***	0.04	***	0.023	***	0.012	***	0.012	***
	(0.001)		(0.001)		(0.002)		(0.003)		(0.003)	
GPA					1.452	***	1.439	***	1.415	***
					(0.071)		(0.07)		(0.07)	
Algebra, grade 11							0.034	***	0.031	***
							(0.008)		(0.008)	
Algebra, grade 9							0.011		0.008	
							(0.006)		(0.006)	
Black			0.29	**	0.505	***	0.472	***	0.506	***
			(0.103)		(0.109)		(0.106)		(0.106)	
Hispanic			0.062		0.321	**	0.285	**	0.391	***
			(0.095)		(0.103)		(0.102)		(0.102)	
Asian			-0.067		0.067		0.036		0.029	
			(0.146)		(0.141)		(0.142)		(0.14)	
Other race			-0.16		0.033		0.007		0.038	
			(0.089)		(0.086)		(0.086)		(0.087)	
Male					-0.263	***	-0.228	***	-0.243	***
					(0.063)		(0.063)		(0.063)	
Parent college graduate									0.501	***
									(-0.057)	
Cutoff 1: No college	4.855	***	5.027	***	6.208	***	6.832	***	6.654	***
	(0.204)		(0.206)		(0.219)		(0.234)		(0.233)	
Cutoff 2: Less than 2-year	5.034	***	5.207	***	6.42	***	7.045	***	6.87	***
	(0.211)		(0.213)		(0.225)		(0.241)		(0.241)	
Cutoff 3: 2- or 4-year with remediation or GPA of less than 2.7	6.53	***	6.707	***	8.169	***	8.808	***	8.652	***
	(0.224)		(0.225)		(0.242)		(0.258)		(0.259)	
Pseudo R^2	0.299		0.301		0.422		0.427		0.436	
N	11,690		11,690		11,690		11,690		11,690	

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).
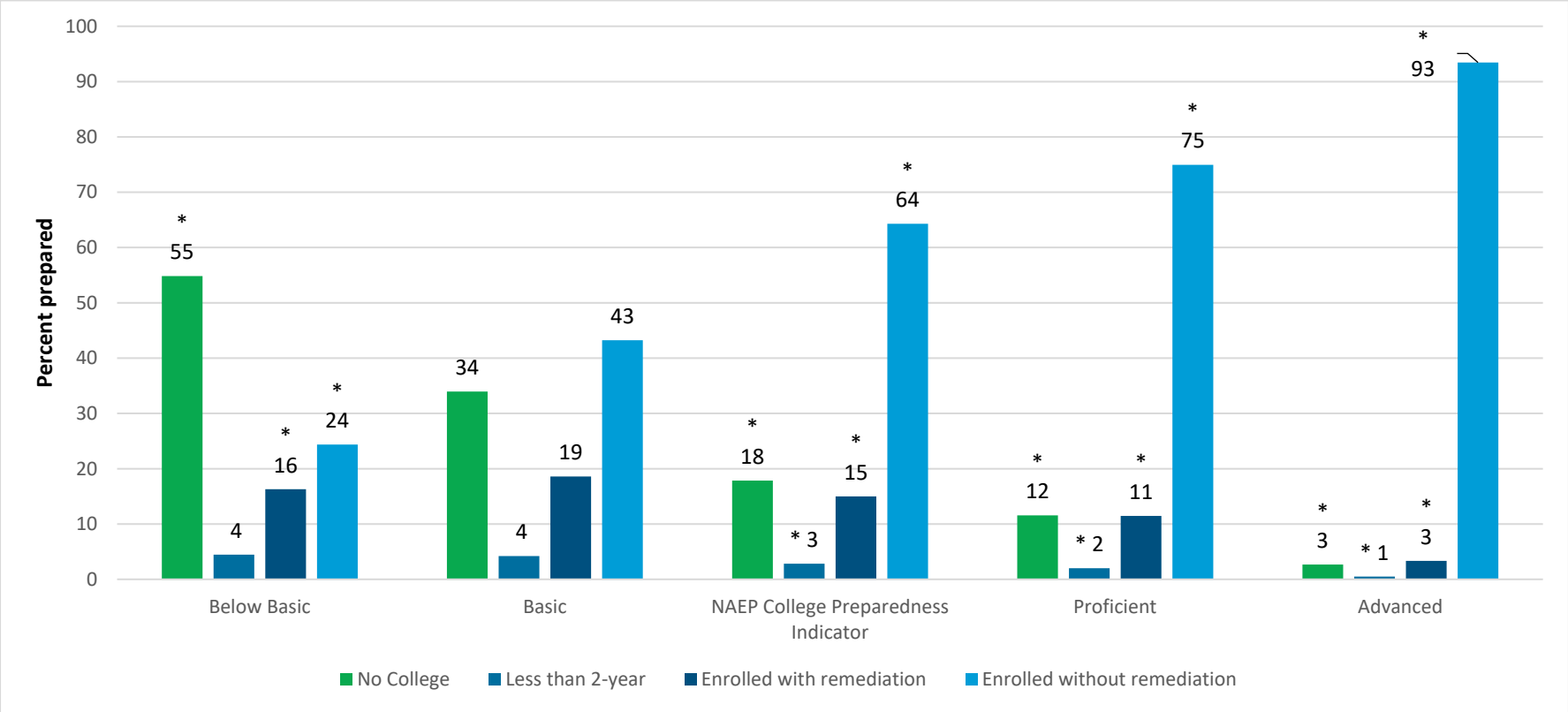
Probabilities of College Preparedness
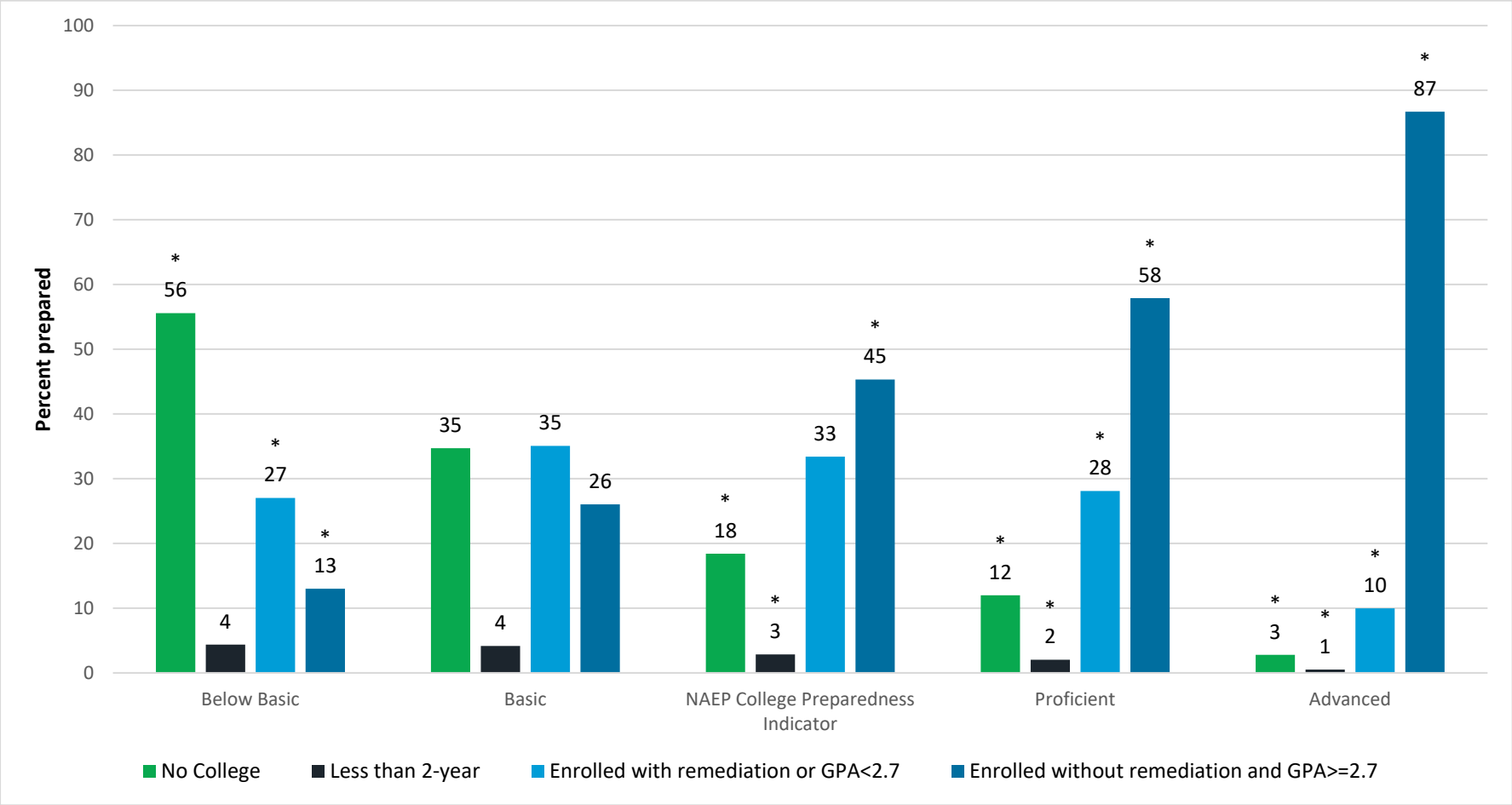
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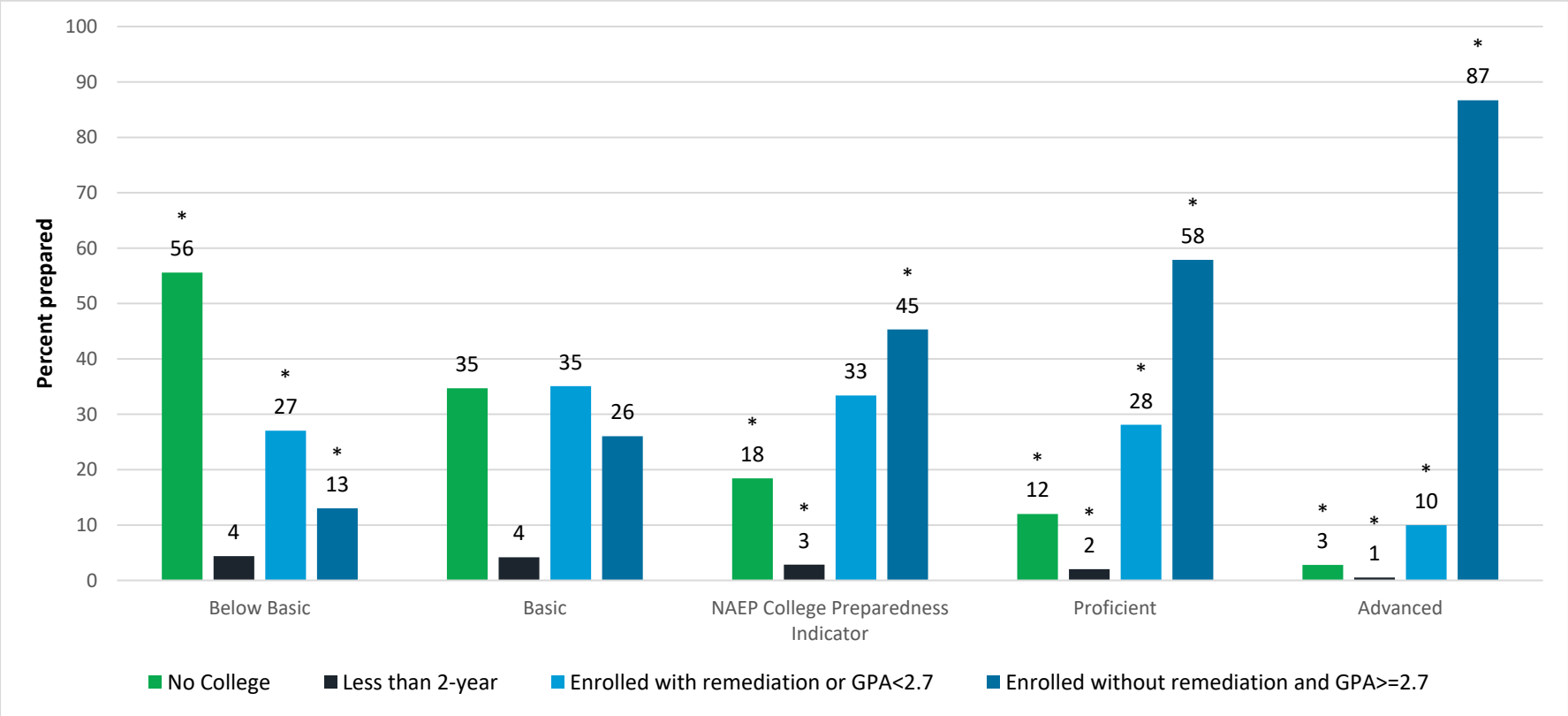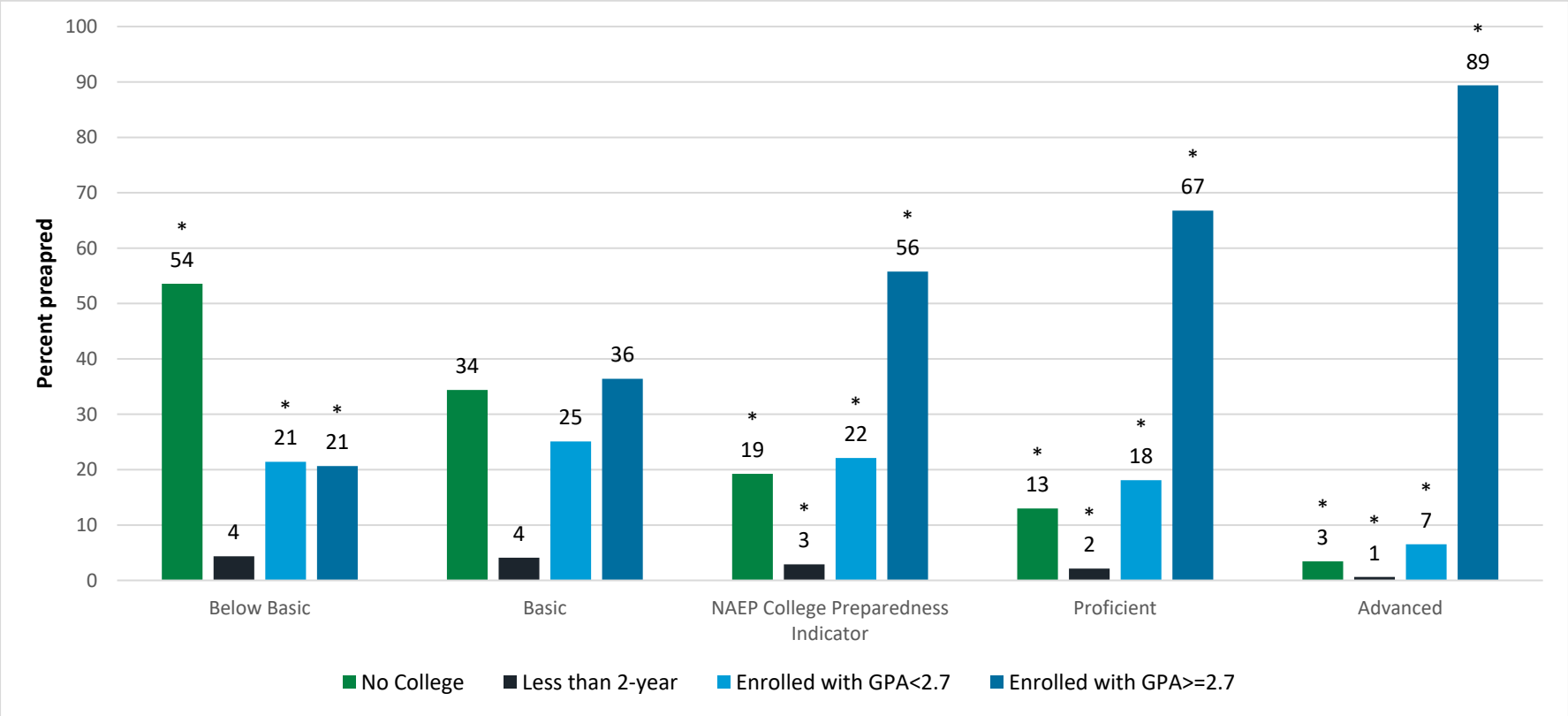
Degrees of Preparedness

Enrollment in a 2-or 4-year college by remedial coursetaking status

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).
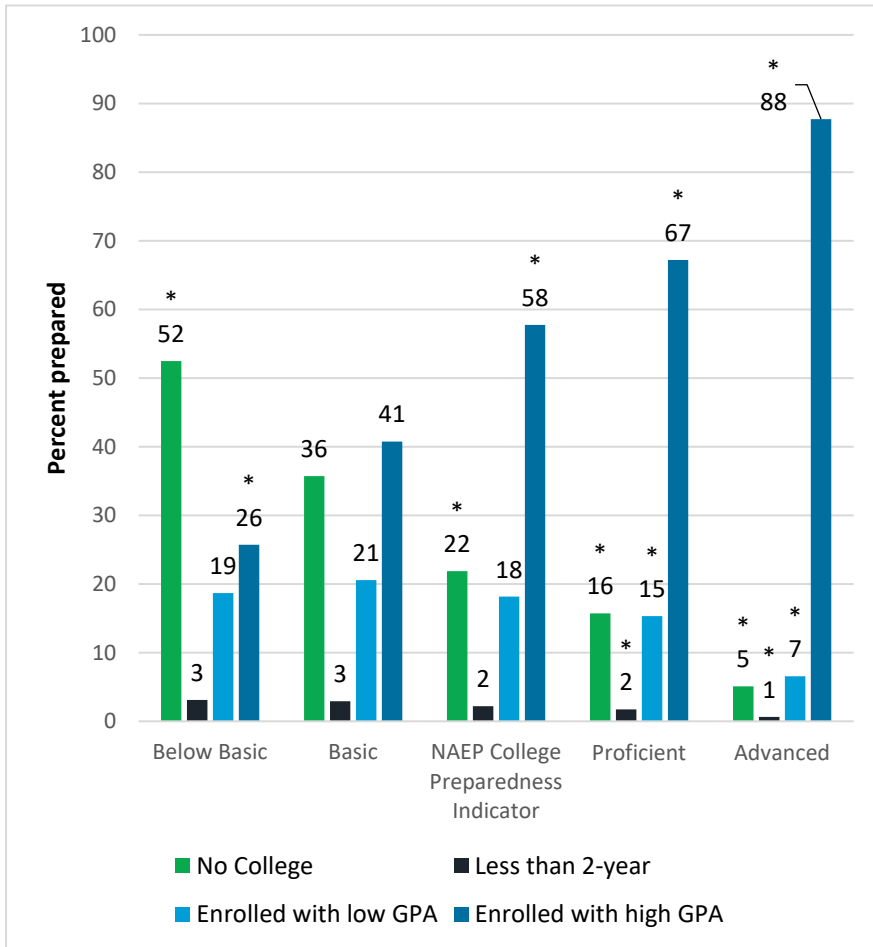
Degrees of Preparedness

Enrollment in a 2-or 4-year college by remedial coursetaking status and first-year college GPA

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

Degrees of Preparedness

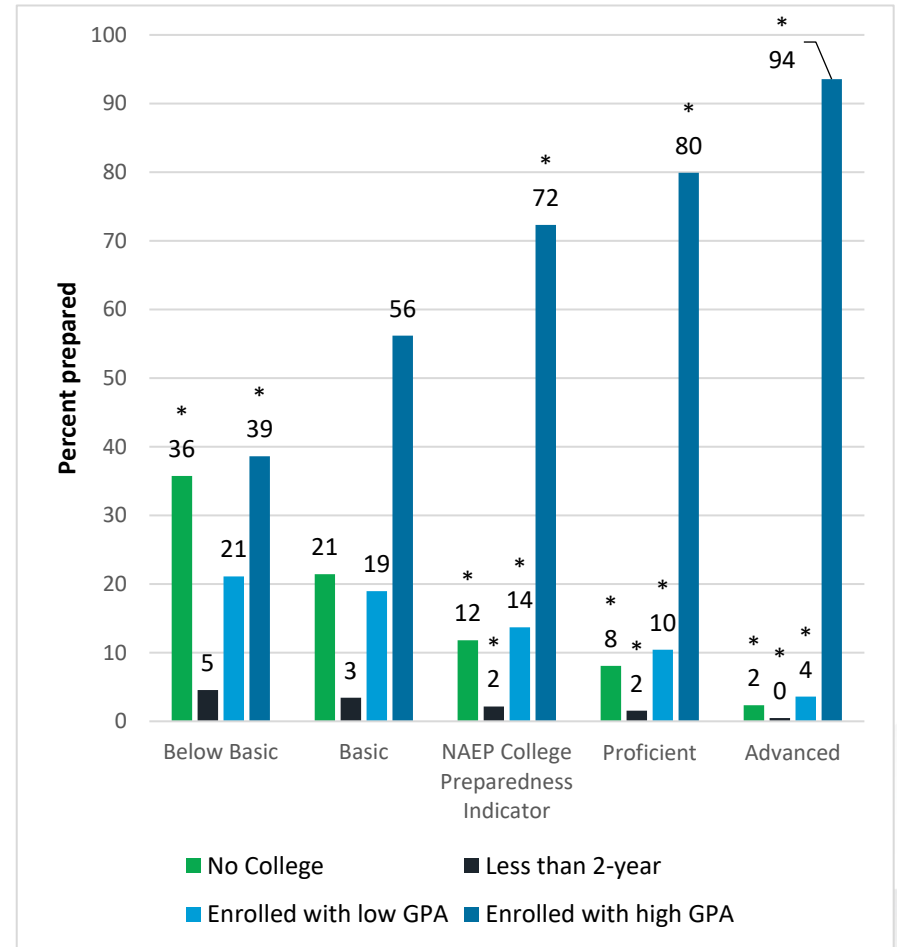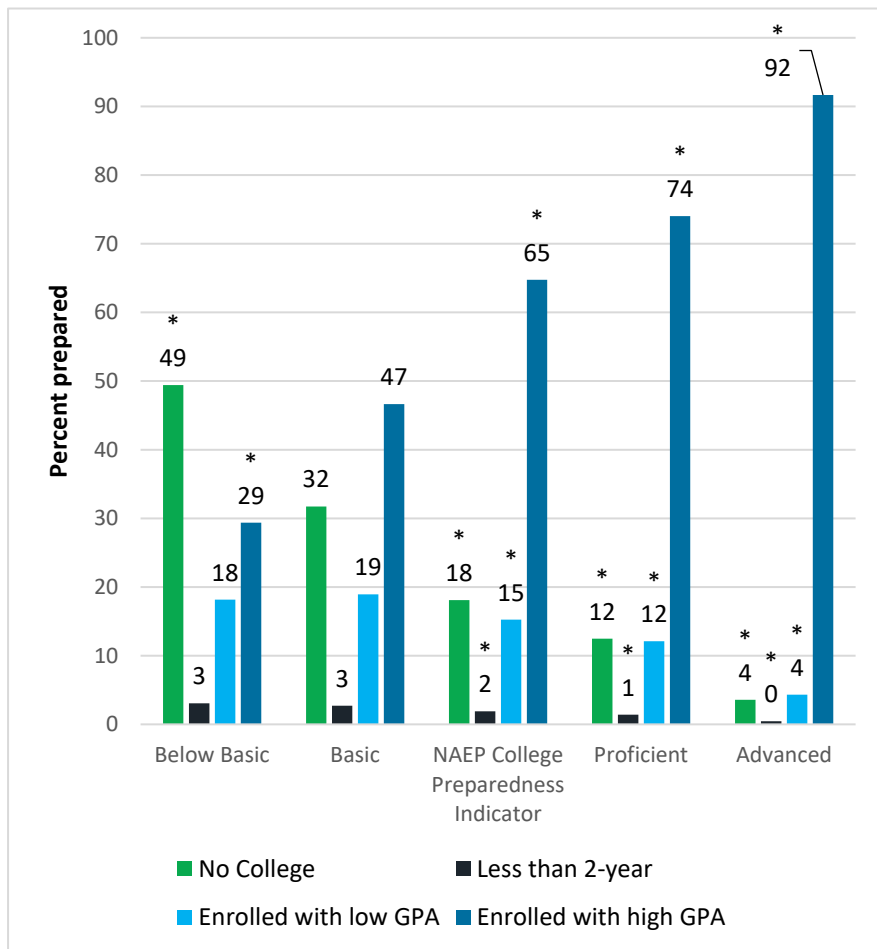Enrollment in a 2-or 4-year college by first-year college GPA

Percent preapred

	No College	Less than 2-year	Enrolled with GPA<2.7	Enrolled with GPA>=2.7
Below Basic	54 *	4	21 *	21 *
Basic	34	4	25	36
NAEP College Preparedness Indicator	19 *	3 *	22 *	56 *
Proficient	13 *	2 *	18 *	67 *
Advanced	3 *	1 *	7 *	89 *

■ No College ■ Less than 2-year ■ Enrolled with GPA<2.7 ■ Enrolled with GPA>=2.7

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

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Subgroups

Male

Percent prepared

	No College	Less than 2-year	Enrolled with low GPA	Enrolled with high GPA
Below Basic	52*	3	19	26*
Basic	36	3	21	41
NAEP College Preparedness Indicator	22*	2	18	58*
Proficient	16*	2*	15*	67*
Advanced	5*	*	1*	88*
Advanced (high GPA)			7	

Female

Percent prepared

	No College	Less than 2-year	Enrolled with low GPA	Enrolled with high GPA
Below Basic	36*	5	21	39*
Basic	21	3	19	56
NAEP College Preparedness Indicator	12*	2*	14*	72*
Proficient	8*	2*	10*	80*
Advanced	2*	0*	4*	94*

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).
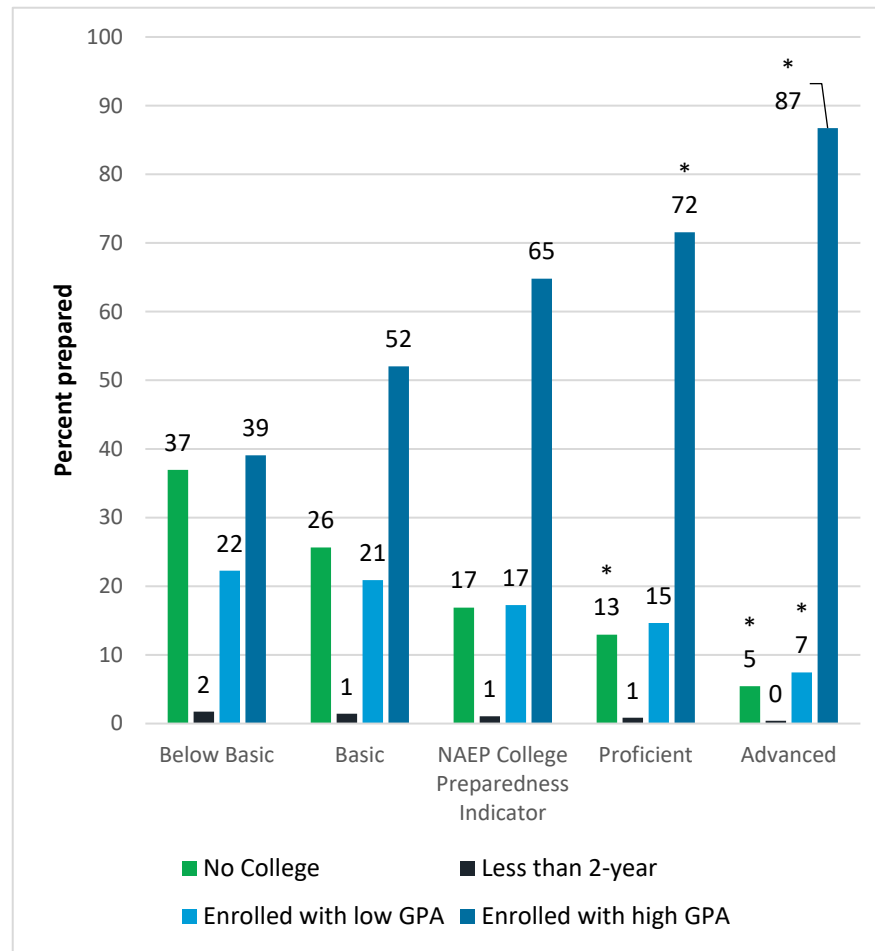
Subgroups

White

Black
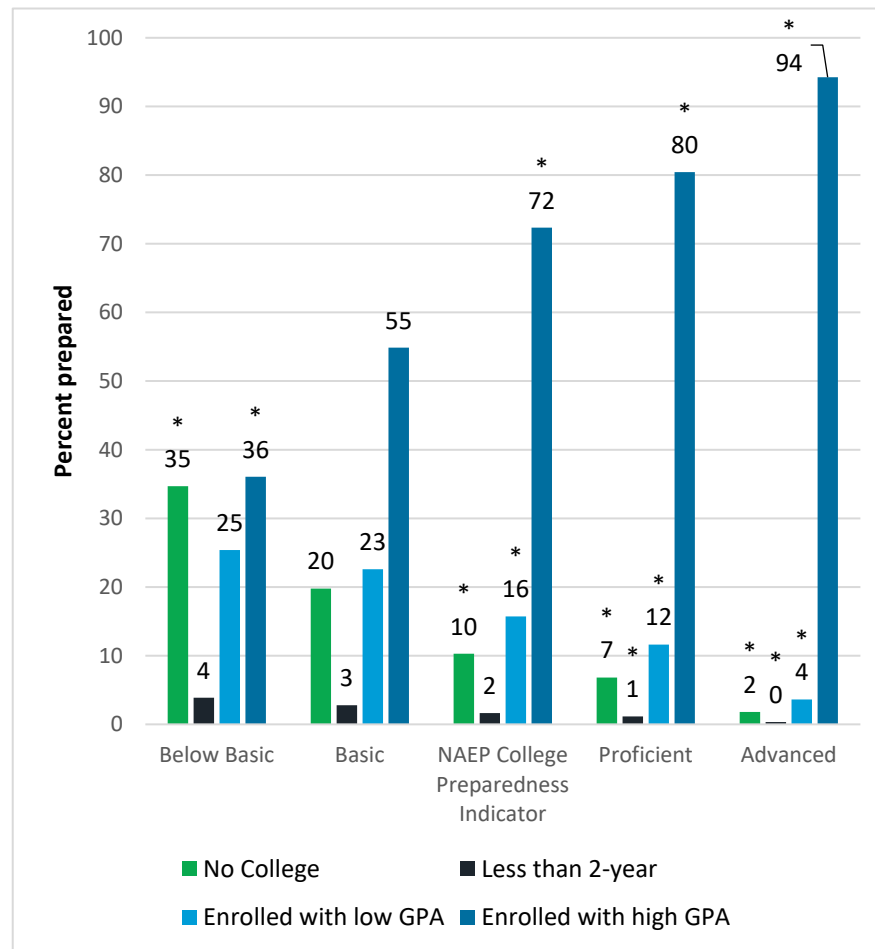
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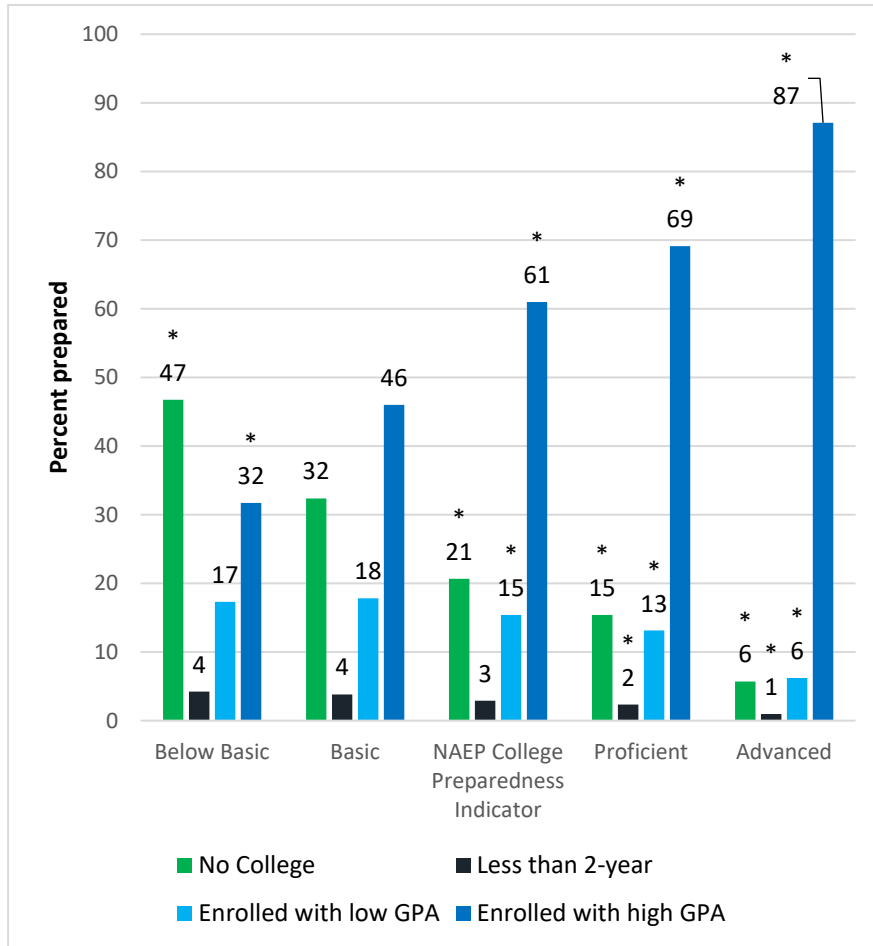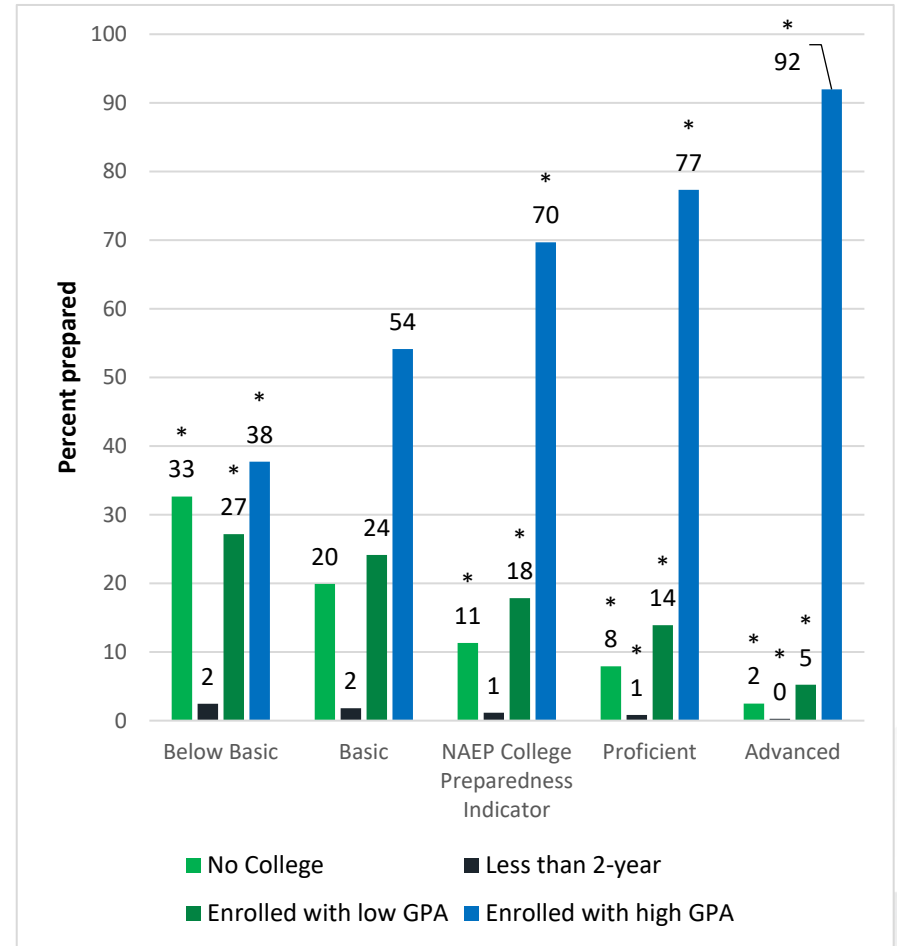
Subgroups

Hispanic
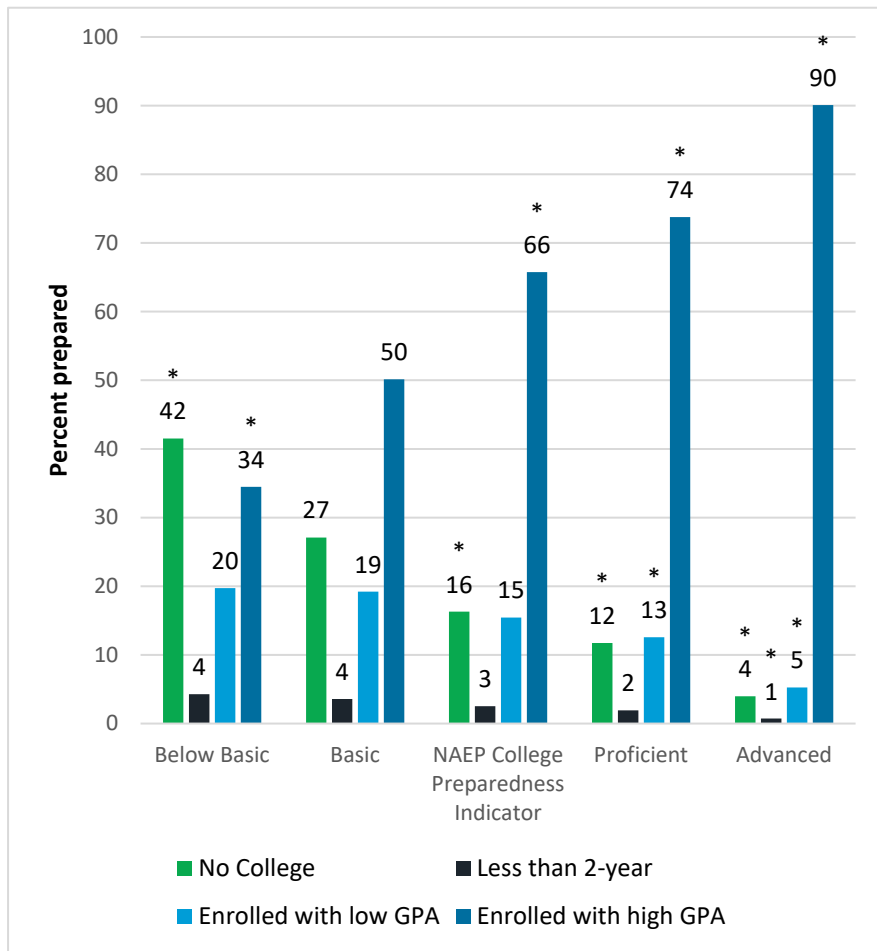
Asian

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

Subgroups

Parental education less than college

Parental education college or higher

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Longitudinal Study of 2009 (HSLS:09).

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Summary

- Preparedness as enrolling in 2- or 4-year college with a first-year GPA of 2.7 or higher
  - The NAEP Basic level corresponded to a 49 percent rate of being college prepared, and the rate increased to 73 percent and 90 percent at the Proficient and Advanced levels, respectively.
  - A student at NAGB's college preparedness cut point had a 65 percent chance of being college prepared.

- Across gender, race/ethnicity, and parental education
  - The probability of preparedness increases as performance moves from the NAEP Basic to the NAEP Advanced levels.
  - Female students and Black students had higher probabilities of being college prepared compared to their male and non-Black peers at each NAEP achievement level.
  - Students whose parents graduated from college or had an advanced degree had a higher probability of being college prepared than did students whose parents had less than a college degree

Discussion

- Strong evidence of the predictive validity of NAEP and NAEP achievement levels

- The evidence for NAGB's college preparedness indicator does not appear to be as strong
  - When college preparedness is defined as entry into a 2- or 4-year college without remedial coursetaking and having a first-year college GPA of 2.7 or higher, the indicator corresponds to a 45 percent probability of preparedness.
  - But when the definition is updated to focus on enrolling in a 2 or 4-year college and earning a first-year college GPA of at least 2.7, the probability of preparedness associated with the indicator increases to 65 percent.

- Preferred definition of college preparedness—which requires a college GPA of 2.7 but does not require the absence of remedial coursetaking
  - NAGB's preparedness indicator (at 65 percent) is very close to a 66 percent benchmark,
  - NAEP Basic (at 49 percent) is close to the 50 percent benchmark
  - NAEP Proficient (at 73 percent) is close to the 75 percent probability benchmark.

BURHAN OGUT

Principal Researcher

bogut@air.org