Math Matters:
Transition from High School to Postsecondary Education

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National/State Data

- <u>Placement</u> in developmental math courses
  - 28% - 42% (National Data, 2010)
  - <u>Enrolling</u> in developmental math (KBOR – 2013/14)
    - 30.9% at community colleges
    - 12.6% at state universities
- <u>Completion rate</u> (Grade C or better)
  - 21% - 30% (National Data, 2010)
  - <u>Completing</u> developmental math in 2 years (KBOR – 2013/14)
    - 66.8% at community colleges
    - 76.2% at state universities
  - <u>Also completing College Algebra</u> in 2 years (KBOR – 2013/14)
    - 19.0% at community colleges
    - 40.7% at state universities

Concerns

- Impact on student self-esteem

- Barrier to postsecondary access

- Increasing costs – for students and institutions

- Workforce: Increased need for K-16 coherence

KSA-M: 2008-2010

- Coverage: algebra, geometry, and data analysis
- 84 multiple-choice items/scores ranging from 0-100/reliability=95%
- Taken at end of 9th, 10th, or 11th grade – Opportunity to Learn
- Can be retaken by those not reaching proficiency
- Used for building accountability, not student graduation
  - Academic warning
  - Approaches standards
  - Proficient
  - Exceeds standards
  - Exemplary

KIDS & KSPSD Datasets

- How well does KSA-M <u>predict</u> developmental math <u>placement</u> in postsecondary education?

- How well does KSA-M <u>predict</u> developmental math <u>performance</u> in postsecondary education?

- How well does KSA-M <u>predict non-developmental math performance</u> in postsecondary education? Is that different from developmental math performance in postsecondary education?

Hierarchical Generalized Linear Models

- Used when outcome variables are influenced by nested variables – students/K-12 schools/postsecondary institution

- Levels of Performance on KSA-M
  - Below proficiency – academic warning & approaches standards)
  - Proficient
  - Above proficiency – exceeds standards & exemplary

- The analysis generates a statistical model that we used to estimate expected probabilities for the outcome variables
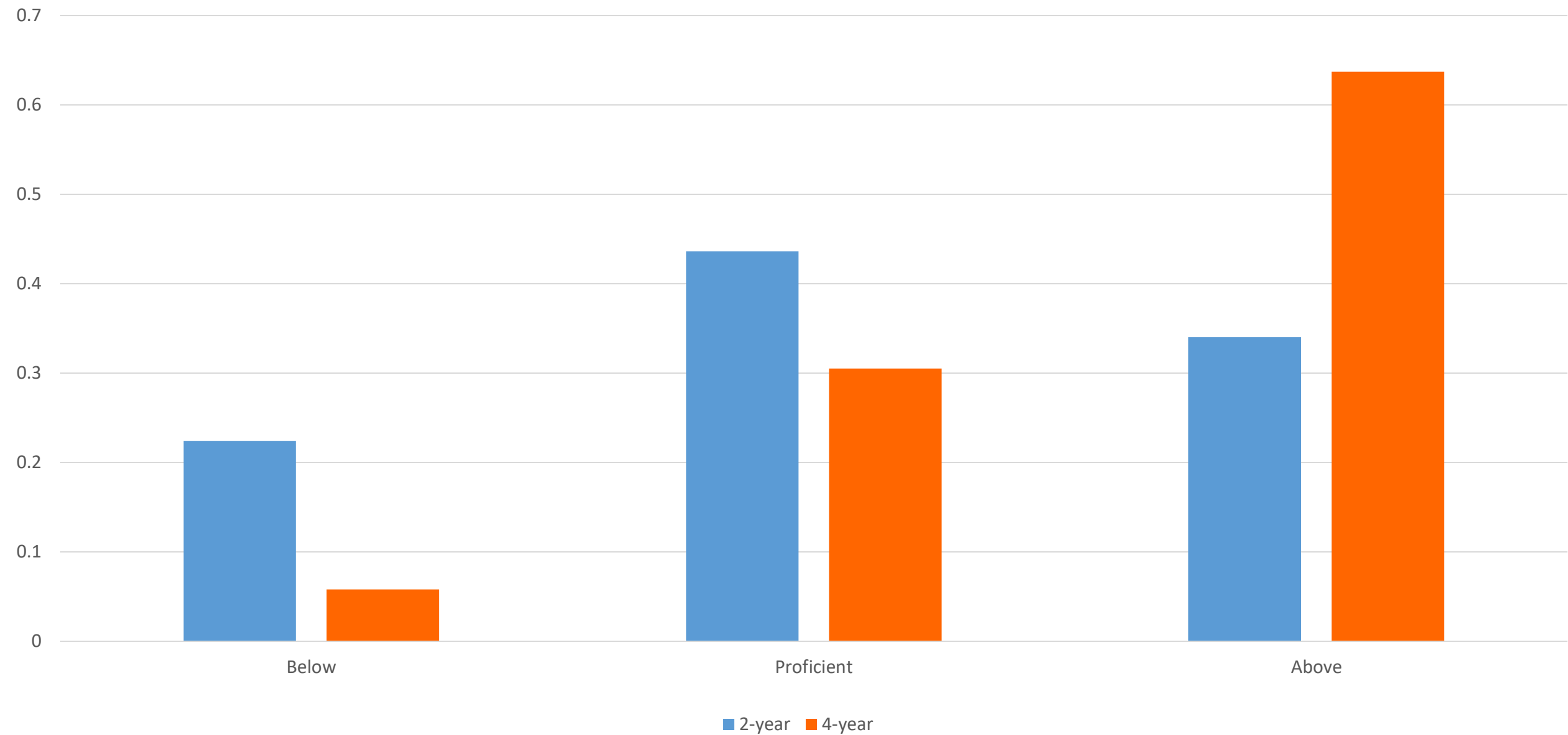
Predicting Developmental Math Placement

Student Variables Examined

- Graduation Year

- Gender

- Race/Ethnicity

- Gifted

- Mild/Moderate Disability

- Gap Between High School Graduation & First Math Course in Postsecondary Education
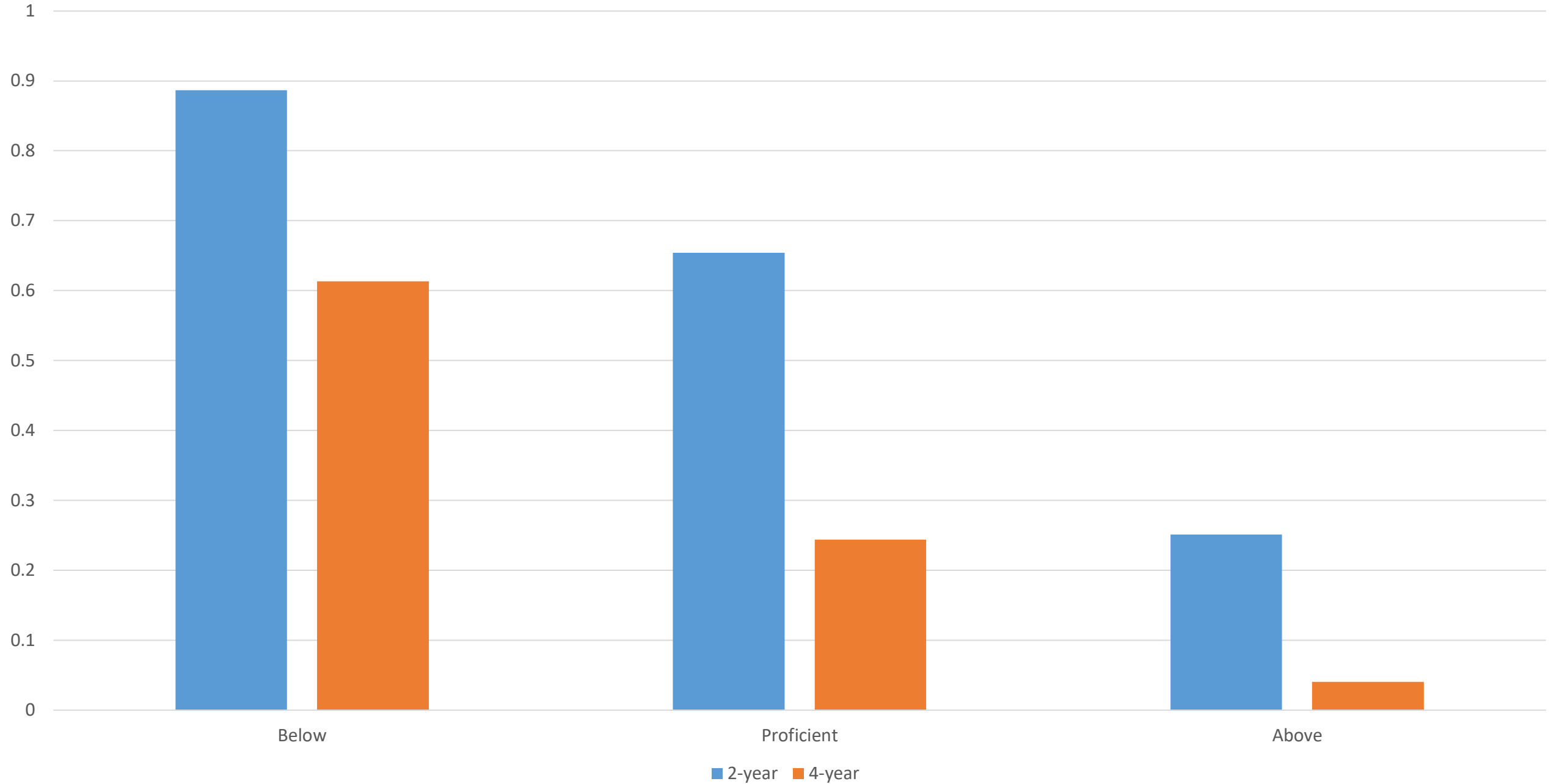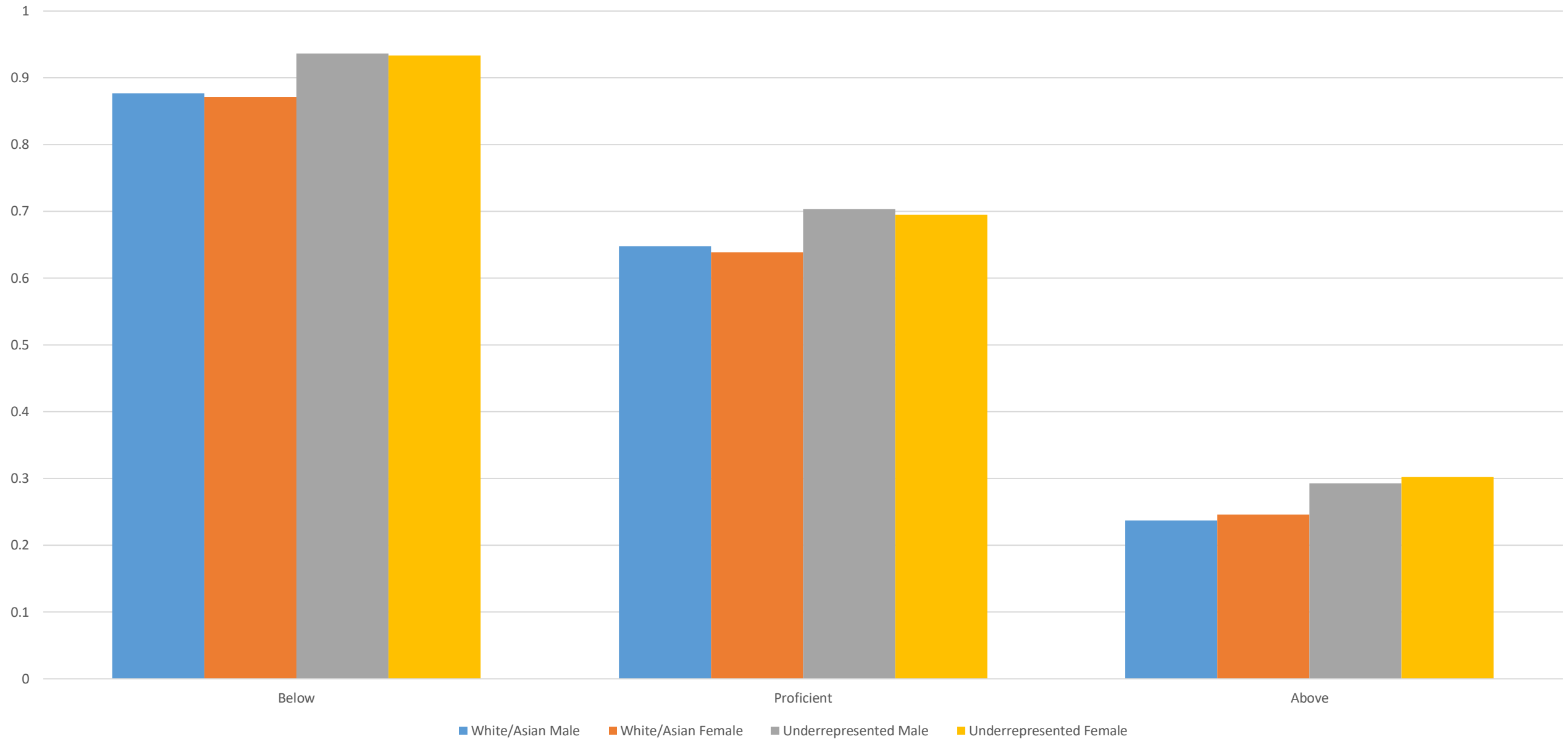
KSA-M Performance

Student Demographics

	Community Colleges	State Universities
%Female	50.45%	48.70%
%White-Non-Hispanic/Asian	72.18%	82.76%
%Mild/Moderate Disability	5.94%	1.44%
Average FRL%	38.79%	32.31%

DMATH Placement by **KSA-M Performance**

2-year ■ 4-year

DMATH Placement by **Gender and Race/Ethnicity** – Community Colleges

Legend: White/Asian Male, White/Asian Female, Underrepresented Male, Underrepresented Female

Categories: Below, Proficient, Above
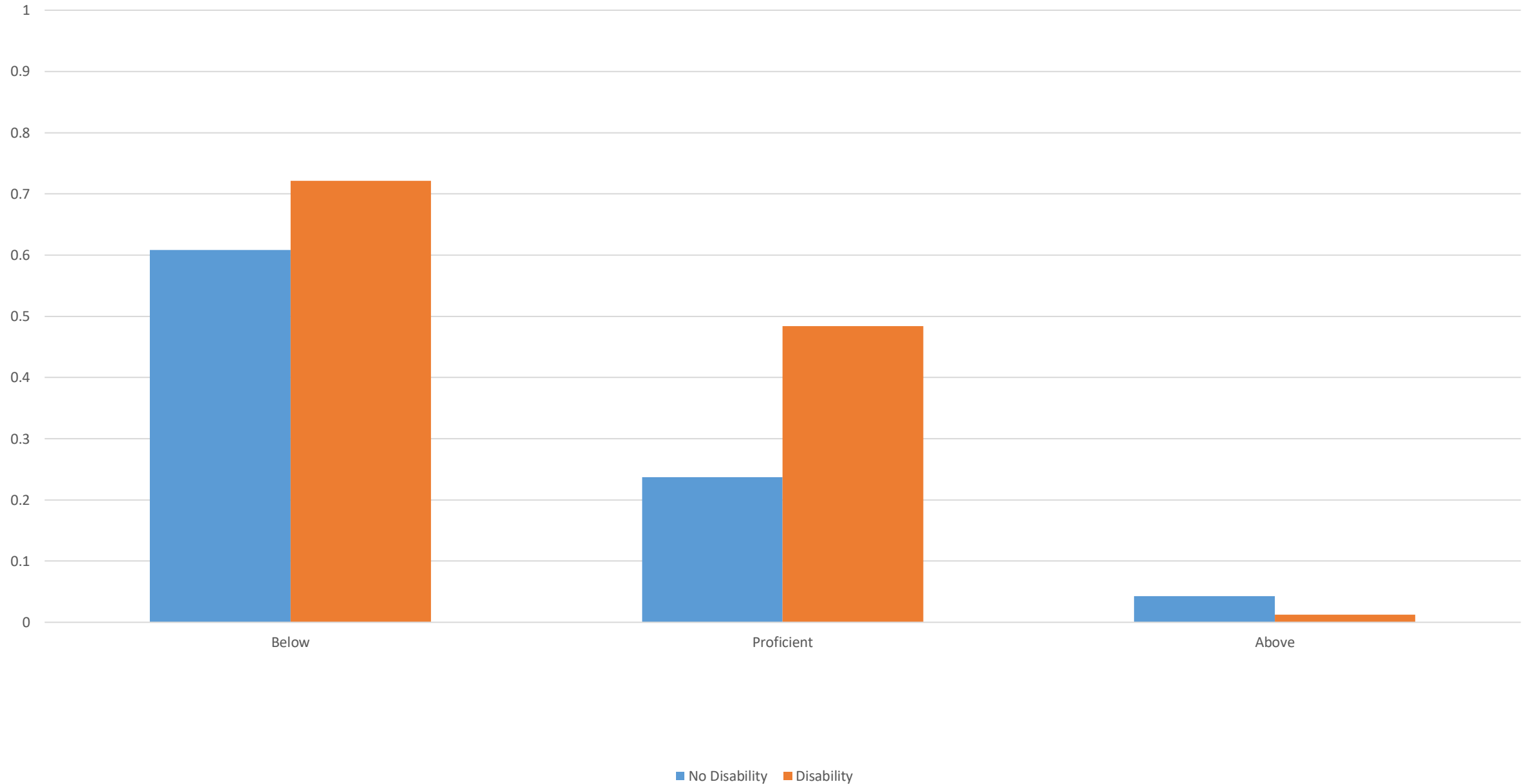
DMATH Placement by **Gender and Race/Ethnicity** – State Universities

DMATH Placement by **Mild/Moderate Disability** – Community Colleges
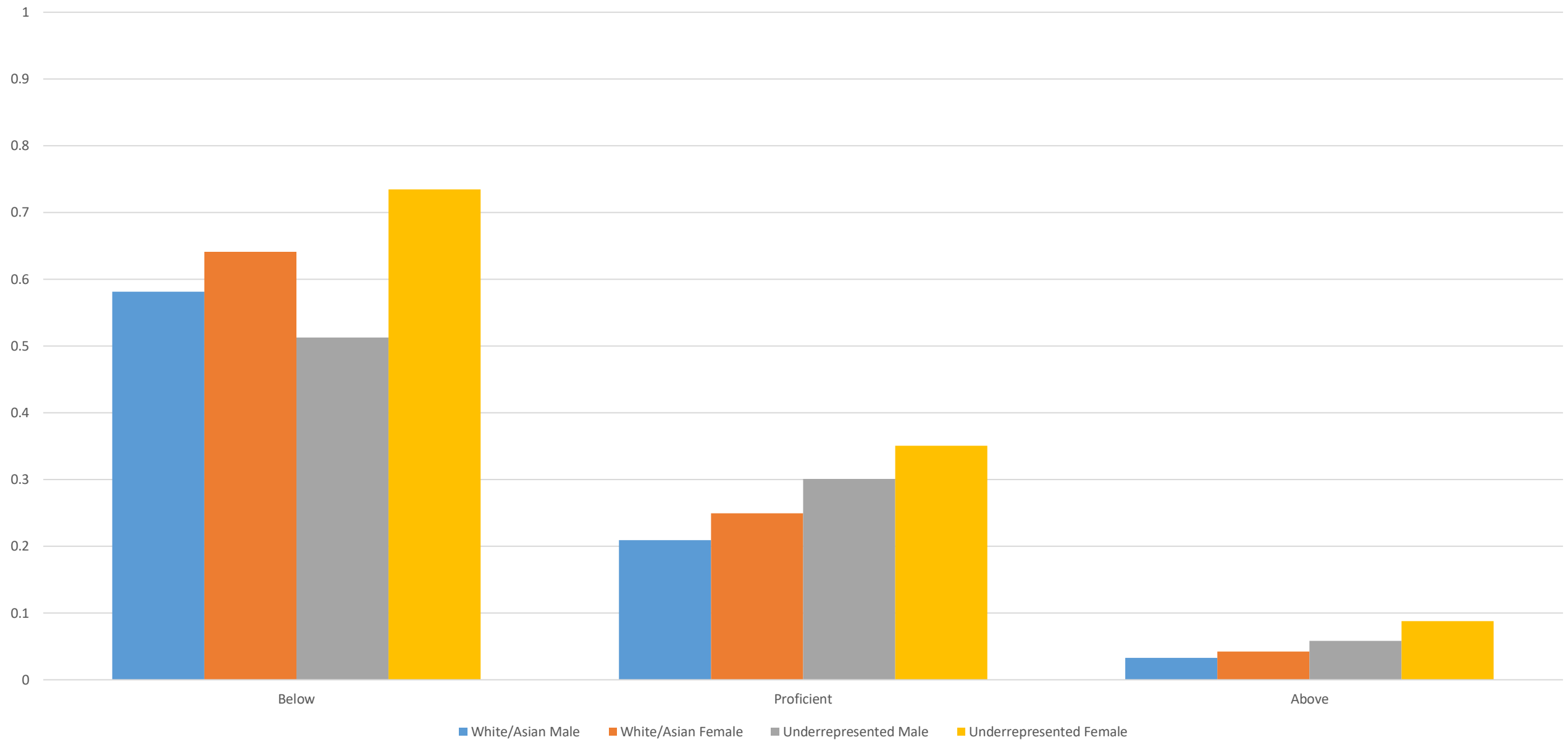
■ No Disability ■ Disability

DMATH Placement by **Mild/Moderate Disability** – State Universities
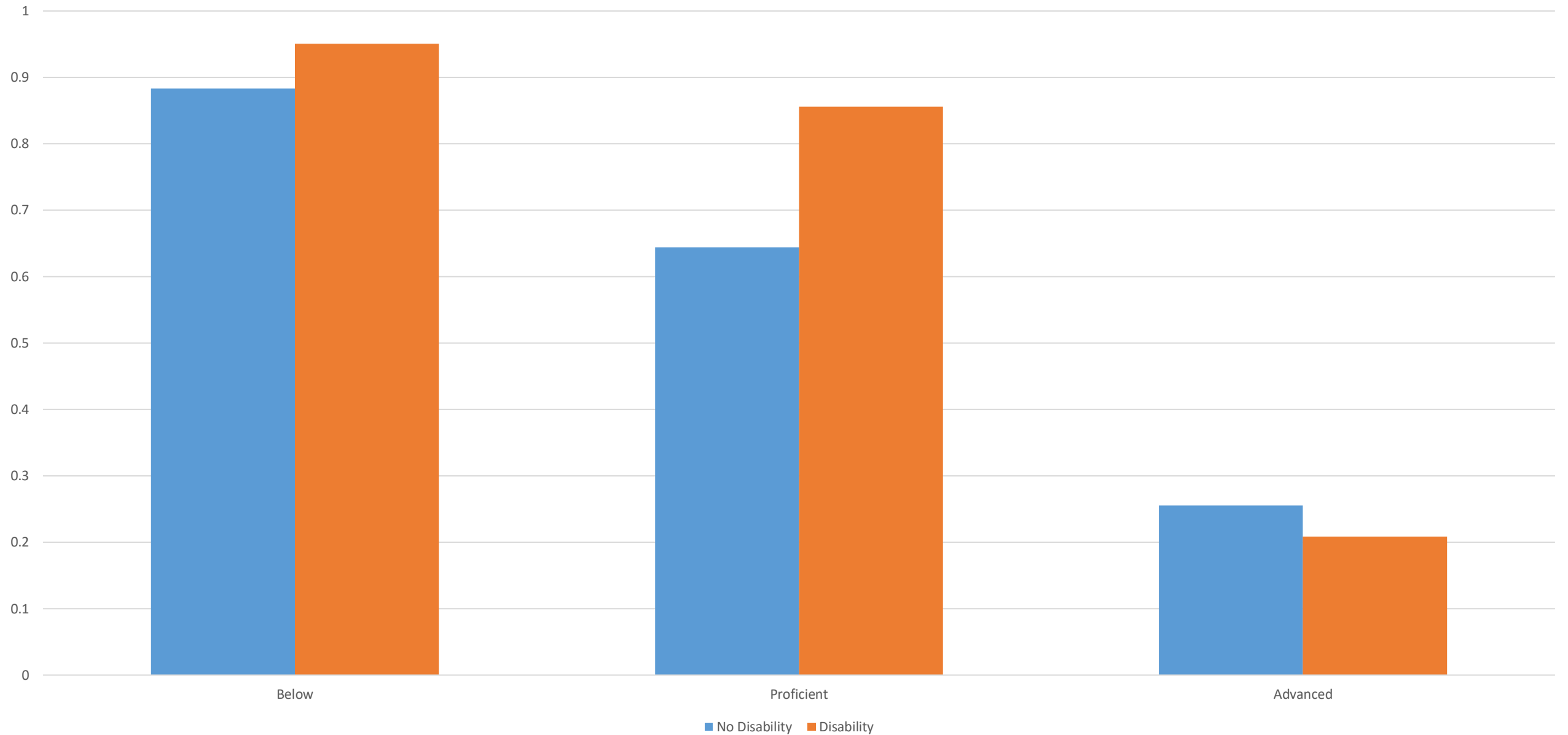
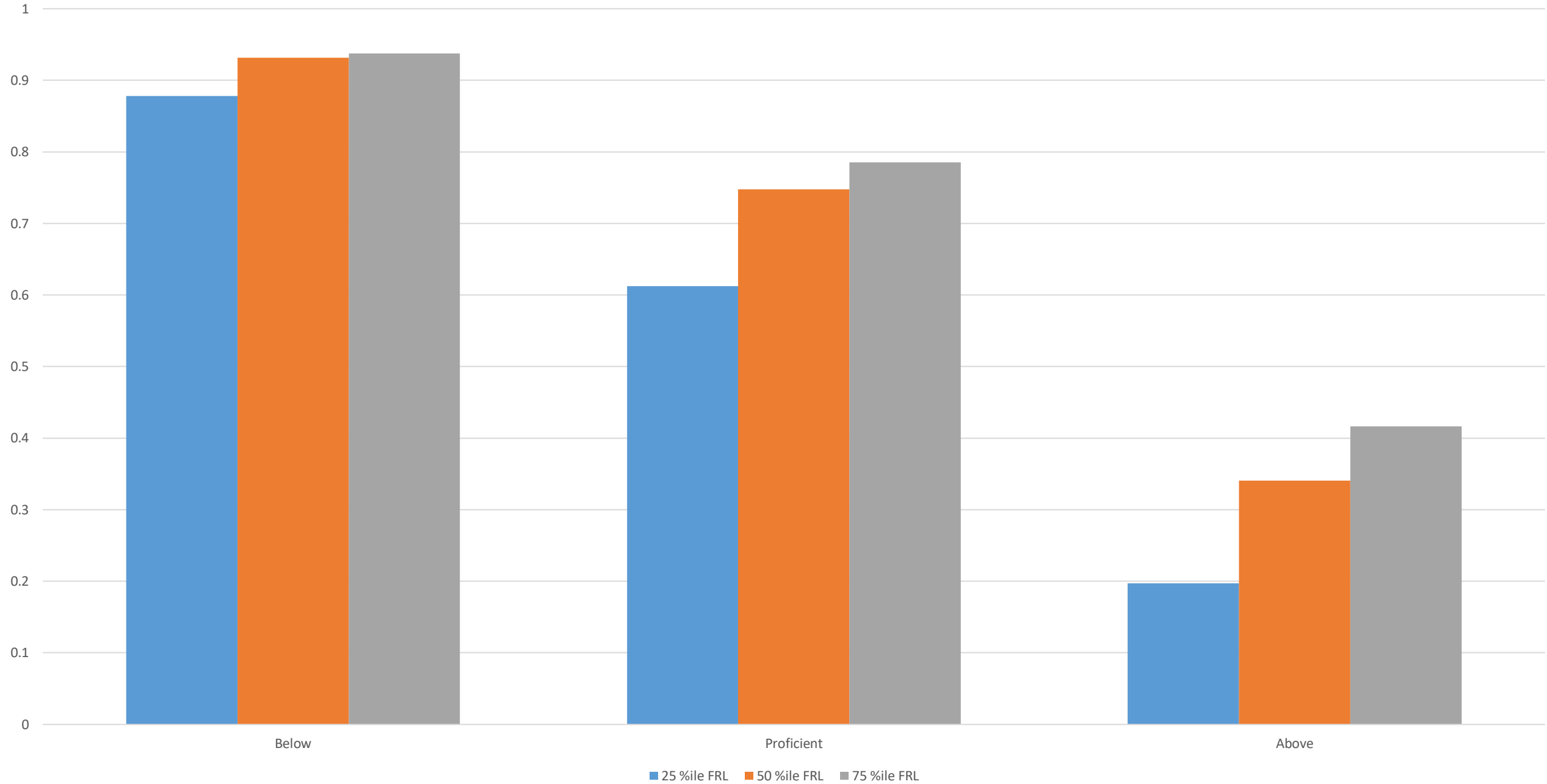■ No Disability ■ Disability
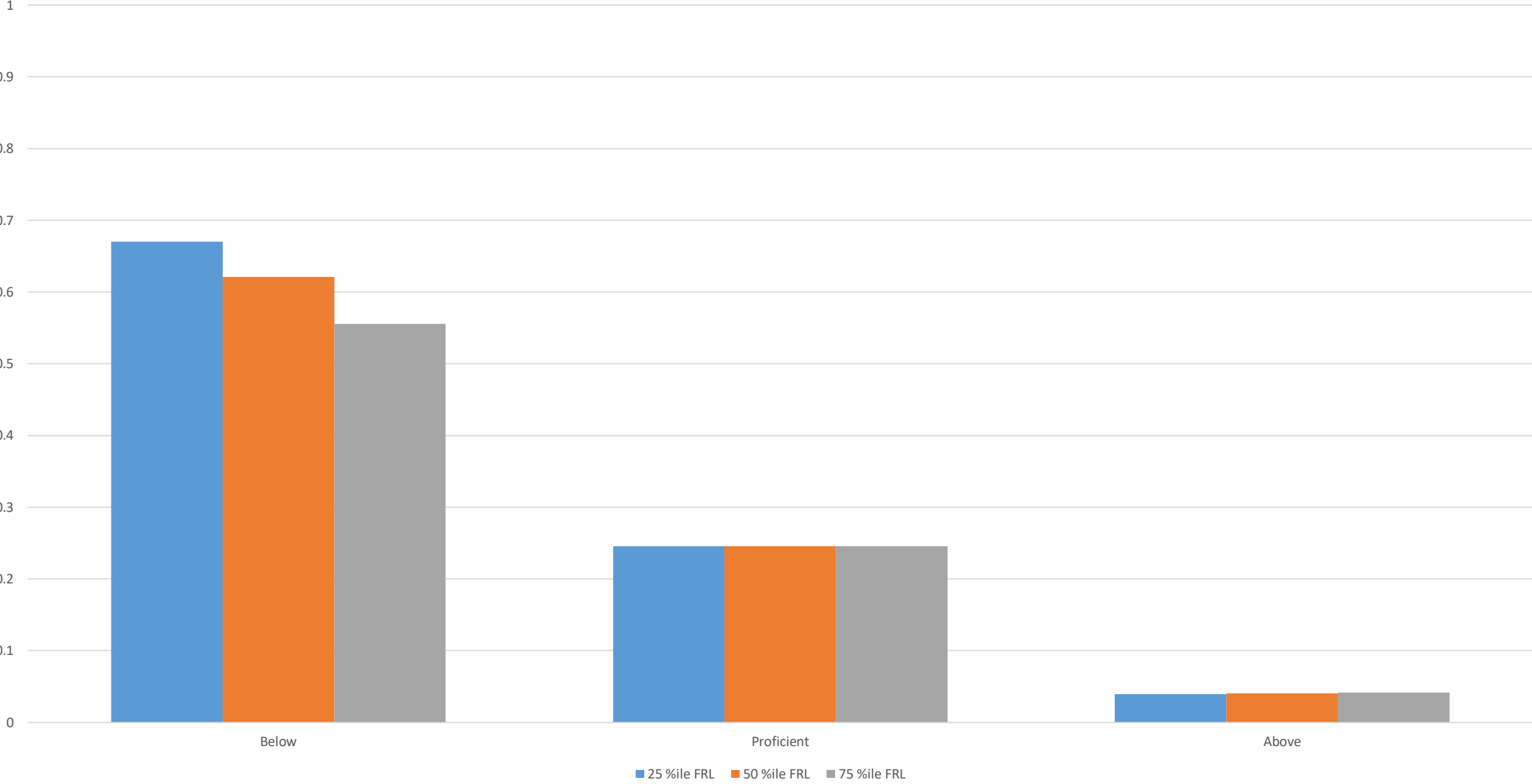
School Variables Examined

- K-12 Location
- School size
- School structure/grade span
- Percent highly qualified math teachers
- Percent of math courses above Algebra II
- Percent of students eligible for Free & Reduced Lunch (FRL)
- School Average Performance on KSA-M
- Sector: Public vs. Private

DMATH Placement by **Percentile FRL** in K-12 - Community Colleges

Legend: ■ 25 %ile FRL ■ 50 %ile FRL ■ 75 %ile FRL

Categories: Below, Proficient, Above

DMATH Placement by **Percentile FRL** in K-12 – State Universities

Legend: ■ 25 %ile FRL ■ 50 %ile FRL ■ 75 %ile FRL

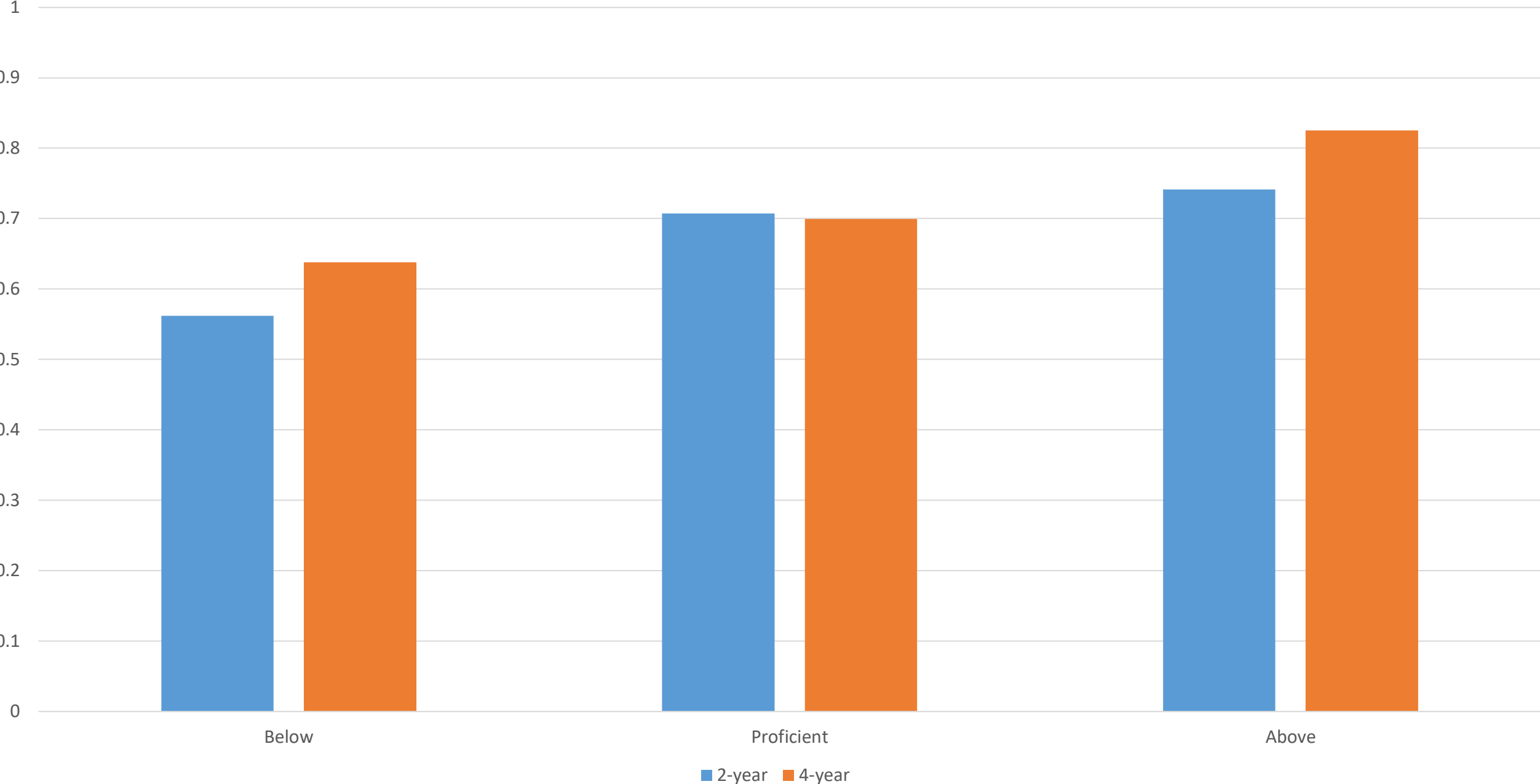# More Likely to be Placed?

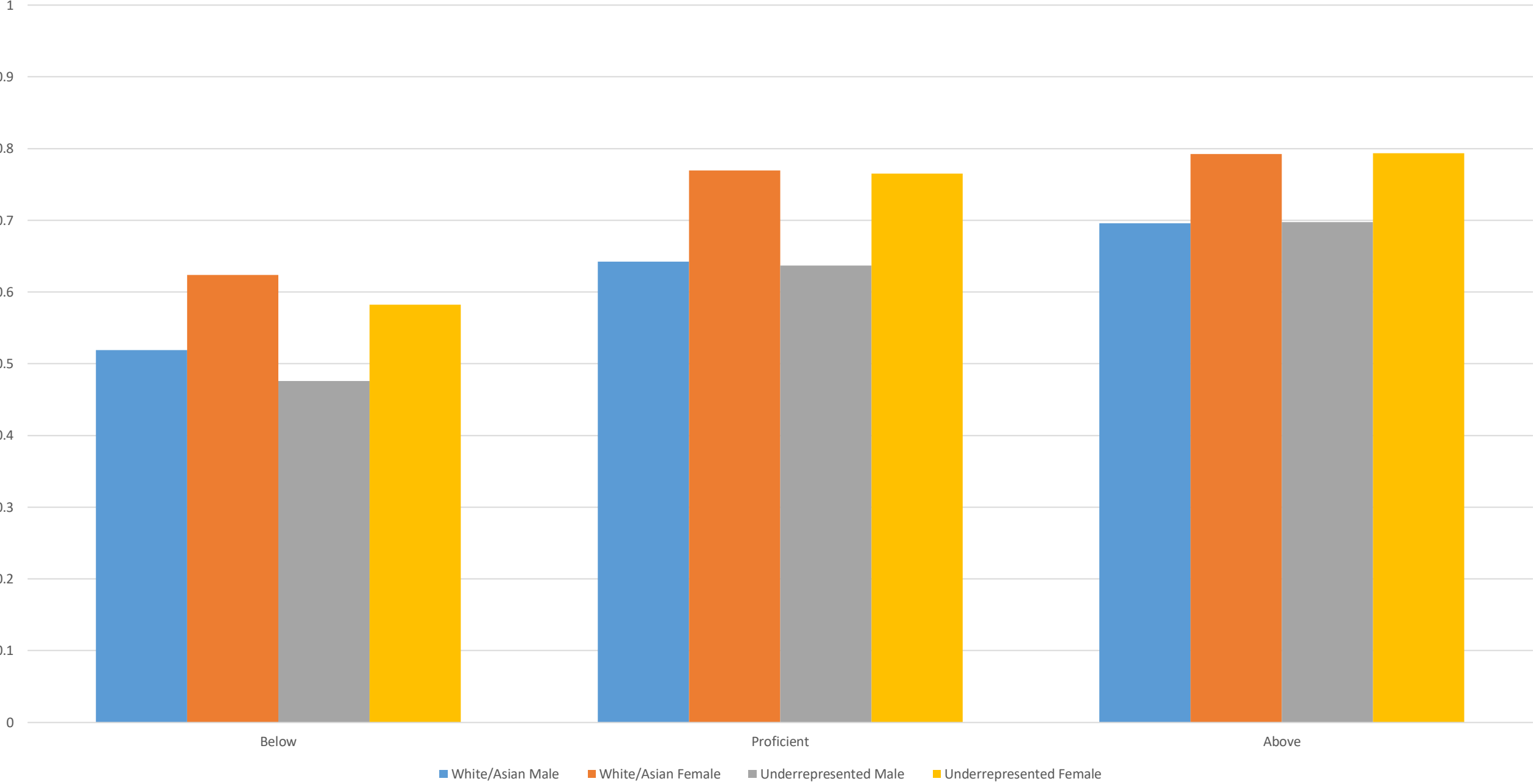**Gender:**   2-Yr – no difference

                          4-Yr – females

Race/Ethnicity: 2-Yr – minorities at all levels

                          4-Yr - minorities at proficiency and above

Disability: 2-Yr - with disability at below and proficient (largest

                                 difference at proficient level)

                          4-Yr – same as 2-Yr

Percentile FRL: 2-Yr –   as percentile of FRL eligibility increases; smallest increase at
                                   below proficiency

                          4-Yr –   no difference at proficient and above; at below
                                   proficiency, students from schools with lower
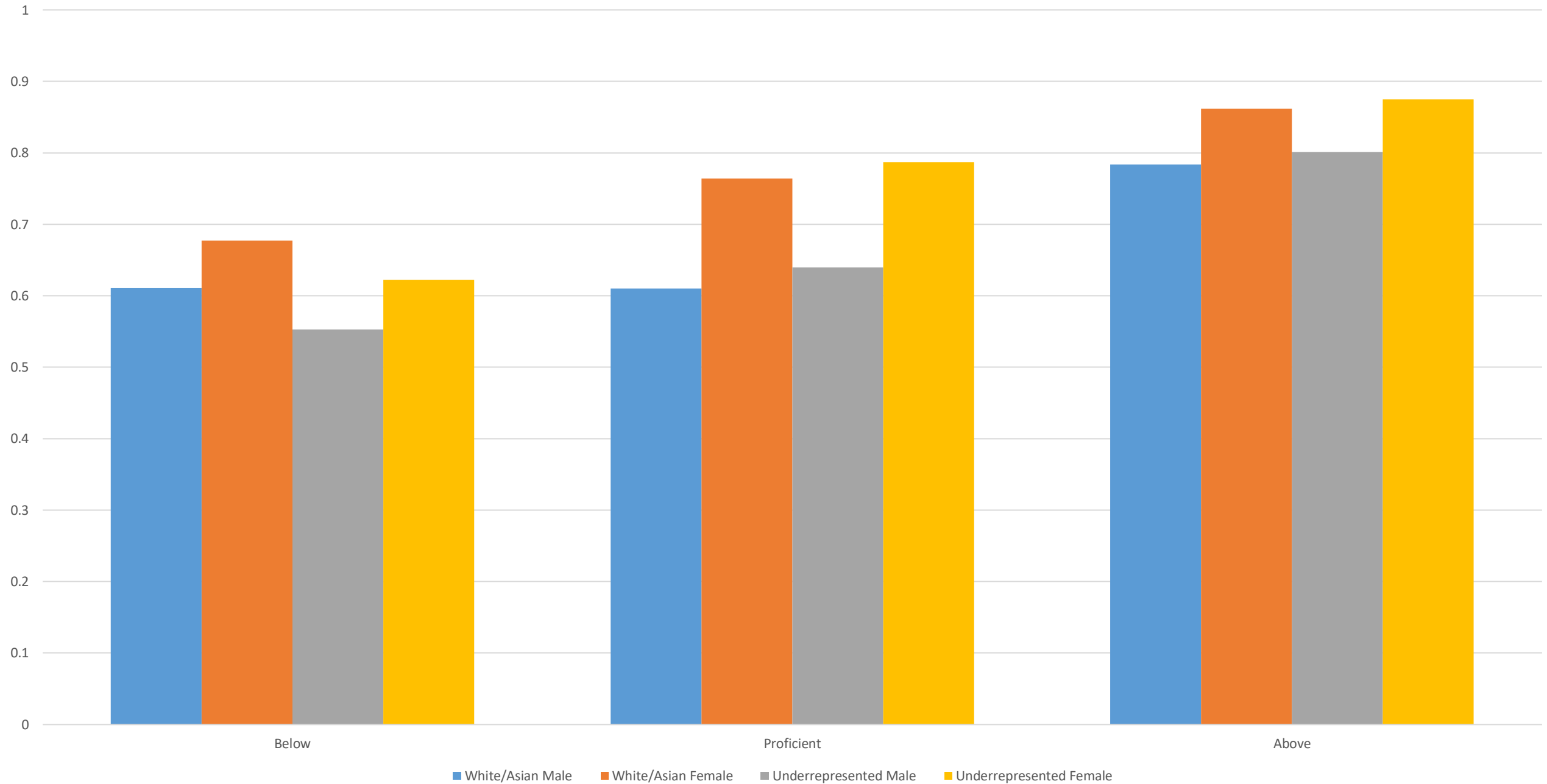   FPL more likely to be placed
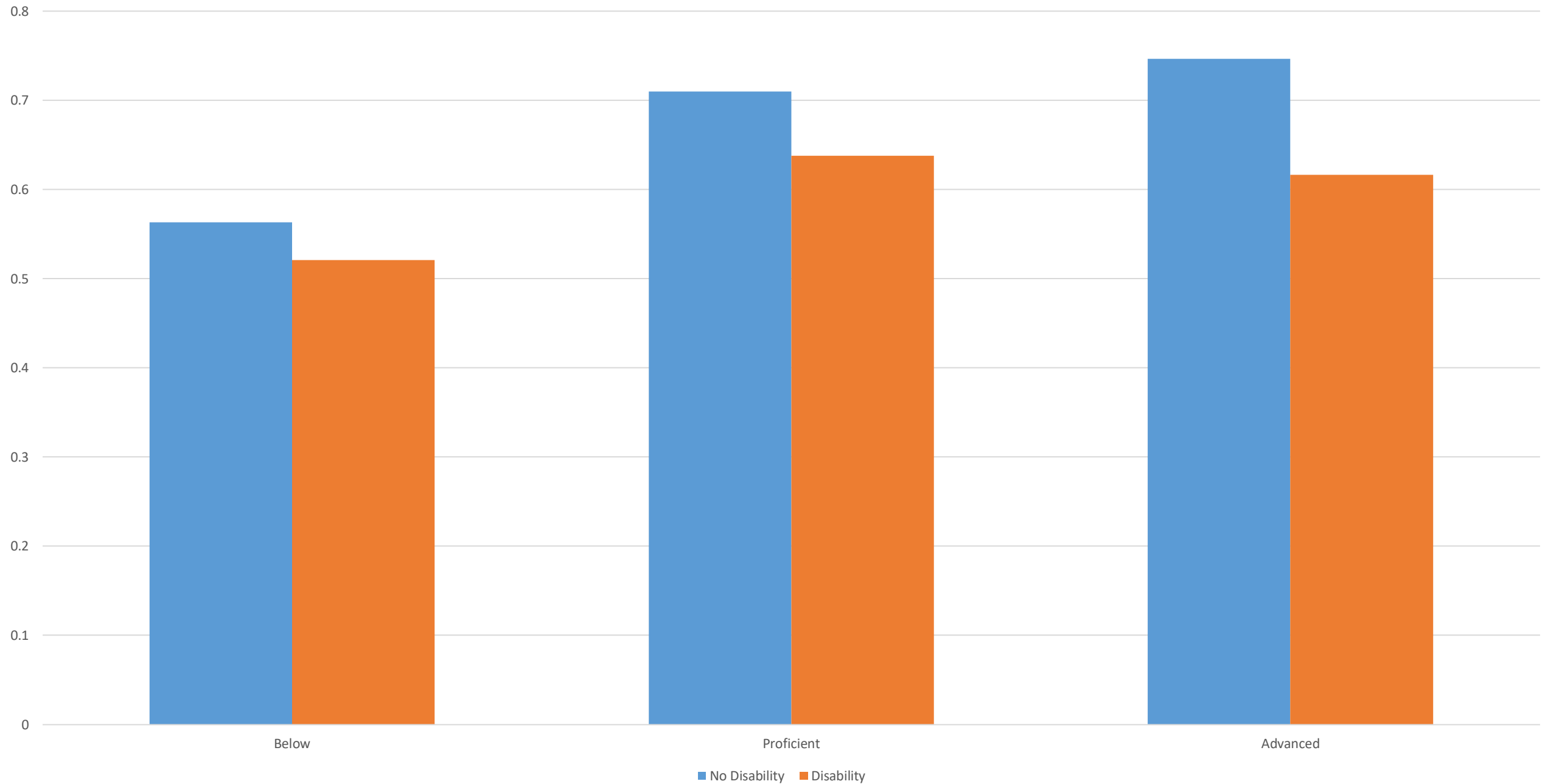
Pass DMATH

Pass DMATH by **KSA-M Performance**

Pass DMATH by **Gender and Race/Ethnicity** – Community Colleges

Legend: White/Asian Male, White/Asian Female, Underrepresented Male, Underrepresented Female

Categories: Below, Proficient, Above

Pass DMATH by **Gender and Race/Ethnicity** - State Universities

Legend: White/Asian Male, White/Asian Female, Underrepresented Male, Underrepresented Female

Pass DMATH by **Mild/Moderate Disability** – Community Colleges
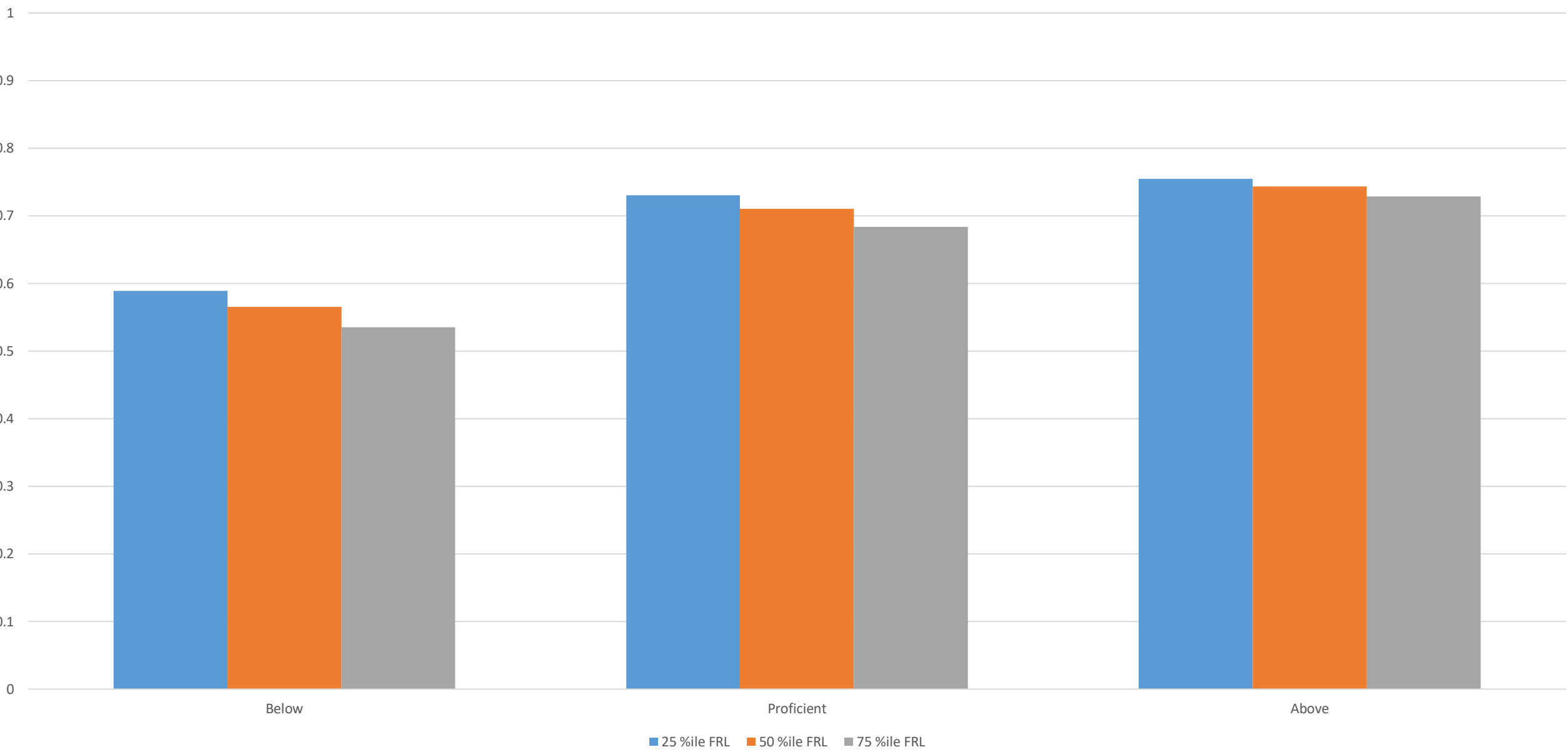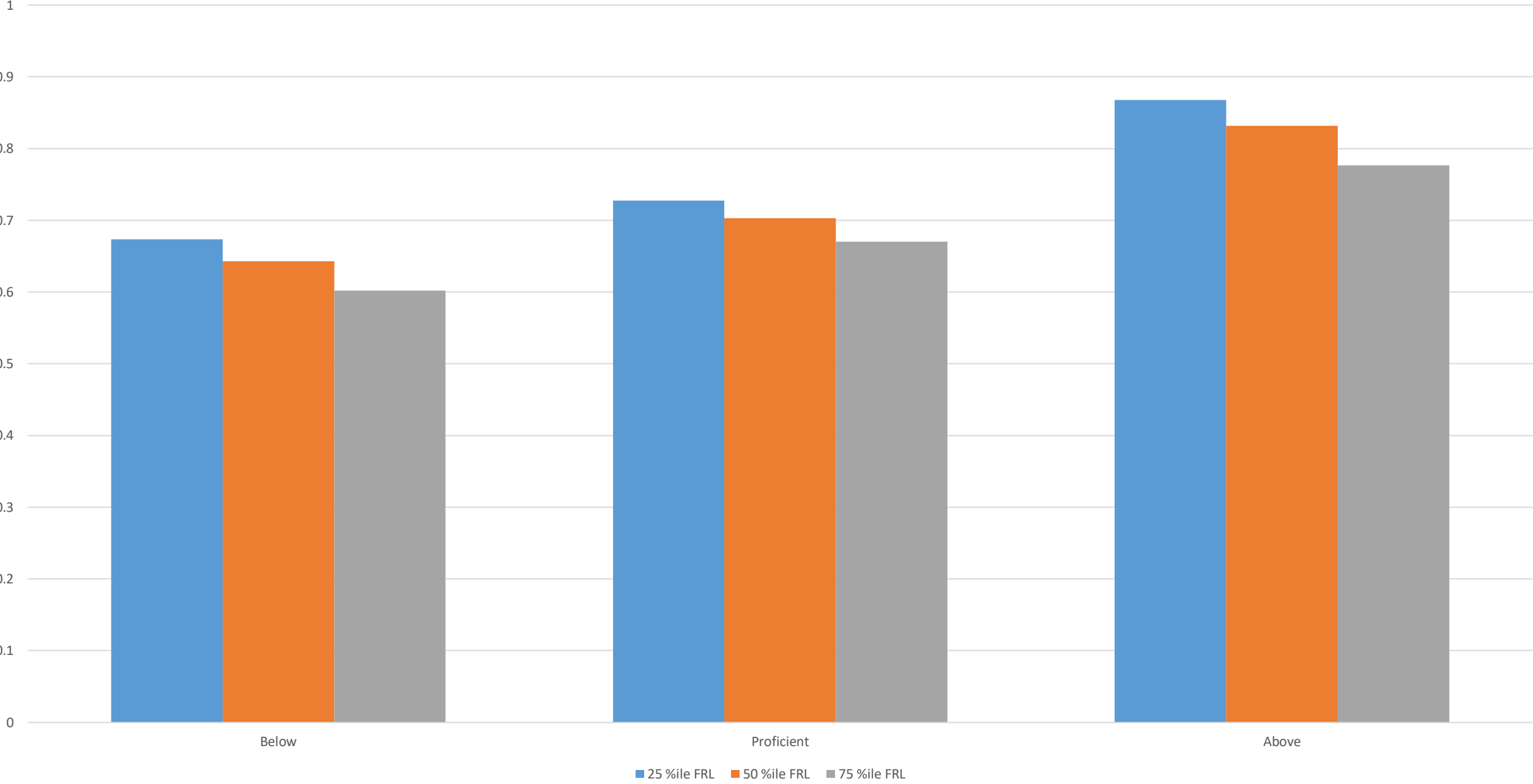

Legend: ■ No Disability   ■ Disability

Pass DMATH by **Mild/Moderate Disability** – State Universities

Pass DMATH by **Percentile FRL Status** in K-12 – Community Colleges

Legend: ■ 25 %ile FRL ■ 50 %ile FRL ■ 75 %ile FRL
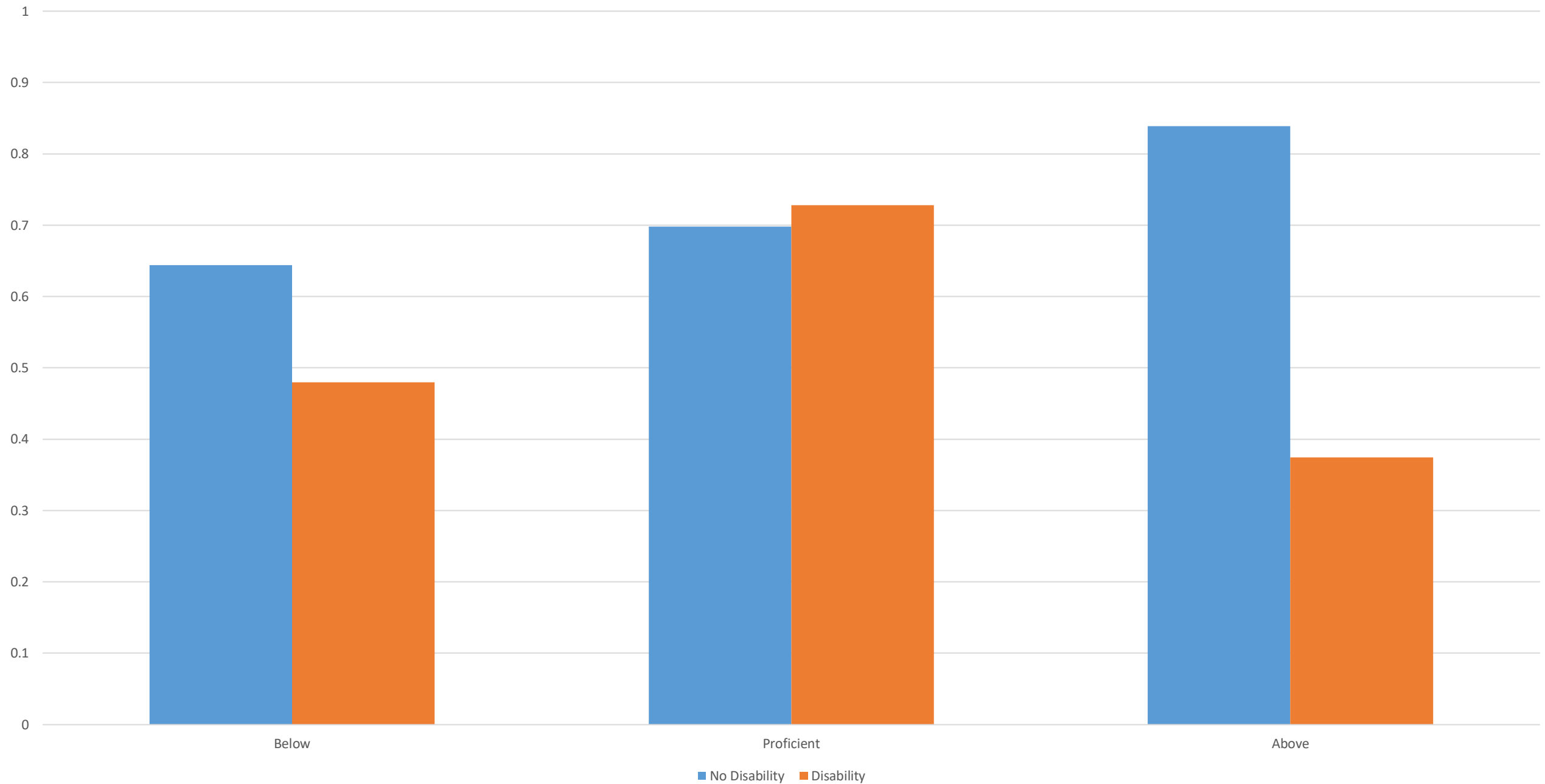
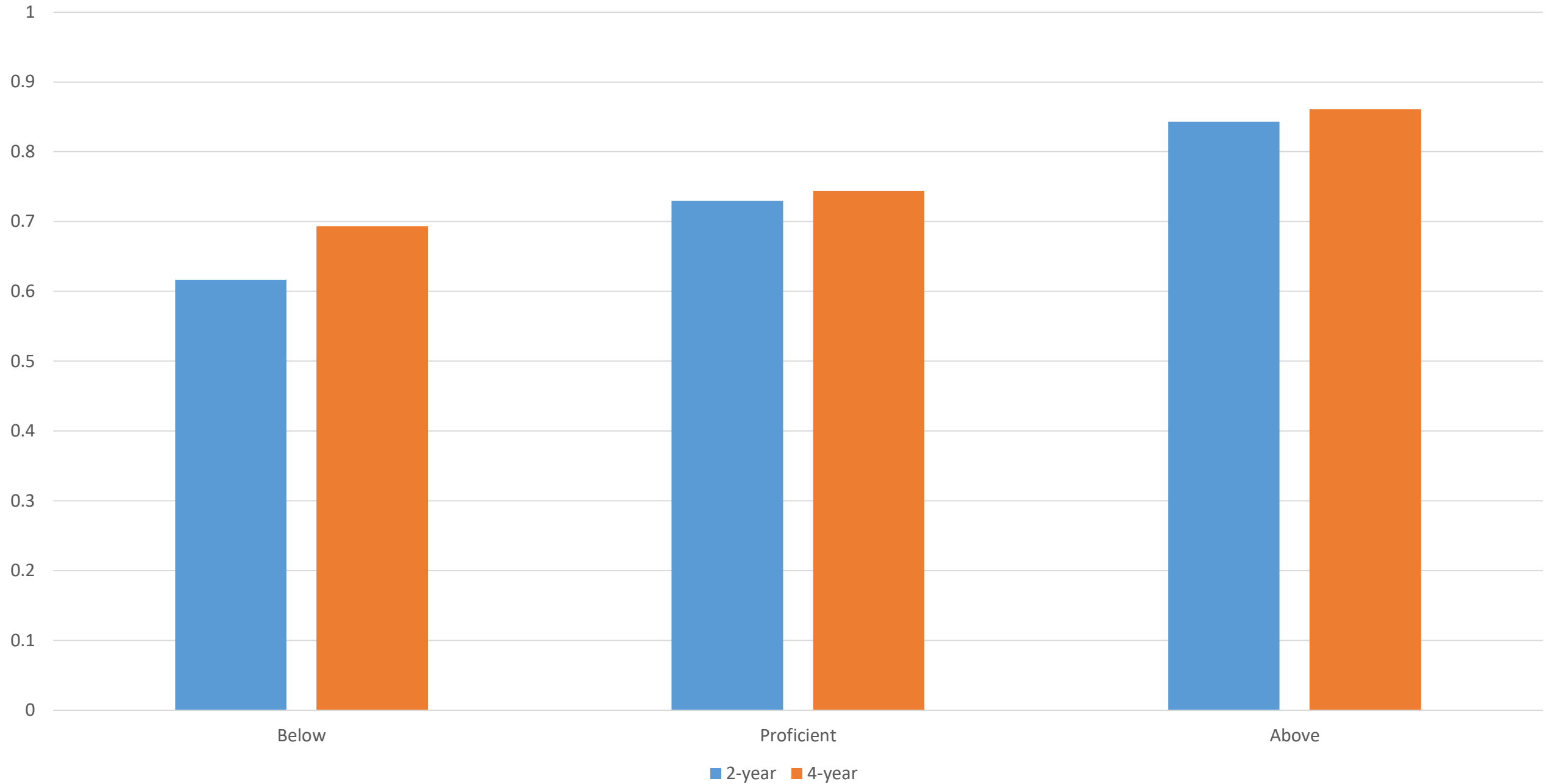Pass DMATH by **Percentile FRL Status** in K-12 – State Universities
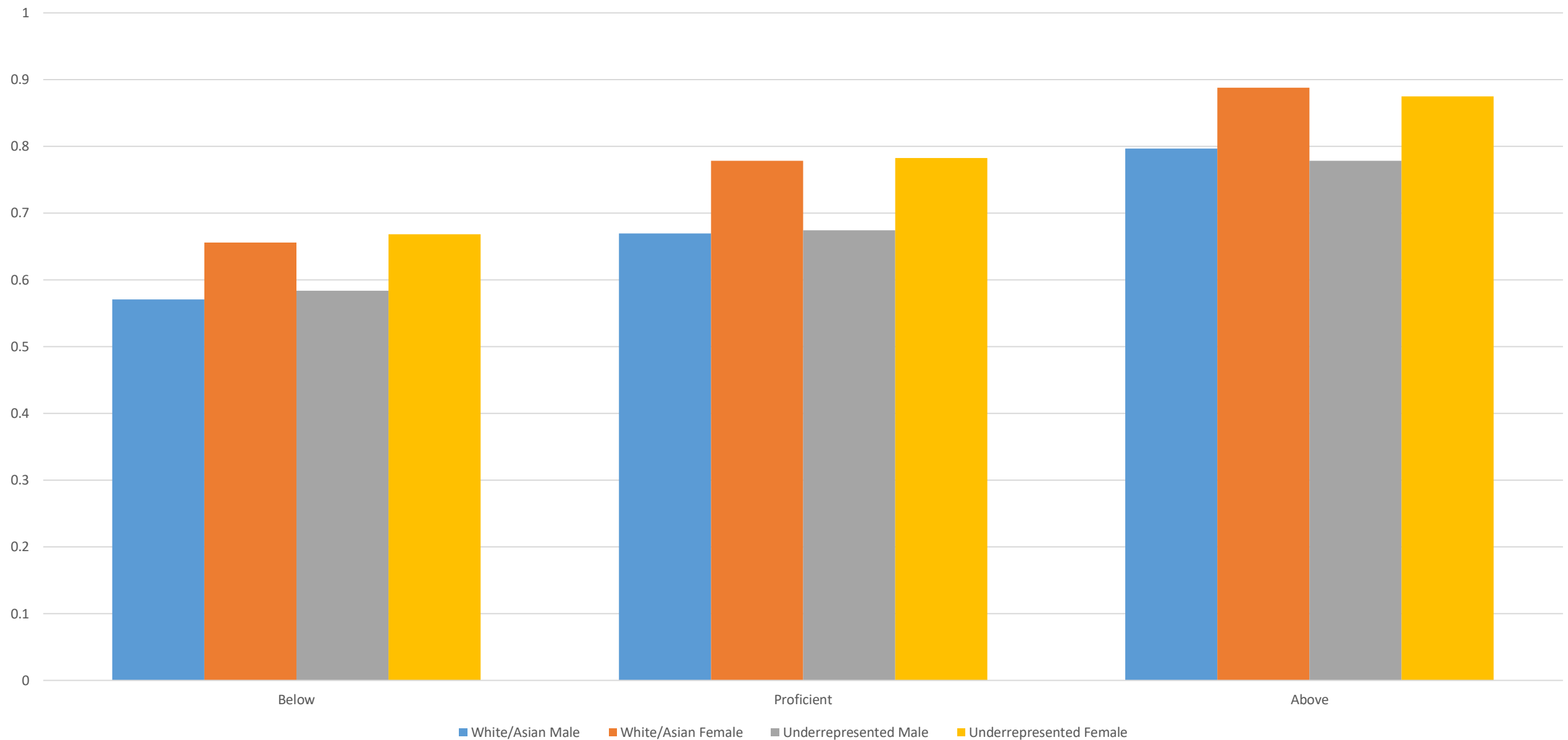
More Likely to Pass DMATH?

Gender: 2-Yr – females at all levels

4-Yr – females at all levels; difference greatest at proficient

Race/Ethnicity: 2-Yr – no difference at below and proficient; majority at
above

4-Yr - minorities at proficiency and above; majority at below

Disability: 2-Yr – no disability at all levels (largest difference at above)

4-Yr – no disability at below and above; no difference at
proficient

difference is more that 40 percentage points at above

Percentile FRL: 2-Yr –   as percentile of FRL eligibility increases, likelihood of

passing DMATH increases with least difference at above

4-Yr –   same as 2-Yr. but a larger effect
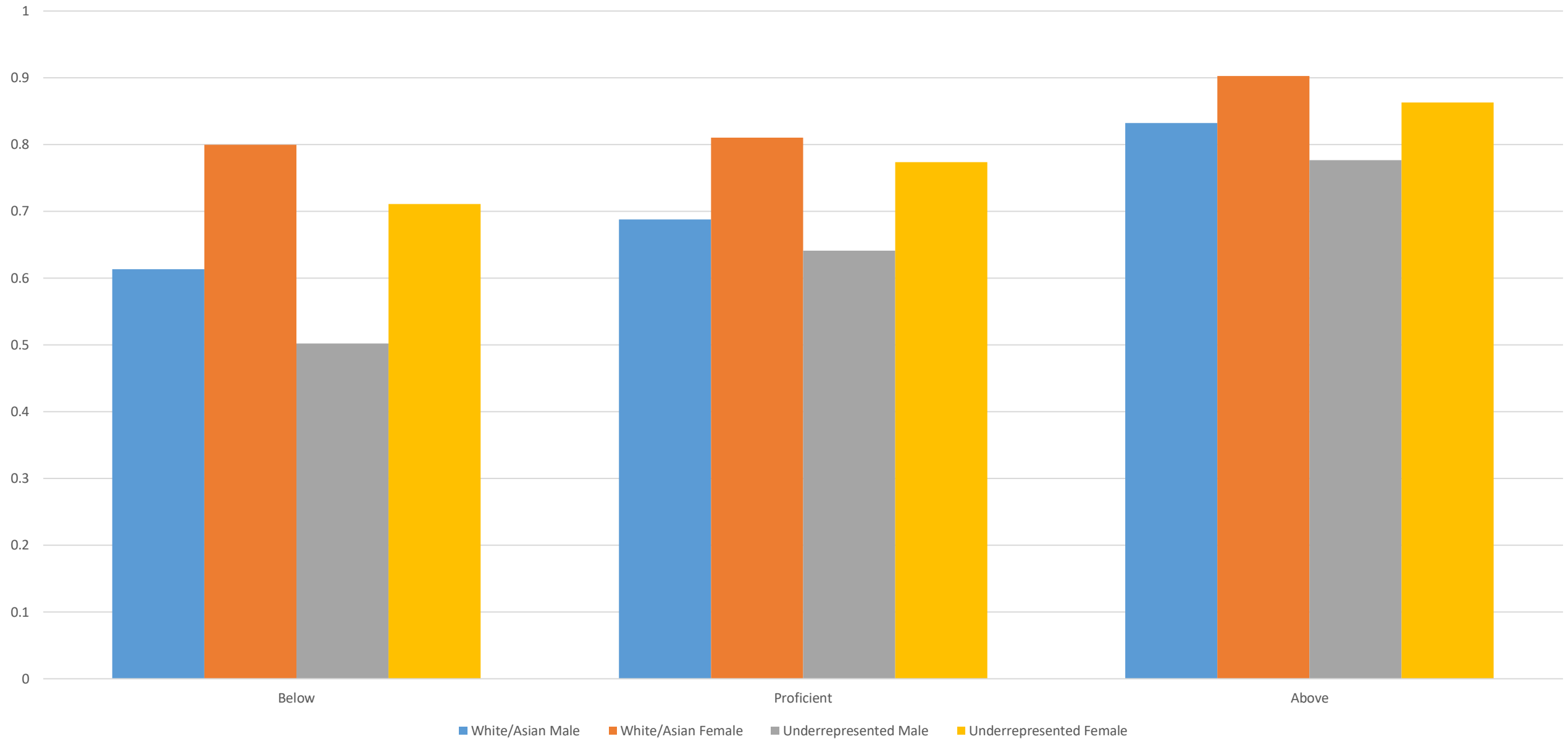
Pass Non-DMATH

Pass Non-DMATH by **KSA-M Performance**

Legend: 2-year (blue), 4-year (orange)

Categories: Below, Proficient, Above

Pass Non-DMATH by **Gender and Race/Ethnicity** - Community Colleges

Legend: White/Asian Male, White/Asian Female, Underrepresented Male, Underrepresented Female

Pass Non-DMATH by **Gender and Race/Ethnicity** - State Universities

Legend: White/Asian Male, White/Asian Female, Underrepresented Male, Underrepresented Female

Pass Non-DMATH by **Mild/Moderate Disability** - Community Colleges

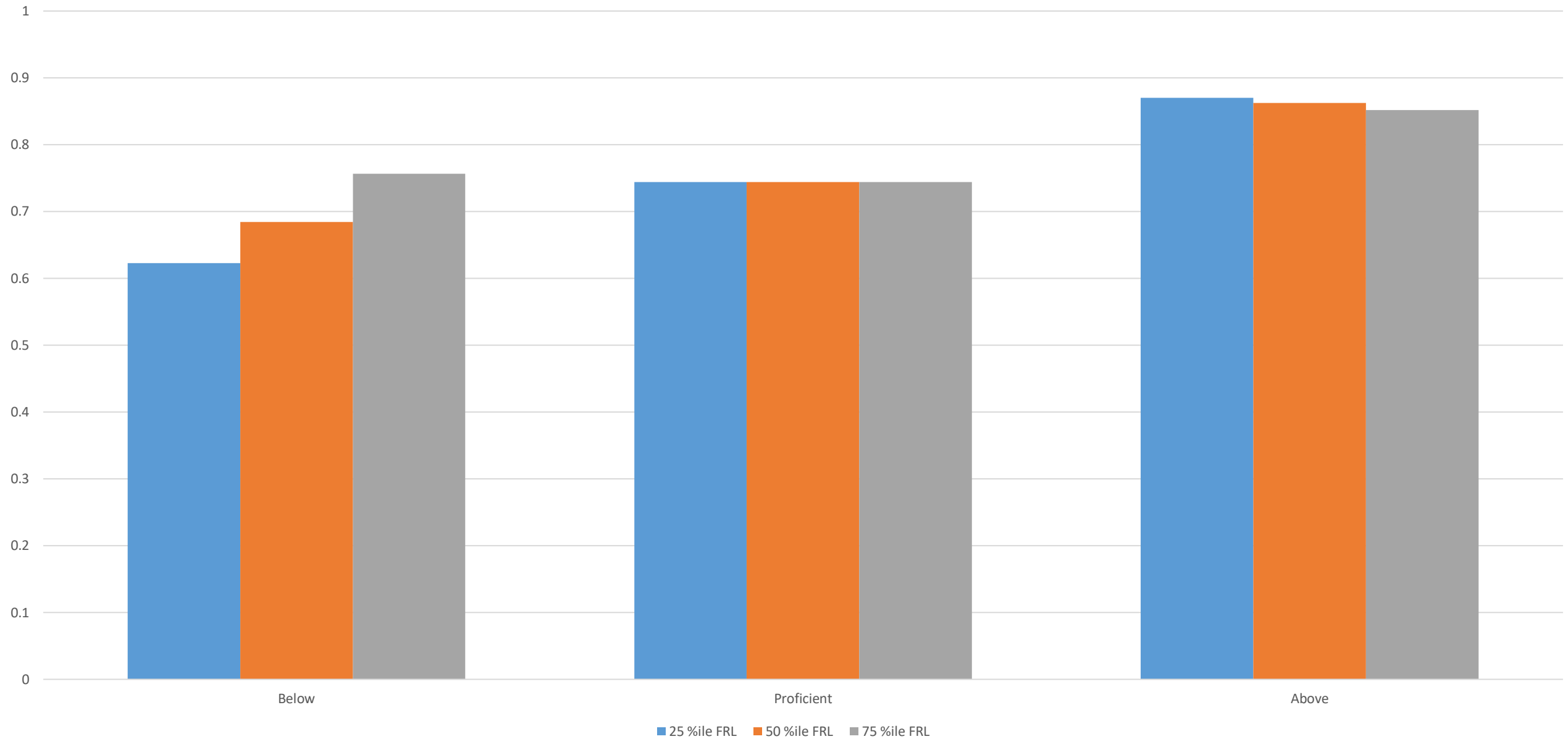Legend: ■ No Disability ■ Disability

Pass Non-DMATH by **Mild/Moderate Disability** – State Universities

Pass Non-DMATH by **Percentile FRL Status** in K-12 – Community Colleges

Legend: 25 %ile FRL, 50 %ile FRL, 75 %ile FRL

Categories: Below, Proficient, Above
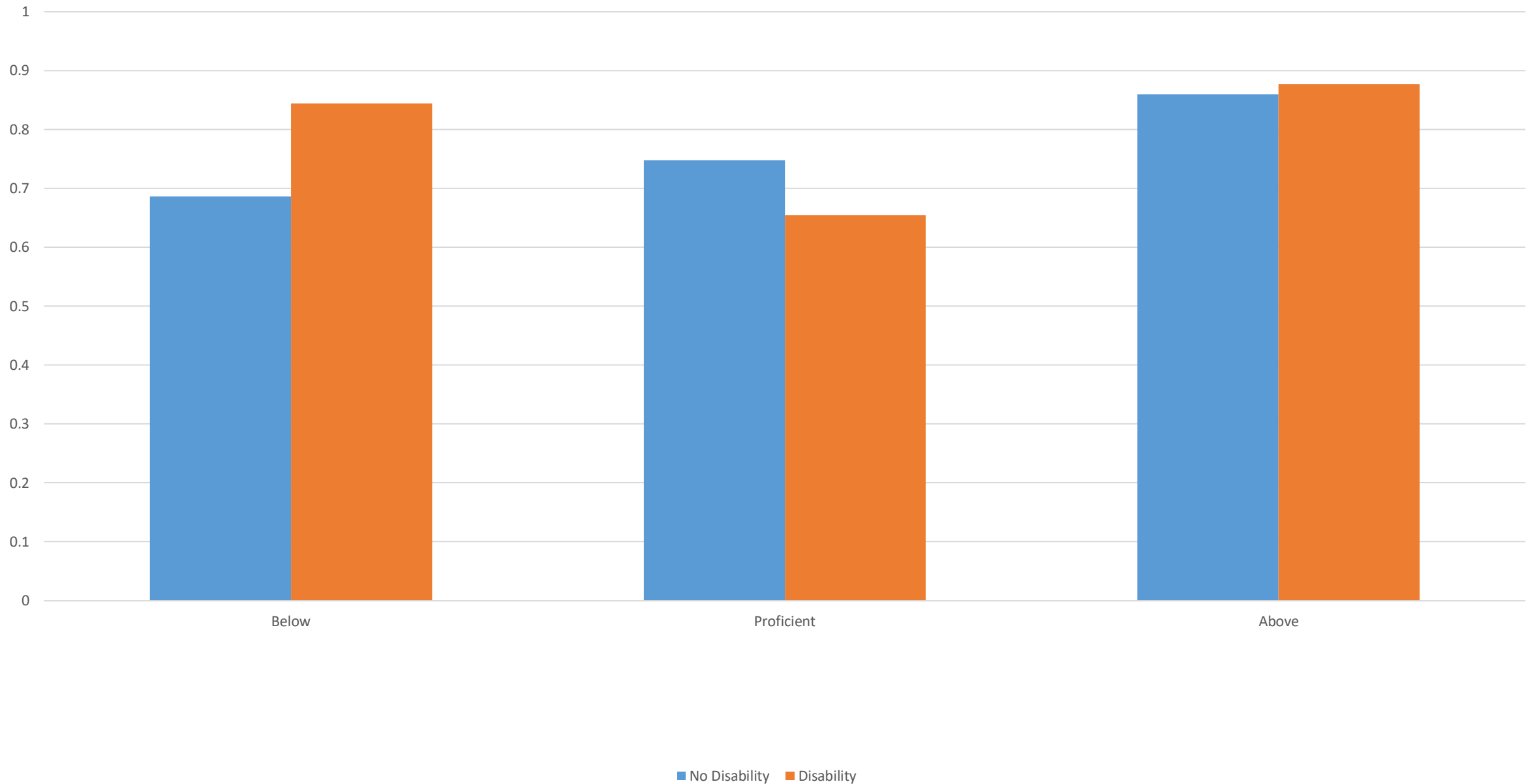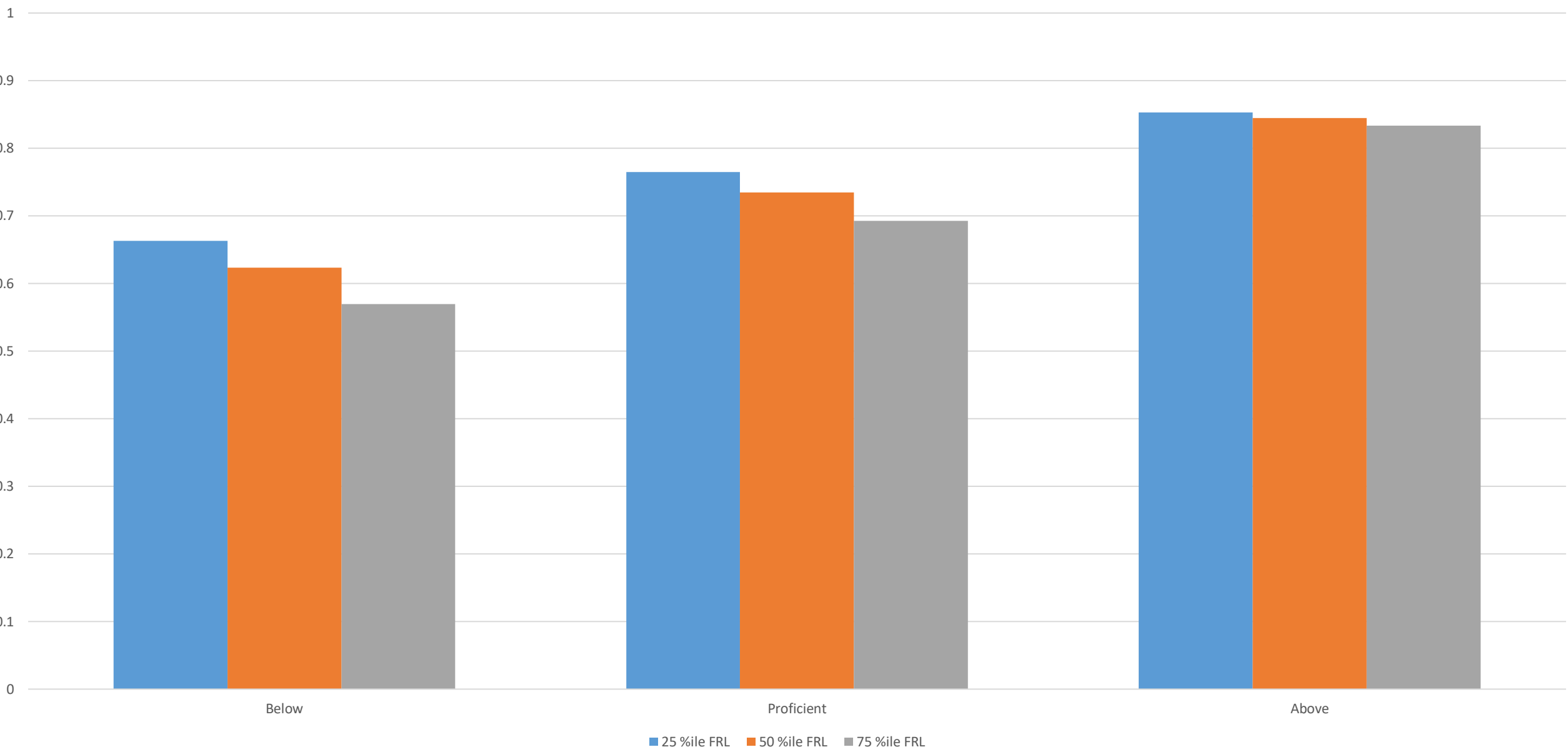
Pass Non-DMATH by **Percentile FRL Status** in K-12 – State Universities

More Likely to Pass Non-DMATH?

Gender: 2-Yr – females

4-Yr – females with differences in likelihood decreasing with increased performance on KSA-M

Race/Ethnicity: 2-Yr – no differences at all levels

4-Yr - majority at all levels of performance on KSA-M; largest difference for students who scored below proficiency

Disability: 2-Yr - no difference at below and proficient; at above those with <u>no</u> mild/moderate disability are more likely to pass

4-Yr – with disability at below proficient; no disability at proficient and above

Percentile FRL: 2-Yr – as percentile of FRL eligibility decreases at below and proficient; no difference at above proficiency

4-Yr – no difference at proficient and above; at below proficiency, students from schools with lower FPR more likely to pass

Summary

	Placement		Pass DMATH		Pass Non-DMATH	
	2-Year	4-Year	2-Year	4-Year	2-Year	4-Year
Below	88.7%	61.3%	56.2%	63.8%	61.6%	69.3%
Proficient	65.4%	24.4%	70.7%	70.0%	72.9%	74.4%
Above	25.1%	4.0%	74.2%	82.5%	84.3%	86.1%

Other Thoughts?