

Antecedents of Developmental/Remedial Mathematics Course Taking in Minnesota Public Post-Secondary Institutions: A Report to the Minnesota P-16 Education Partnership

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Discussion Questions for Council

1. What do the findings tell us about identifying students who are ready?
2. How useful are readiness thresholds?
3. What role do developmental courses play?
4. What messages should we be giving students?
5. What should we be doing to increase college readiness?

Background

- Information age → post-secondary education is critical for living wage jobs
- Higher standards can lead to more high level course-taking and a reduced achievement gap (e.g., Schiller & Muller, 2003).
- Currently:
 - 88% of eighth graders expect to participate in post-secondary education
 - ~75% of HS graduates participate
- One-third of HS grads take developmental education
- Disproportionately students of color and economically disadvantaged

Framing

- Developmental course taking is a measure of College Readiness
- Readiness → performance in and after college
- Looking for proxies for performance (prediction)
- Why start with math?
 - Cumulative
 - Largest area for Dev. Coursework
 - Key for science/math/business careers
- Measures are imperfect and will misclassify some students

Broad Questions

- *How **well** can we predict readiness for success in college math?*
- *How **early** can we predict readiness/success?*
- *Do findings vary with different measures of college readiness?*
 - Completing particular high school math classes.
 - Taking math classes in senior year of high school
 - Getting a grade of C or higher on the first college math class (the old ACT benchmark);
 - Getting a grade of B or higher on the first college math class (the new ACT benchmark);

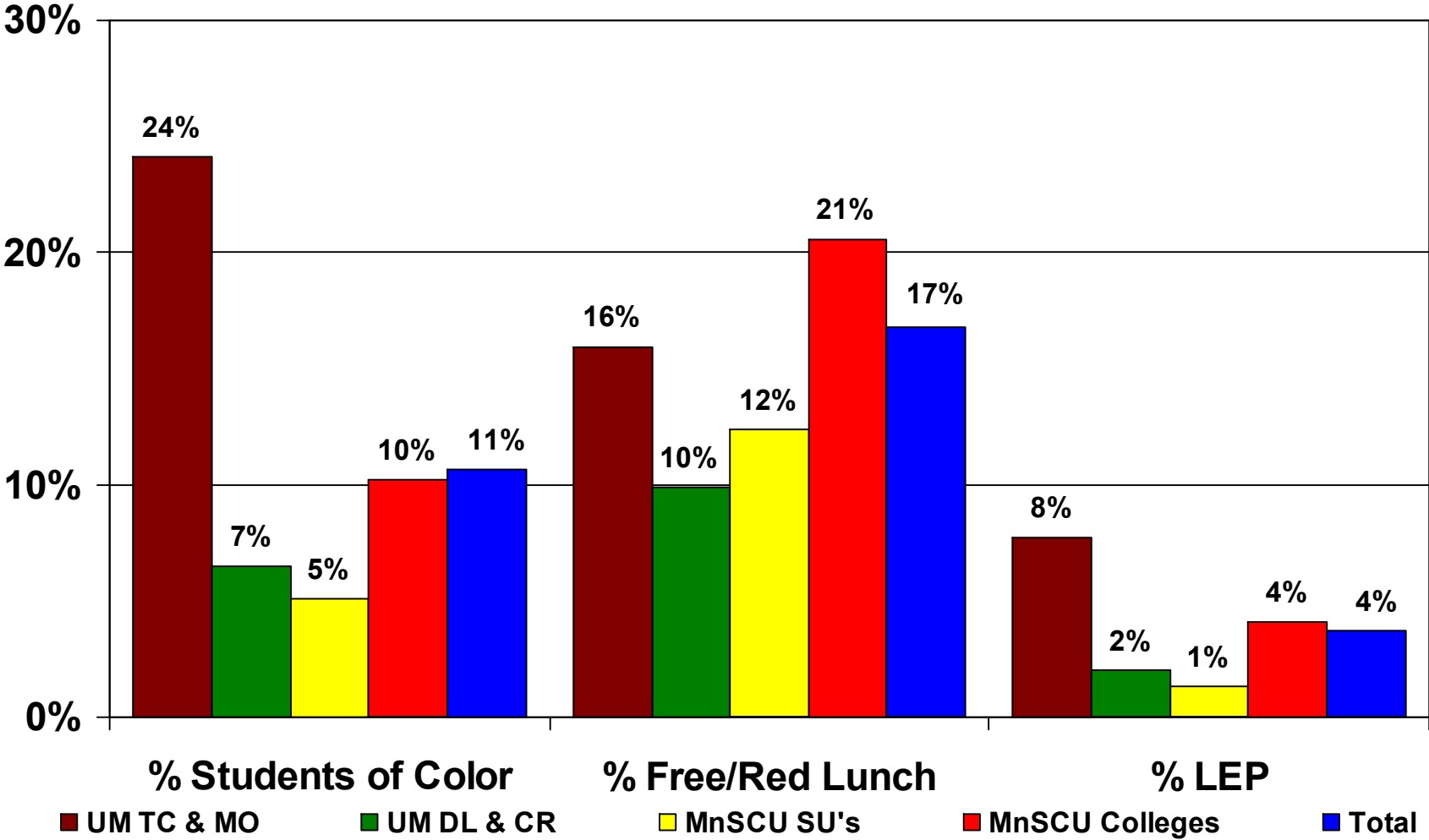
Data Sources & Limitations

- Data Sources
 - MnSCU and UM higher education student data & HS course data
 - MN Department of Education K-12 student data
- Limitations
 - Missing high school courses and ACT scores for some students and institutions.
 - Minnesota state tests used for graduating class of 2003 were different from those currently in use.
 - Some students took college courses in high school through PSEO or advanced programs, but impacts should be modest.

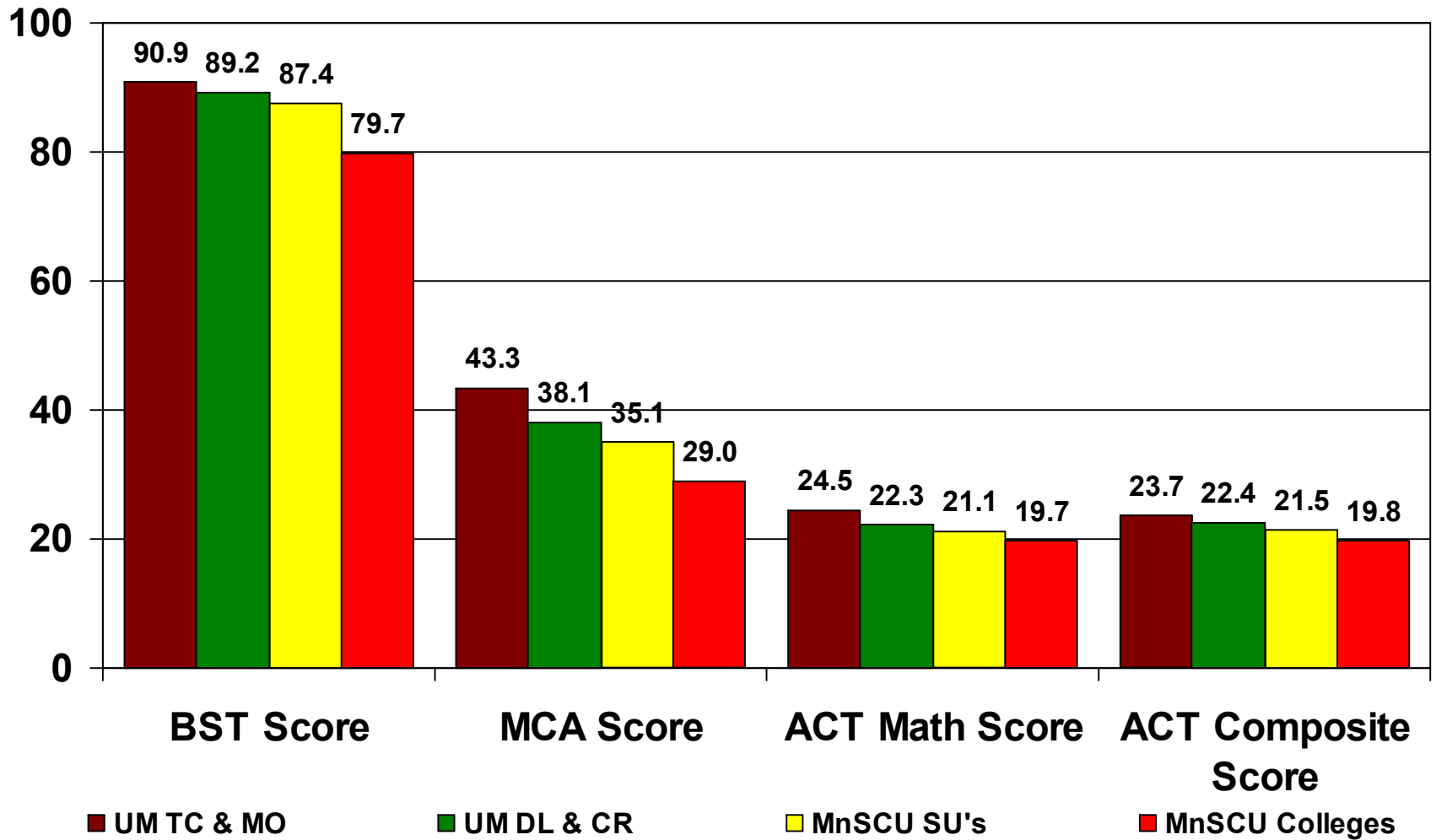
Who Is this sample

- Minnesota Public HS graduates in 2003 who started college in fall, 2003
- MnSCU & UMN student data matched with MDE student data:
 - 94% of MnSCU students matched (16,458 of 17,591)
 - 88% of UMN students (5,230 of 5,943 but included private school graduates)
- Four institution groups:
 - (1) Twin Cities and Morris campuses—UM TC-MO;
 - (2) Duluth and Crookston campuses—UM DL-CR;
 - (3) Minnesota State Universities – MnSCU SU;
 - (4) Minnesota State Colleges – MnSCU Colleges

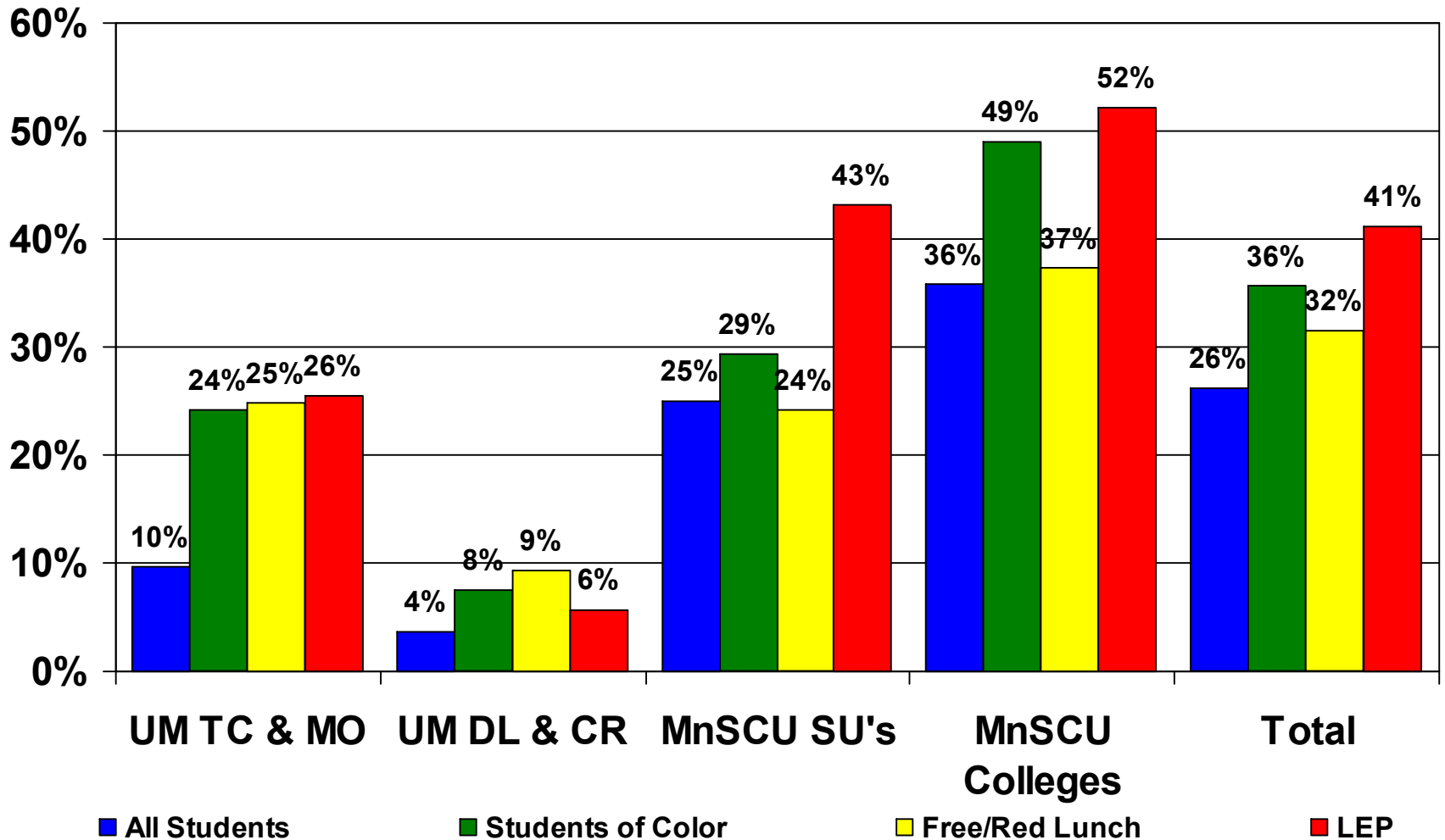
Student Characteristics by Sector



Test Scores by Sector



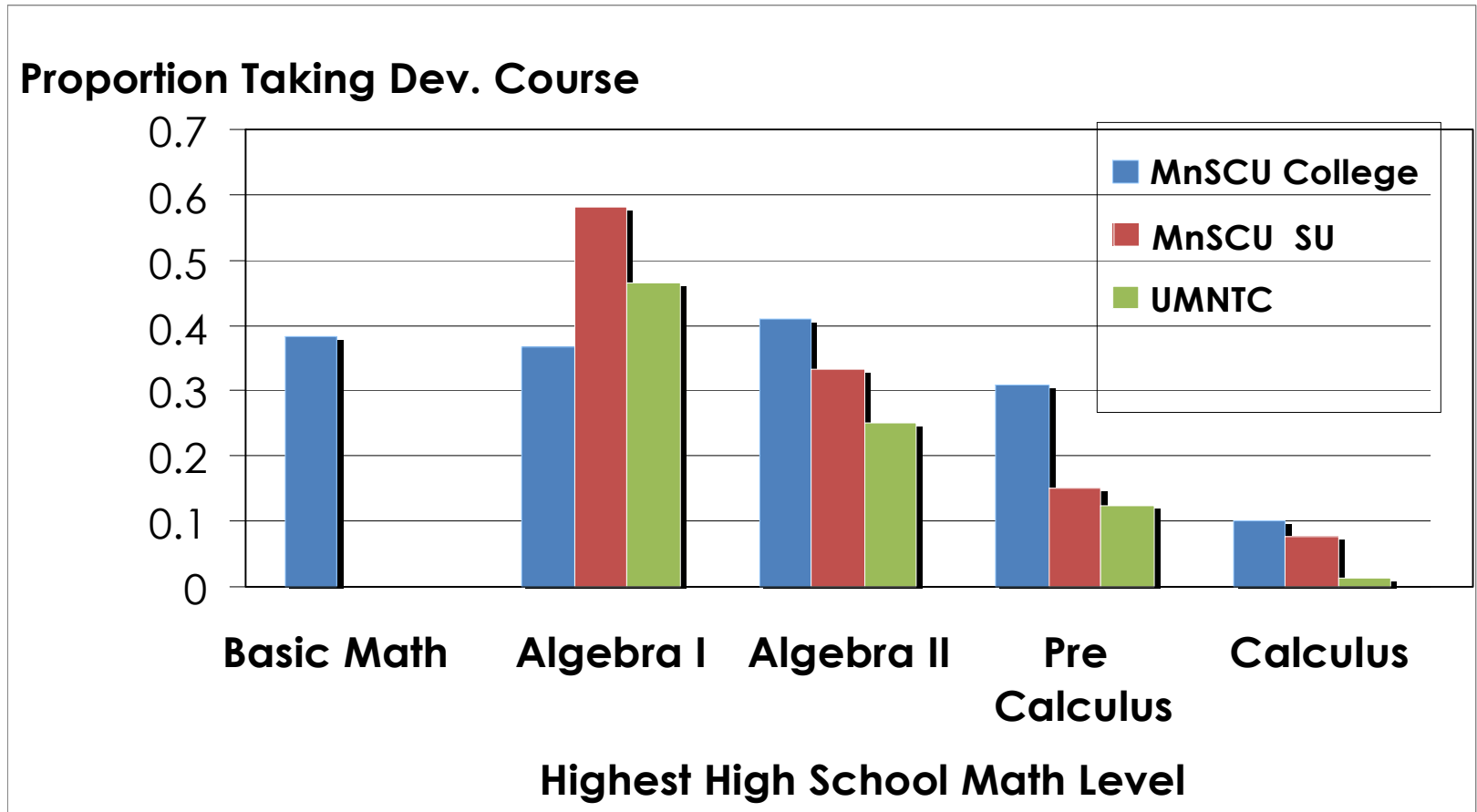
% Students Taking Dev. Courses



Specific Questions

1. Is there a pattern of course taking that assures college readiness?
2. Are there threshold scores on assessments that assure college success and do they vary with level of high school math courses completed?
3. What happens if we try to evaluate viability of “cut scores?” Examples: Completing Algebra 2, and an ACT math score 22 or greater.
4. Is taking a math class during the senior year of high school important for success?
5. How well can measures together predict college readiness?

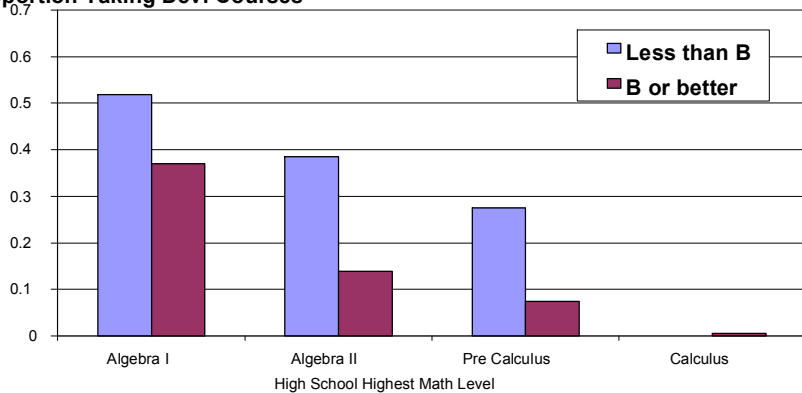
1. Is there a pattern of course taking that assures college readiness? Highest HS Math Level



1. Is there a pattern of course taking that assures college readiness? HS Math Level & Grade: B or Better & Less Than B

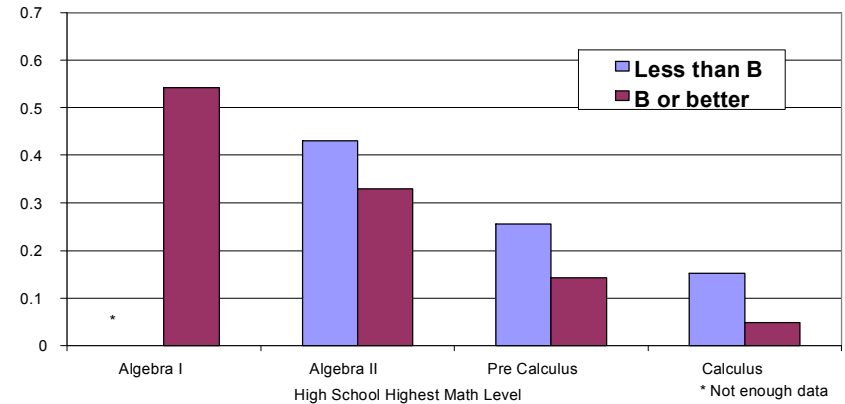
UMN Twin Cities

Proportion Taking Dev. Courses



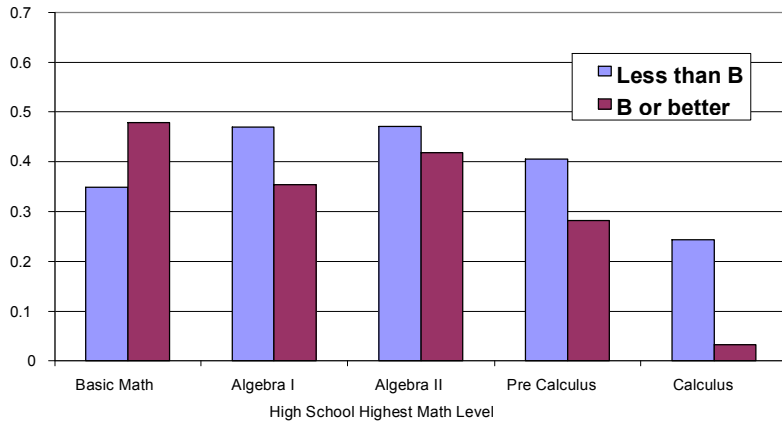
MnSCU State Universities

Proportion Taking Dev. Courses

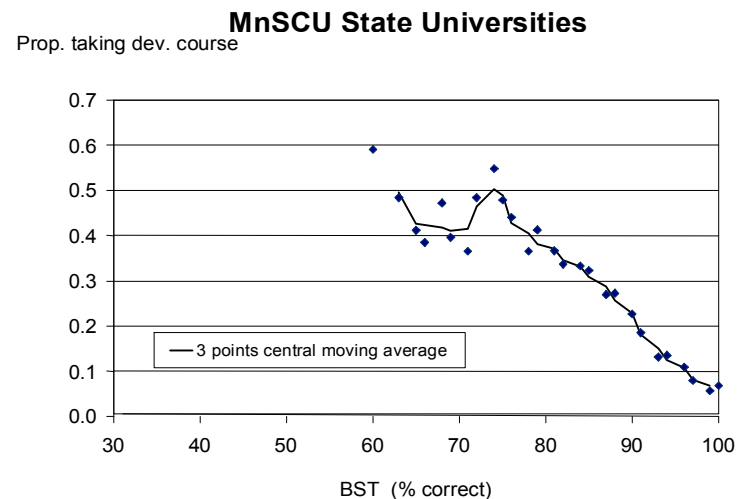
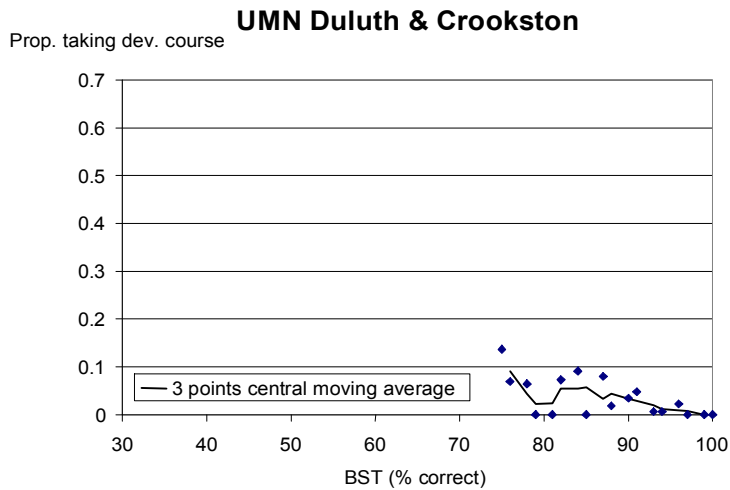
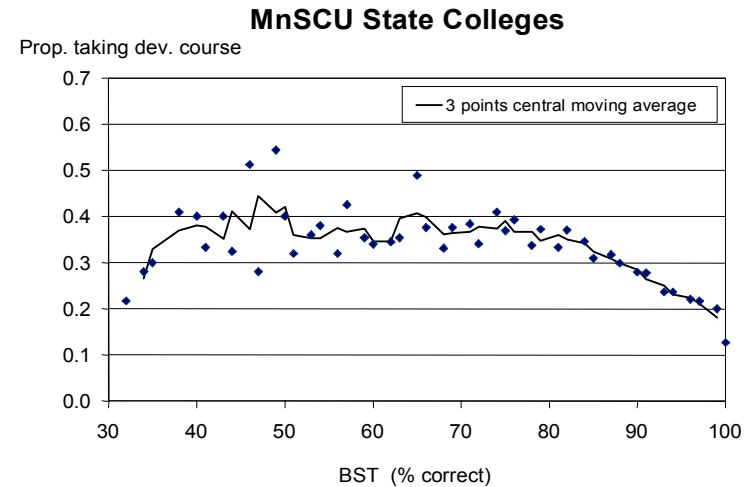
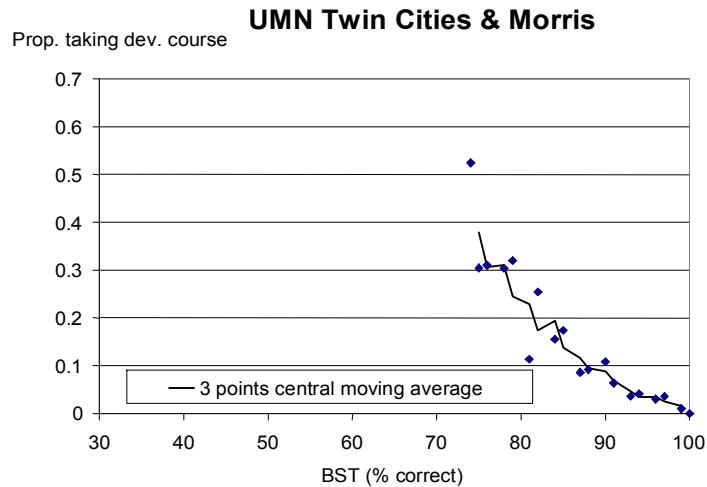


Proportion Taking Dev. Courses

MnSCU State Colleges



2. Are there threshold scores on assessments that assure college success? BST Score

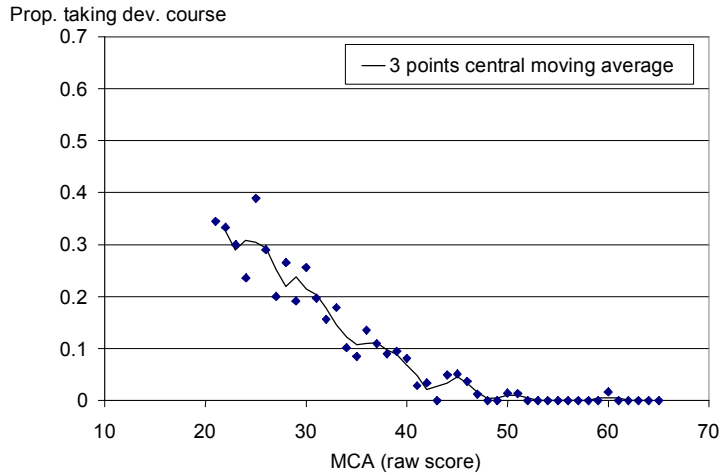


BST and Probability of Taking Developmental Courses

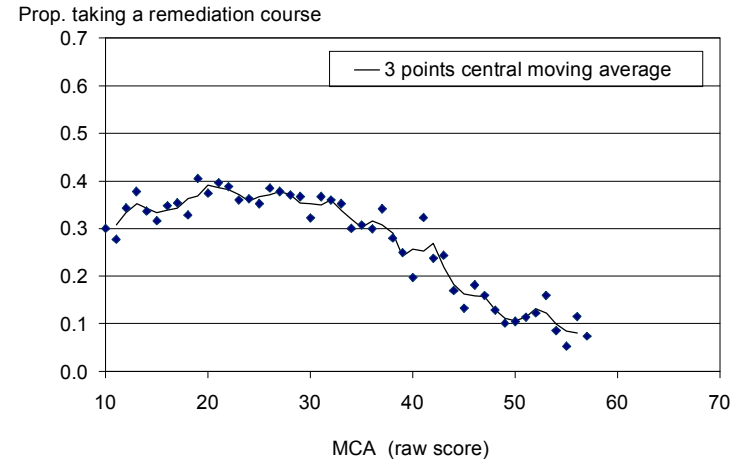
- What can we say about probability of taking developmental courses for every 1 percent change in BST score?
 - UMN TC-MO: Probability decreases $1\frac{1}{2}\%$
 - MnSCU State U's: Probability decreases $\sim 1\%$
 - UMN DU-CR: Probability decreases $\sim 0.3\%$
 - MnSCU Colleges: Probability decreases $\sim 0.2\%$

2. Are there threshold scores on assessments that assure college success? MCA Score

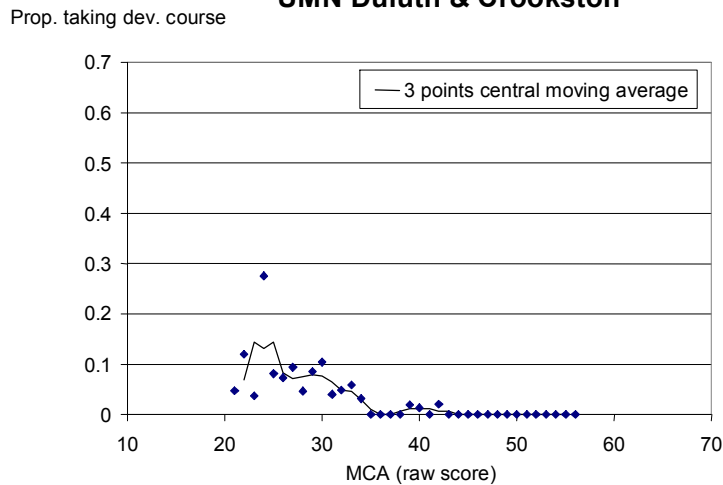
UMN Twin Cities & Morris



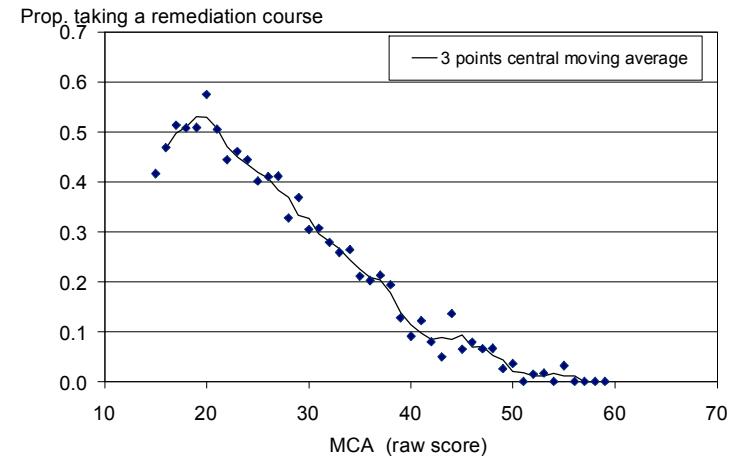
MnSCU State Colleges



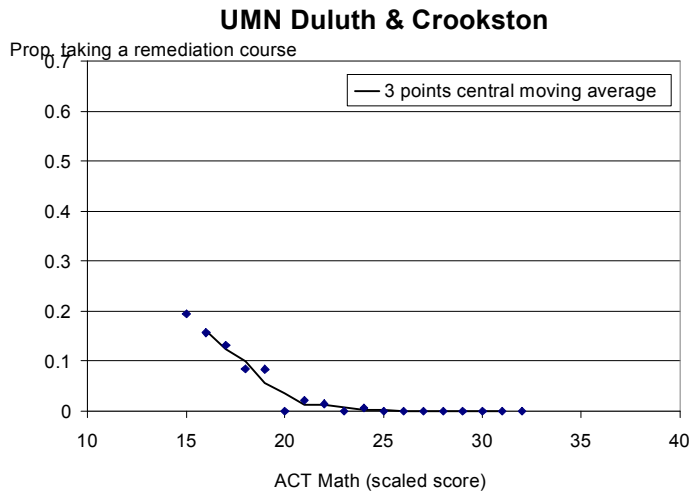
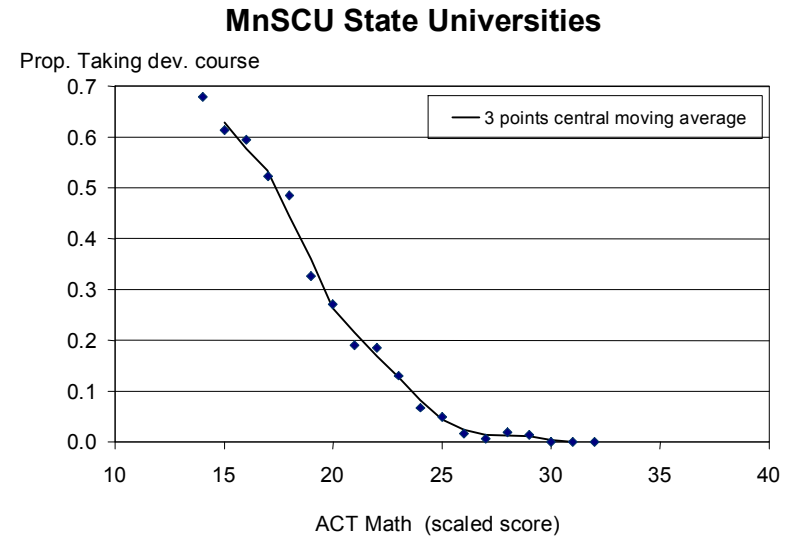
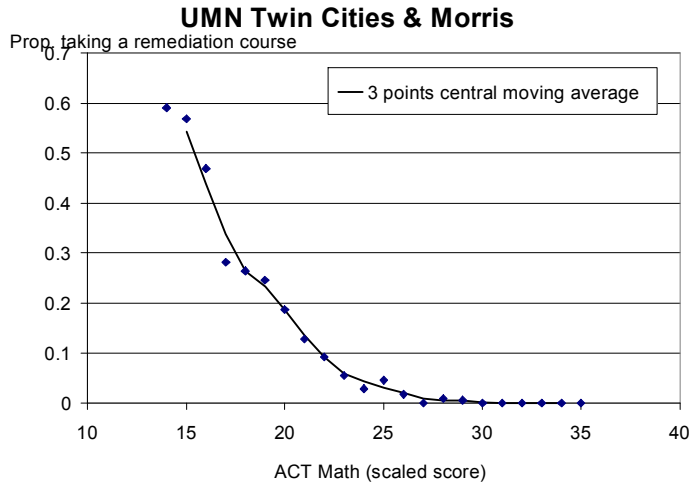
UMN Duluth & Crookston



MnSCU State Universities



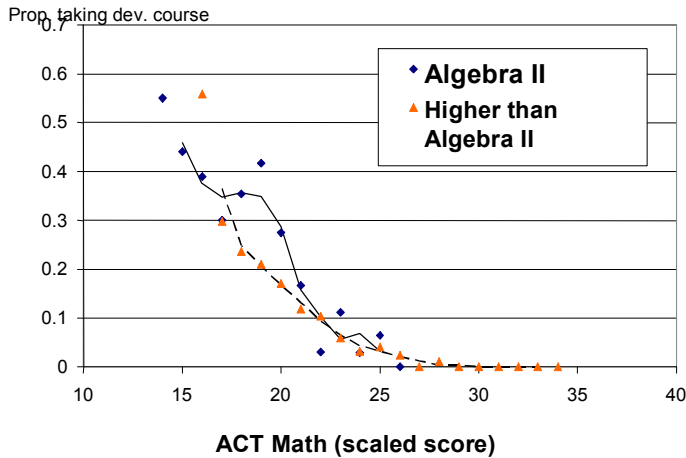
2. Are there threshold scores on assessments that assure college success? ACT Score



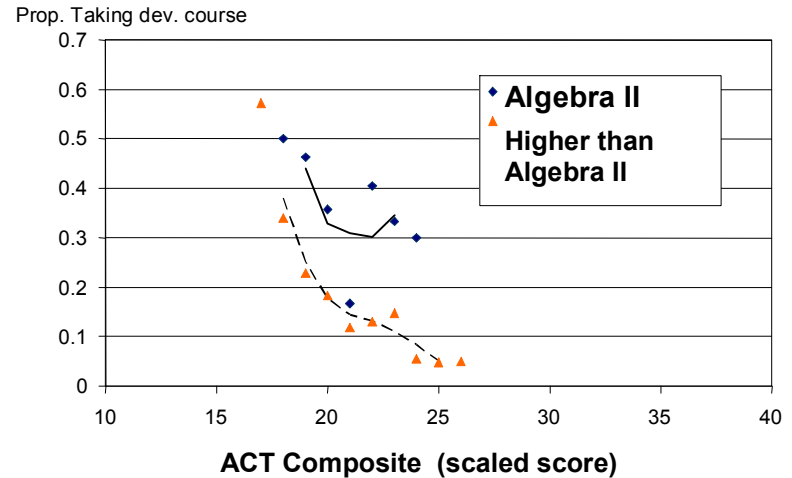
2. Are there threshold scores on assessments that assure college success?

ACT and HS Math Level

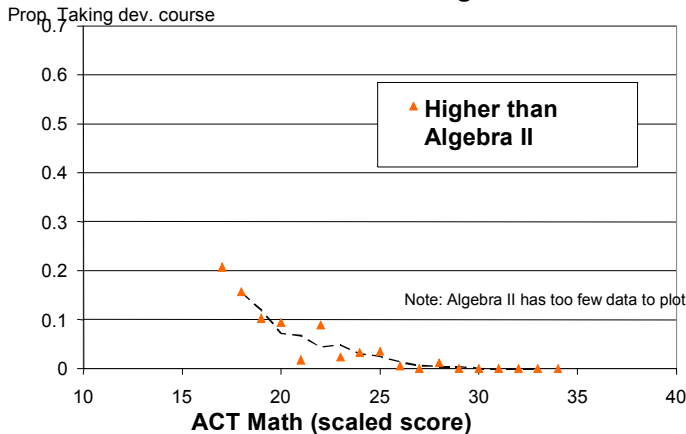
UMN Twin Cities



MnSCU State Universities



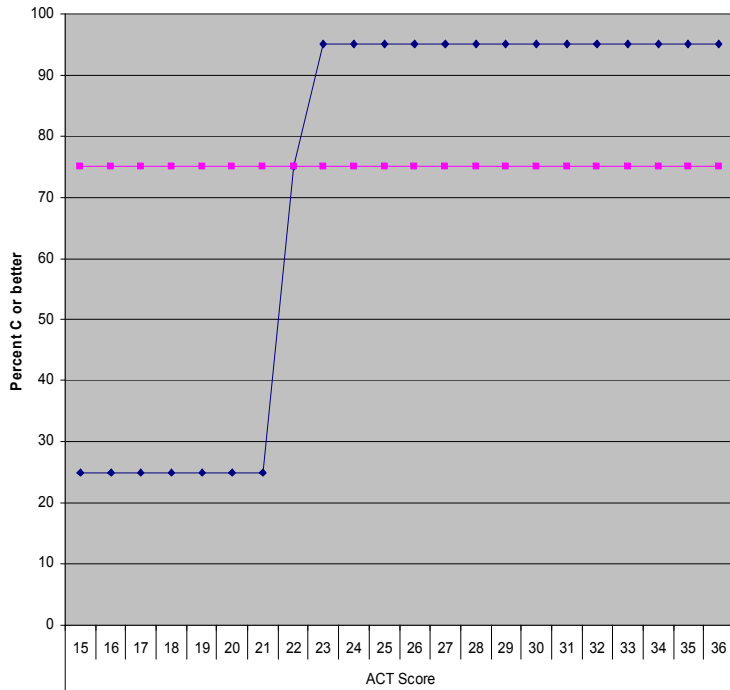
UMN Twin Cities: B or better with highest HS math



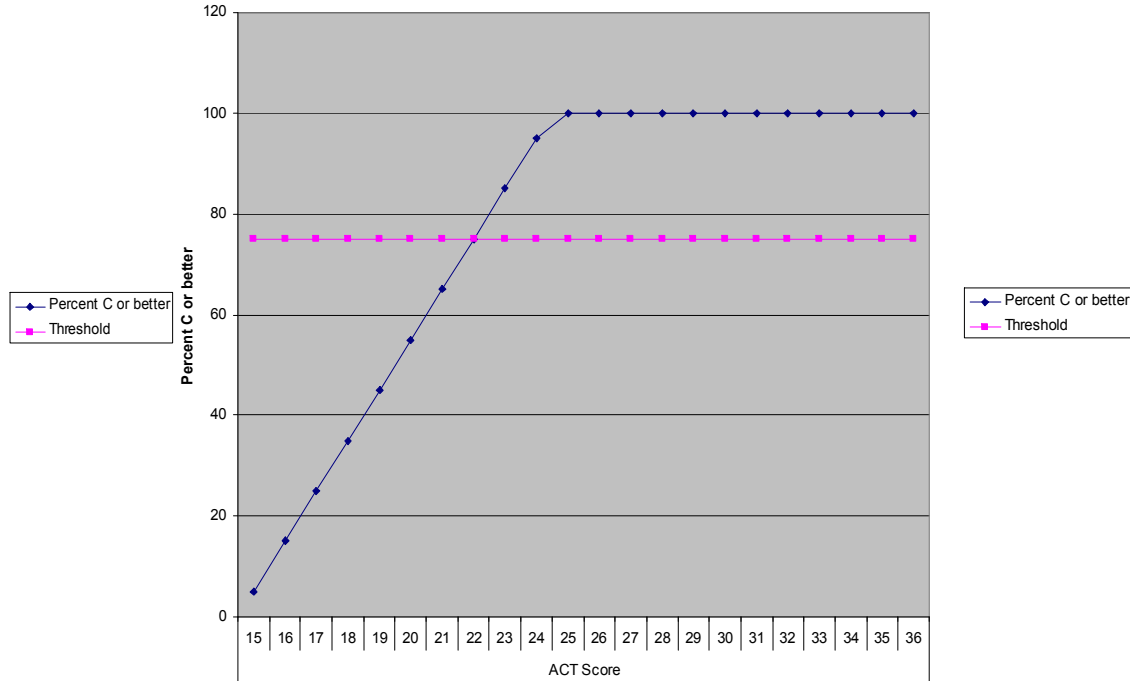
3. What happens if we try to evaluate viability of “cut scores?”

How do people think about thresholds?

One View of Readiness Thresholds



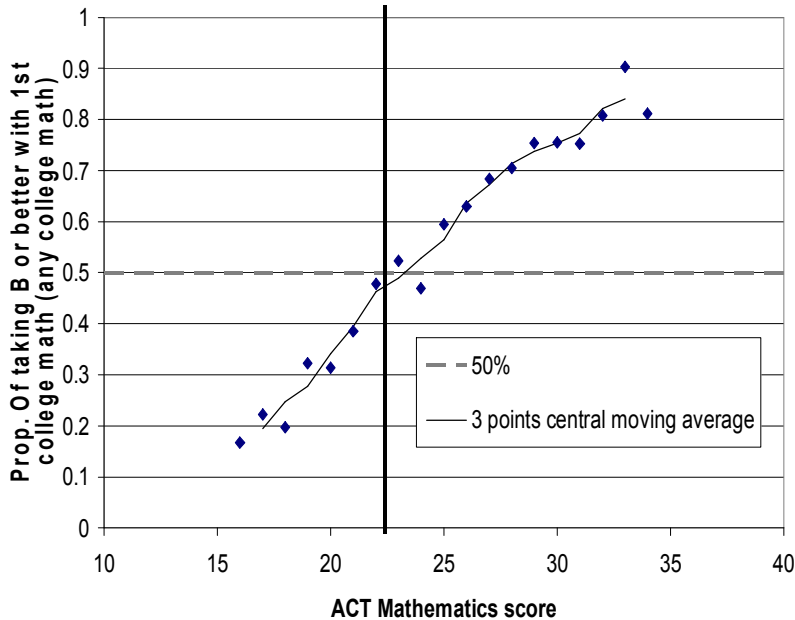
A Second View of Readiness Thresholds



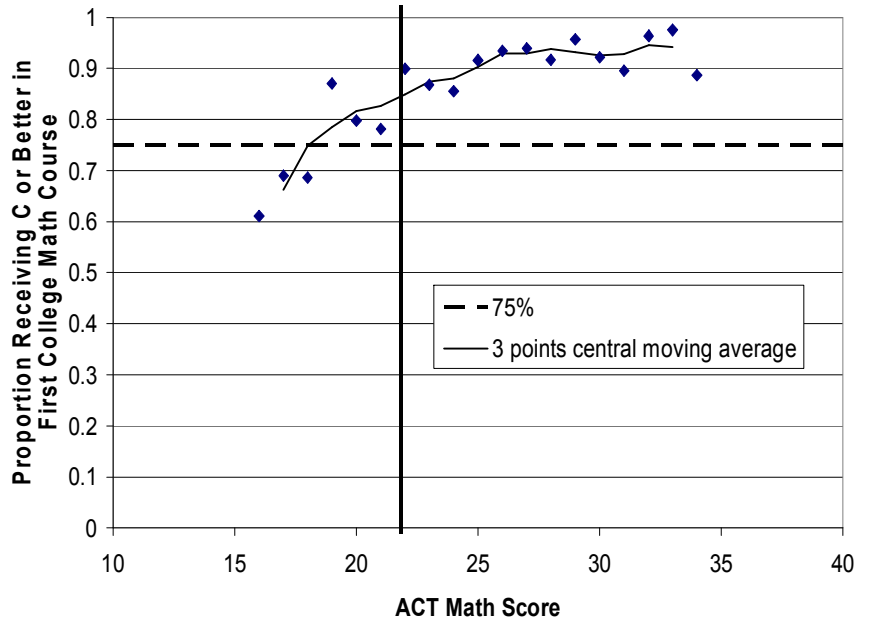
3. What happens if we try to evaluate viability of “cut scores?”

ACT College Readiness Benchmark

UMN Twin Cities and Morris:
all students

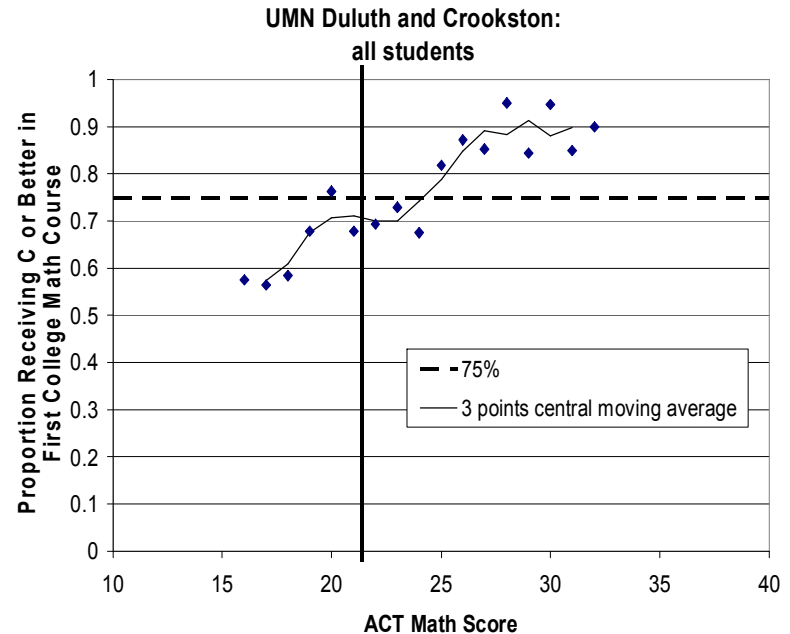
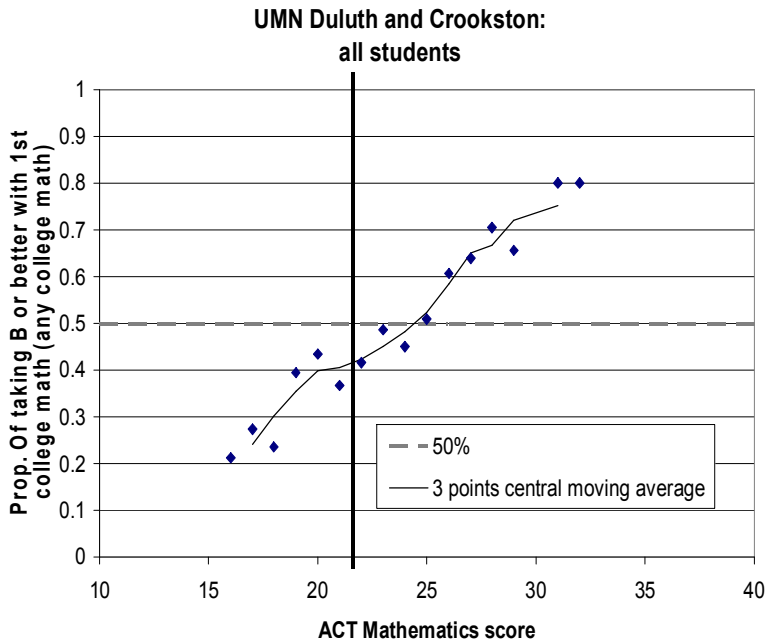


UMN Twin Cities and Morris:
all students



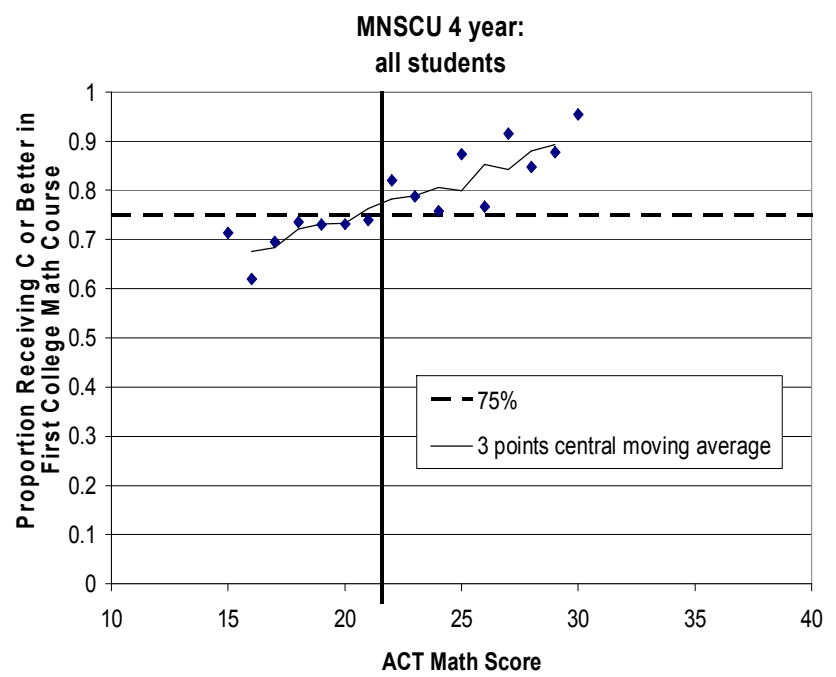
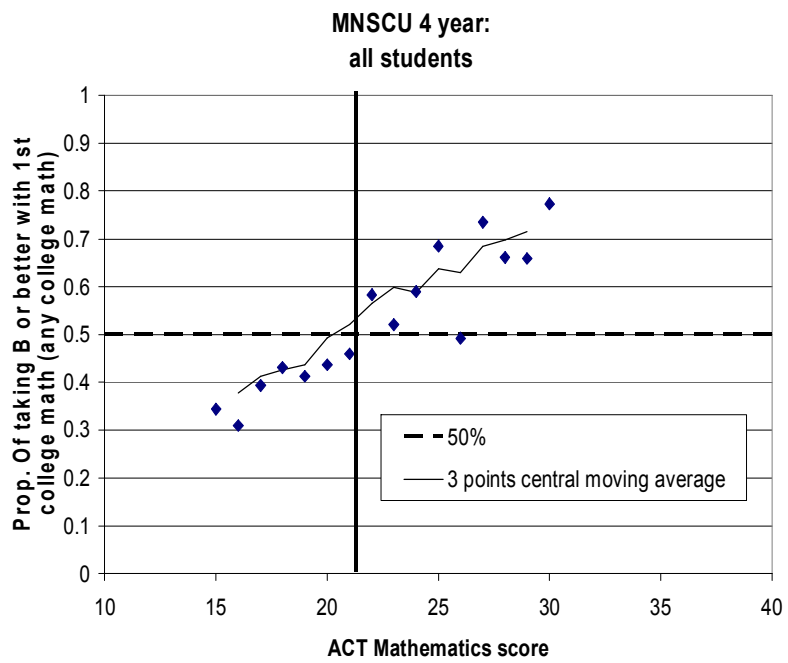
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ACT College Readiness Benchmark



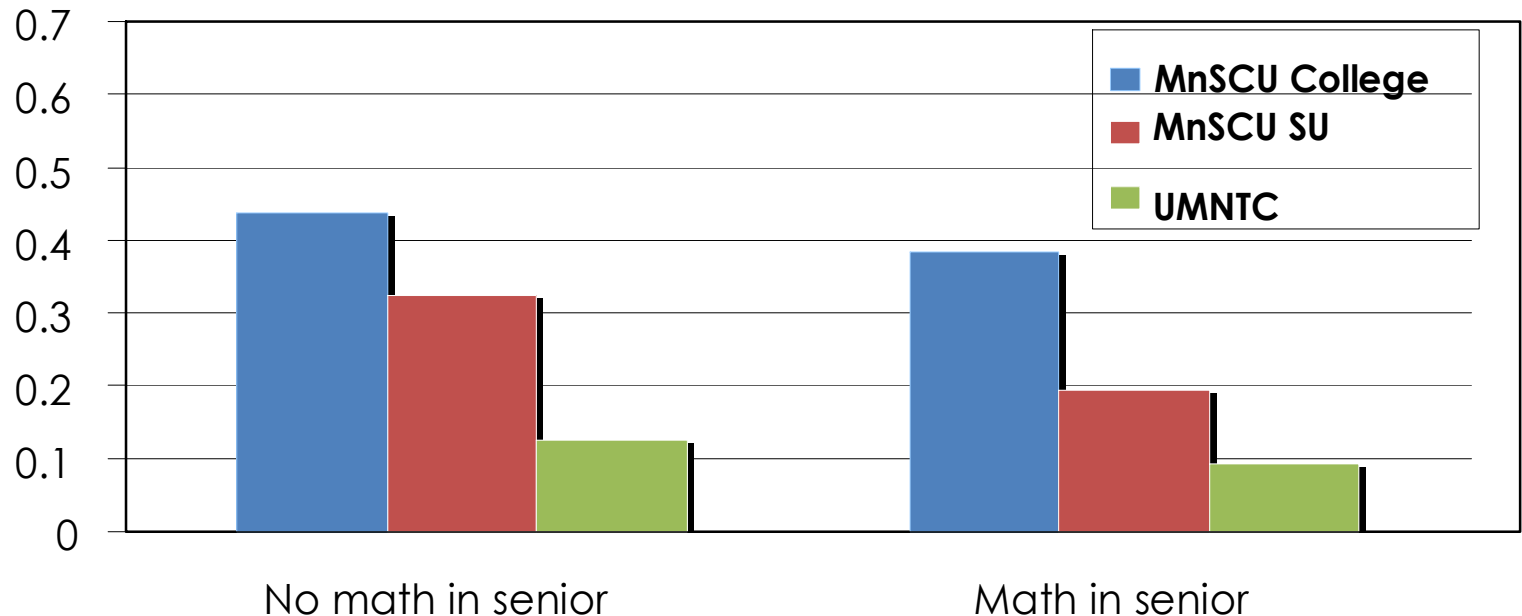
3. What happens if we try to evaluate viability of “cut scores?”

ACT College Readiness Benchmark



4. Is taking a math class during the senior year of high school important for success?

Proportion Taking Developmental Course



5. How well can measures together predict college developmental course taking?

- Four Models were examined:
 - Model 1 (M1): K-12 data, including background variables, test scores, and attendance.
Model 2 (M2): Added course-taking and grades.
 - Model 3 (M3): Added ACT math scores M1.
 - Model 4 (M4): All variables from M1 to M3.

5. How well can measures together predict college developmental course taking?

- Significant predictors included test scores, background variables, and course taking
 - MCA and ACT scores were consistent predictors
 - Course taking and course performance were consistent predictors
 - Ethnicity and 12th grade attendance were predictive for UM students
 - Free/reduced Lunch & Special Ed status were predictive for MnSCU College students
 - Free/reduced Lunch was modestly predictive for MnSCU State University students

5. How well can measures together predict college developmental course taking?

- UM TC: Correct classifications ranged from 89% for M1 to 92% for M4.
- MnSCU SU: Correct classifications ranged from 74% for M2 to 81% for M3 and M4.
- MnSCU Colleges: Correct classifications was 61% for M1 and 63% for M2.
- All Sectors: Classification rates were similar to rates of developmental course taking
 - UM 10%;
 - MnSCU SU's 25%;
 - MnSCU Colleges 36%

Discussion Questions for Council

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