

What Might Affect Student Performance in a Math Course?

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[Incoming skills?]

- In a two-term differential calculus course, incoming precalculus skills correlates with the performance in Term 1, but become less important in Term 2 as students sharpen their skills.

Correlation r between course grades and September basic skills diagnostic			
Oct MT	Dec Exam	Feb MT	Apr Exam
0.52	0.42	0.32	0.28

- The diagnostic at the end of the course correlates more with the final exam.

Correlation r between tests and March basic skills diagnostic	
Apr Exam	Final Grade
0.42	0.5

[Introduction]

Besides incoming skills, what other factors might affect student performance in a math course? How about... gender difference?

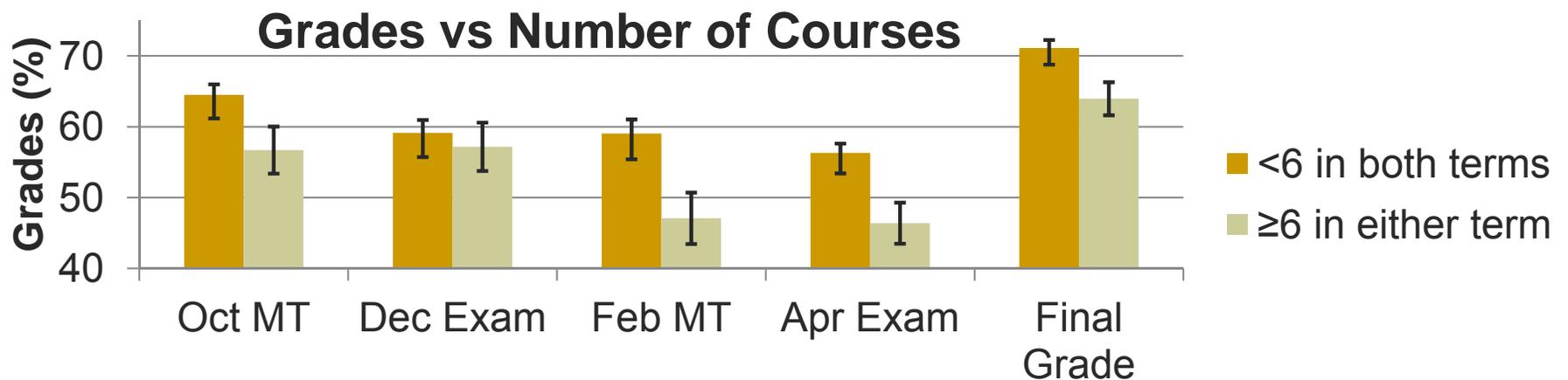
Based on the course grades and various surveys, we will attempt to identify some demographic, psychological and behavioural factors that might influence student performance.

[The analysis]

- Focus on Math 110 (Sept 2010 – Apr 2011)
 - a two-term differential calculus course for students not meeting the prerequisites of regular one-term course.
- Data from
 - pre- and post precalculus diagnostic (Sept and Mar)
 - Mathematics Attitudes and Perceptions Survey (MAPS)
 - study habit survey
 - course grades (assignments, workshops, tests, final grades)

Course load?

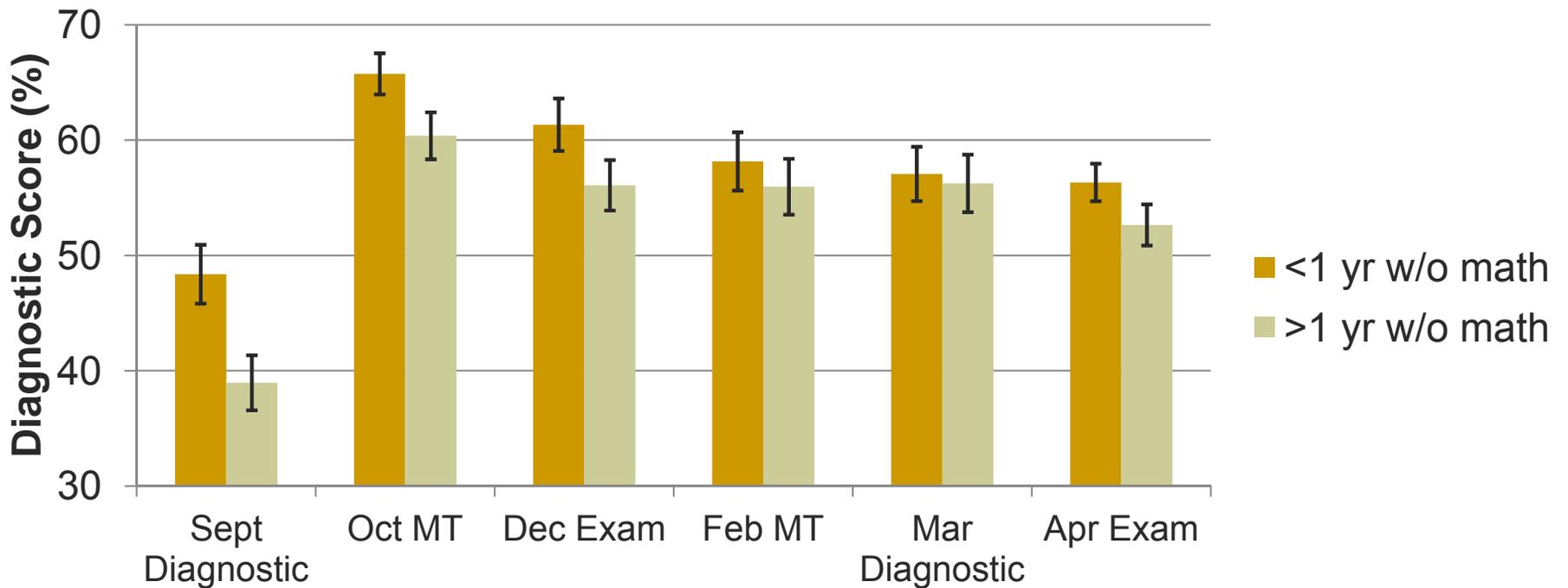
- Students taking 6 courses generally have lower grades throughout a two-term differential calculus course.
- More than 6 courses in a term → overloaded? However, these students attend workshops and submit assignments not less than others.



<6 in both terms: N = 113; ≥6 in either term: N = 24

Did not take math for a long time?

- Students who did not take a math course for more than a year performed worse in the beginning, but they can catch up in the second term.



<1 yr w/o math: N = 80; >1 yr w/o math: N = 61

Interest? Or... lack of interest?

- Lower-performing students tend to agree that the lack of interest is a significant factor that influences failure in math, much more so than higher-performing students.

	Top third (N=53)	Bottom third (N=39)
% respondents	58%	85%

- However, not only they lack the interest in math, they actually tend to avoid doing math problems whenever possible.

	Top third (N=33)	Bottom third (N=25)
% respondents	18%	64%

[Why avoiding math?]

- A few statements in the attitudinal survey highly correlated with the avoidance of math may give us some clues.

Q1: I study math to learn things that will be useful in my life outside of school.

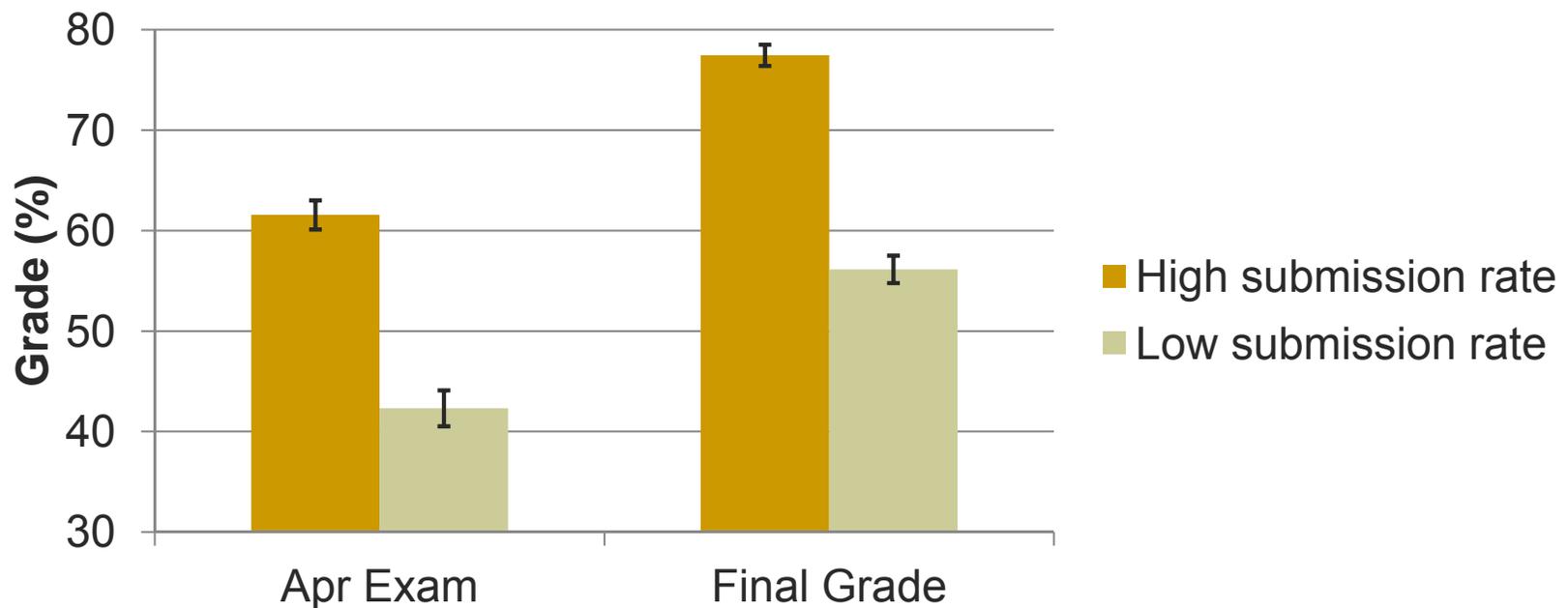
Q2: Learning math changes my ideas about how the world works.

Q3: I can usually figure out a way to solve math problems.

% respondents agree	Top third (N=33)	Bottom third (N=25)
Q1 (usefulness)	48%	12%
Q2 (applicability)	63%	28%
Q3 (confidence/ability)	64%	28%

Completing assignments?

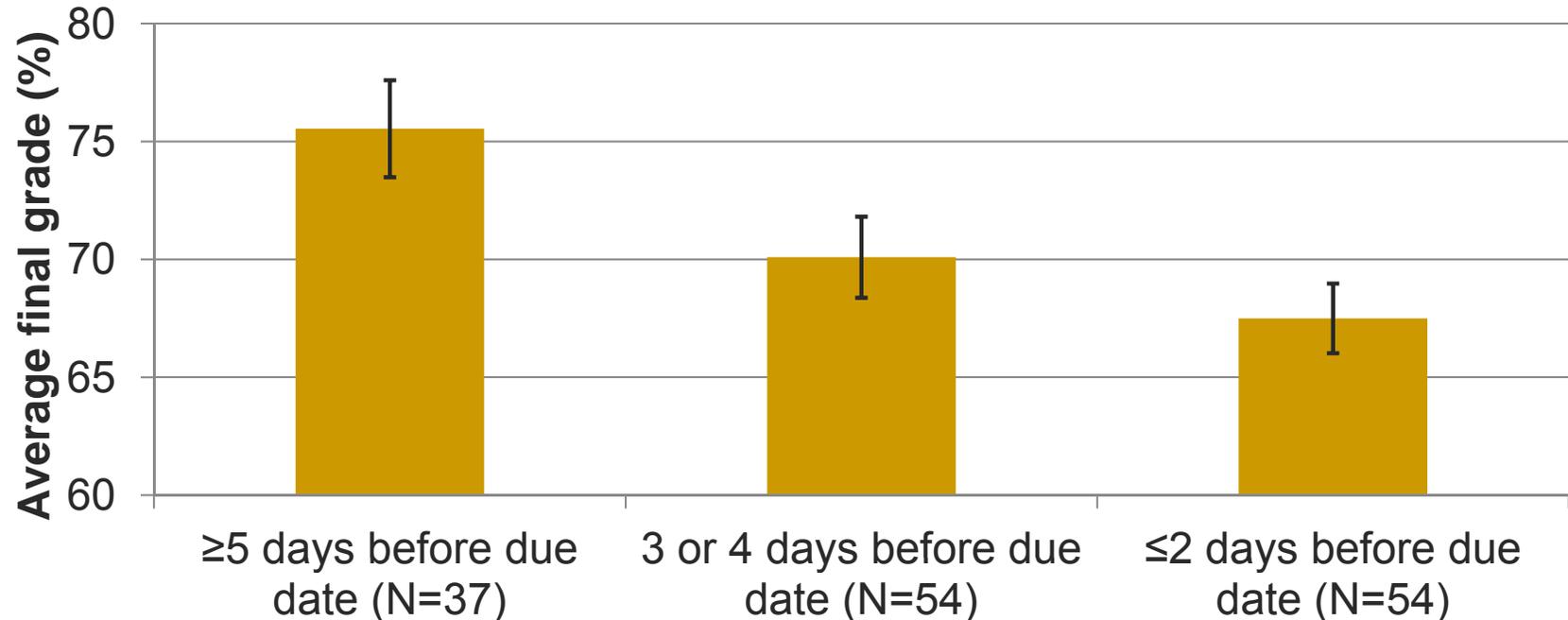
- Assignment submission rate correlates significantly with course grades ($r = 0.47$ with final exam, 0.66 with final grades)



High submission rate: $N = 78$, $>89.3\%$ of asmts submitted;
Low submission rate: $N = 75$, $<77.8\%$ of asmts submitted

When do they start their assignments?

- Higher-performing students report starting their assignments earlier than lower-performing students.
- Are they simply more engaged?



[Study techniques? Effective?]

- Things higher-performing students do more when studying math – *Practice*

	% respondents <u>usually</u> do	
	Top third	Bottom third
# responses	53	39
Redo assignment problems	58%	28%
Rework sample problems before reading solutions	66%	47%
Do practice problems other than those assigned	64%	46%
Try to explain to someone else	38%	15%

Top third: final grade > 74%, Bottom third: final grade < 61%

[Study techniques? Ineffective?]

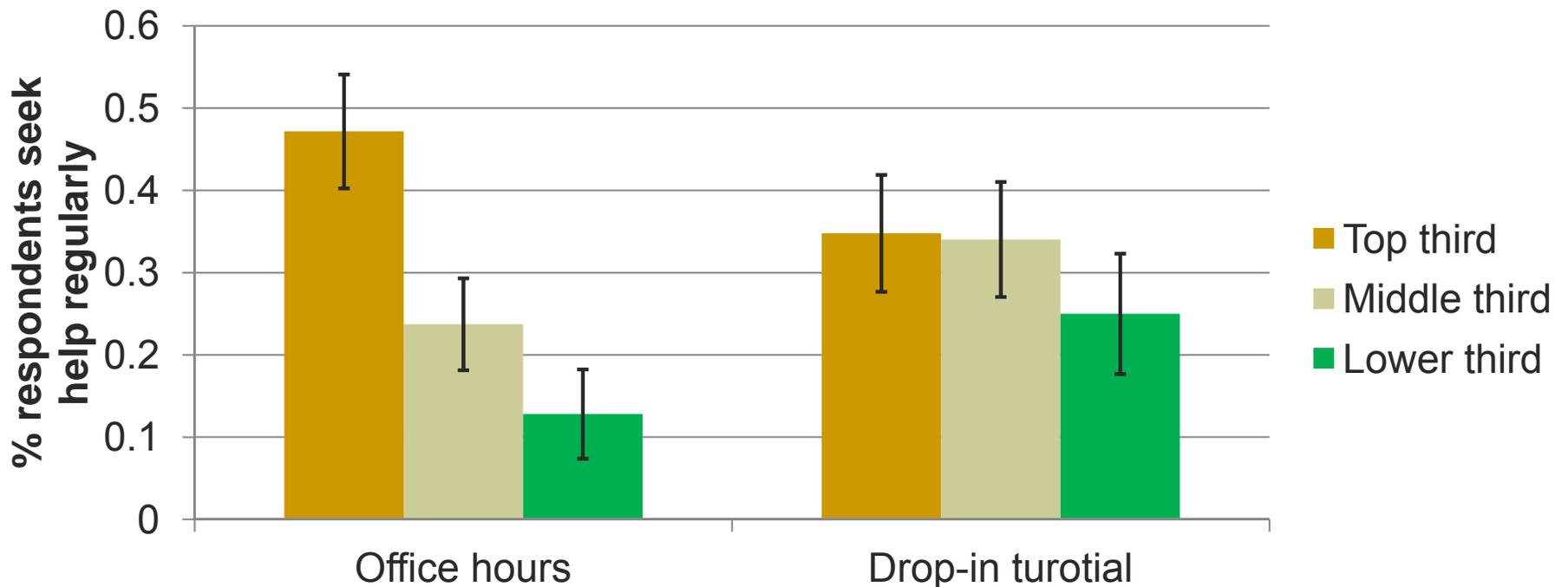
- Things higher-performing students do less when studying math – *Review existing materials*

	% respondents <u>rarely</u> do	
	Top third	Bottom third
# responses	53	39
Transcribe notes/textbook into personal notes	60%	44%
Study solutions of sample problems without trying first	70%	31%
Study with friends	43%	23%

Top third: final grade > 74%, Bottom third: final grade < 61%

Seek help?

- Higher-performing students tend to visit office hours much more than lower-performing students.
- The same trend is not observed for drop-in tutorials.



Top third: N = 53, final grade > 74%; Bottom third: N = 39, final grade < 61%

Seek help? Why not?

- Weaker students who don't go to office hours claim that the main reason is time conflict.

	Top third	Bottom third
% respondents don't go to office hours because of <u>time conflict</u>	29%	65%

Top third: N = 28, final grade > 74%; Bottom third: N = 34, final grade < 61%

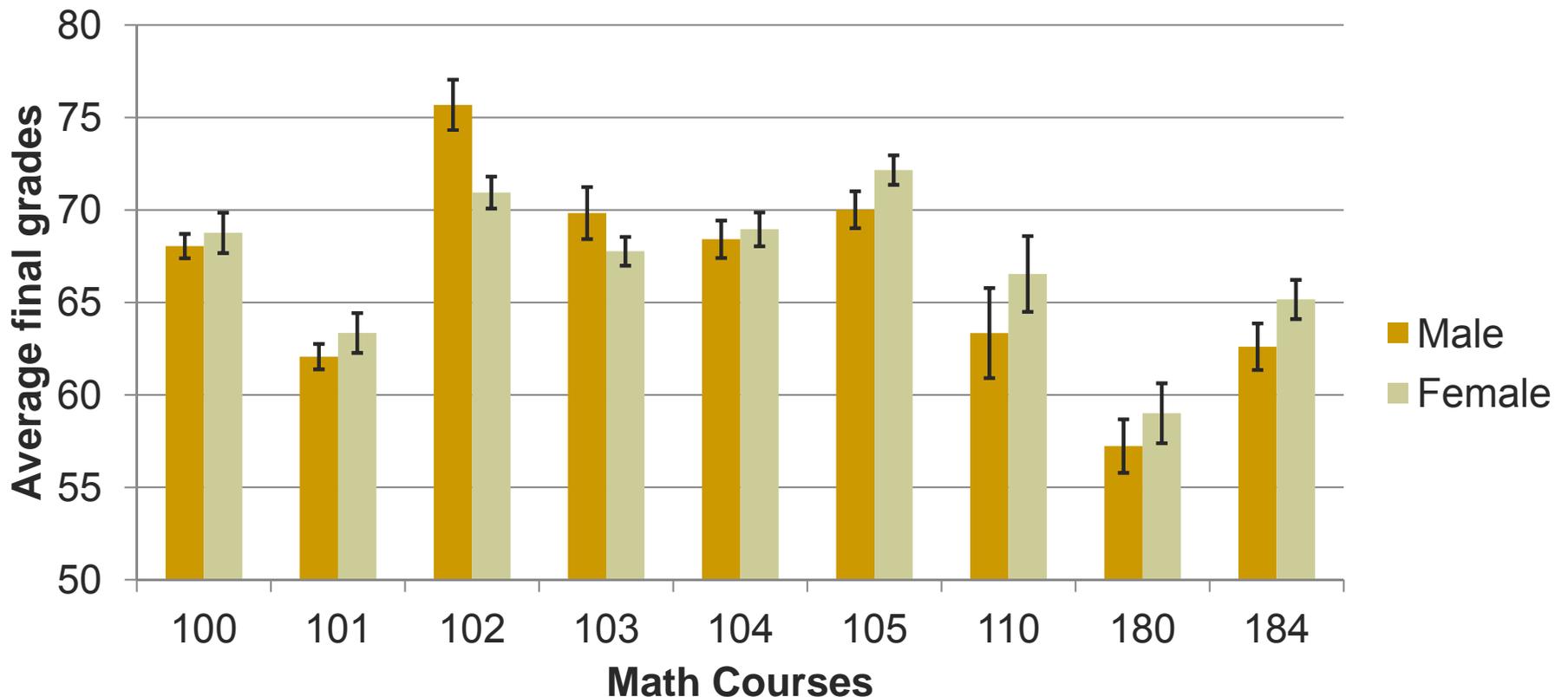
- They also say that they don't go to drop-in tutorial because of the inconvenience of location, the crowdedness and the long waiting time.

	Top third	Bottom third
% respondents don't go to drop-in tutorials because of <u>inconvenience</u>	30%	59%

Top third: N = 30, final grade > 74%; Bottom third: N = 27, final grade < 61%

Did we mention gender?

- Gender doesn't seem to influence student performance in UBC 1st year math courses.



[Summary]

- We have identified a few factors (demographic, psychological and behavioural) that might influence student performance. These factors could provide instructors some insights on the perceptions towards math lower-performing students may have and what type of advices these students may benefit from. Further analysis with course grades and surveys will be done.

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