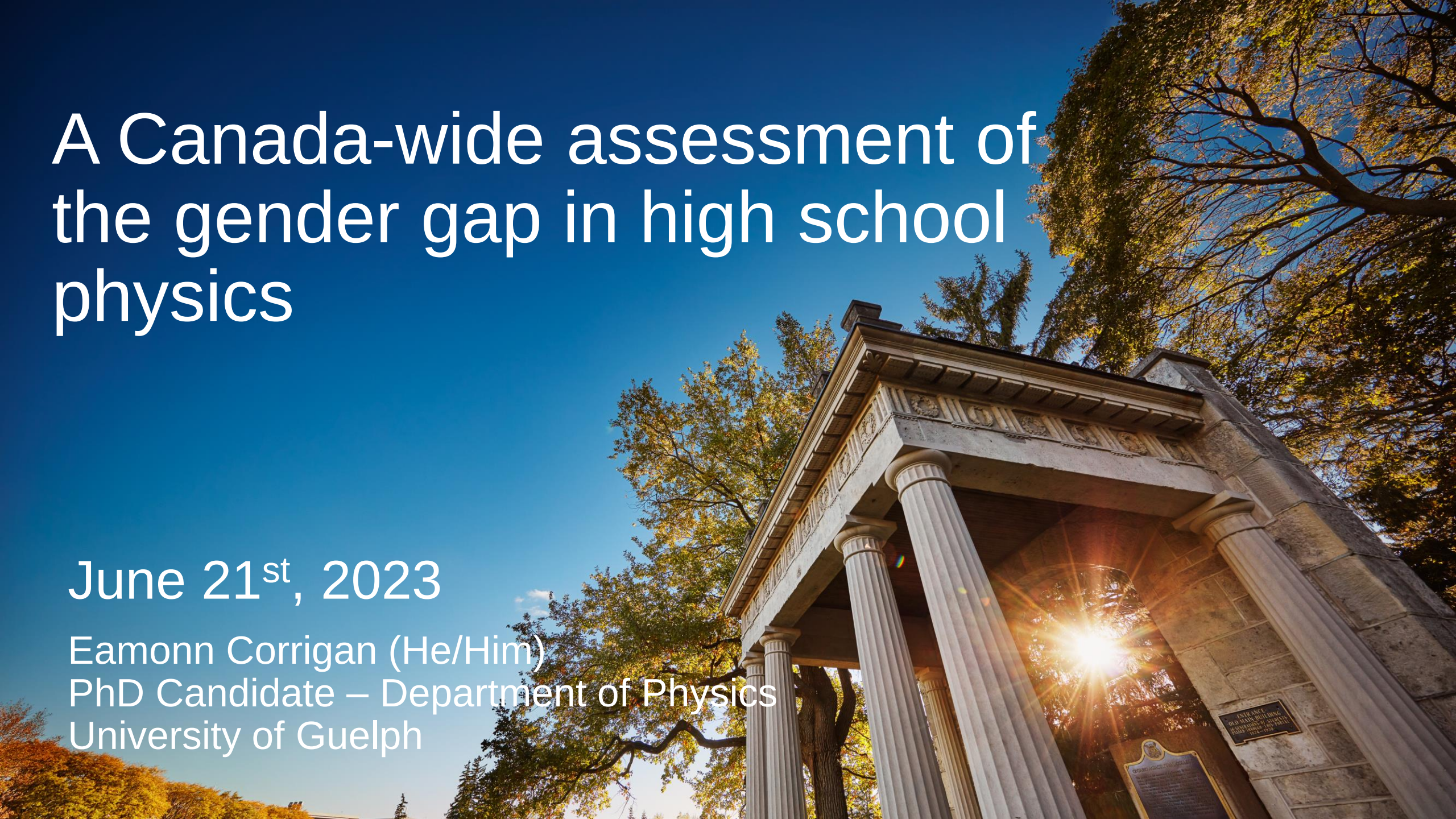
A Canada-wide assessment of the gender gap in high school physics



June 21st, 2023

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PhD Candidate – Department of Physics
University of Guelph

How are we doing?

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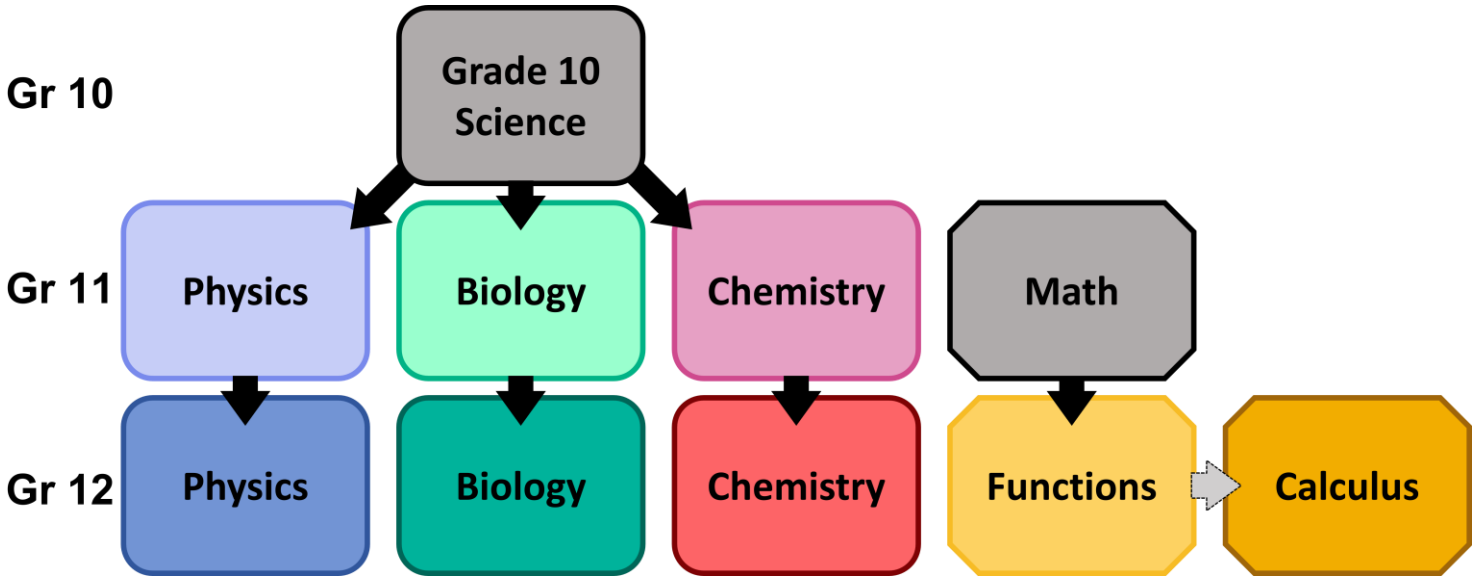
The gender gap in Canada’s high schools over time

School Enrolment Dataset

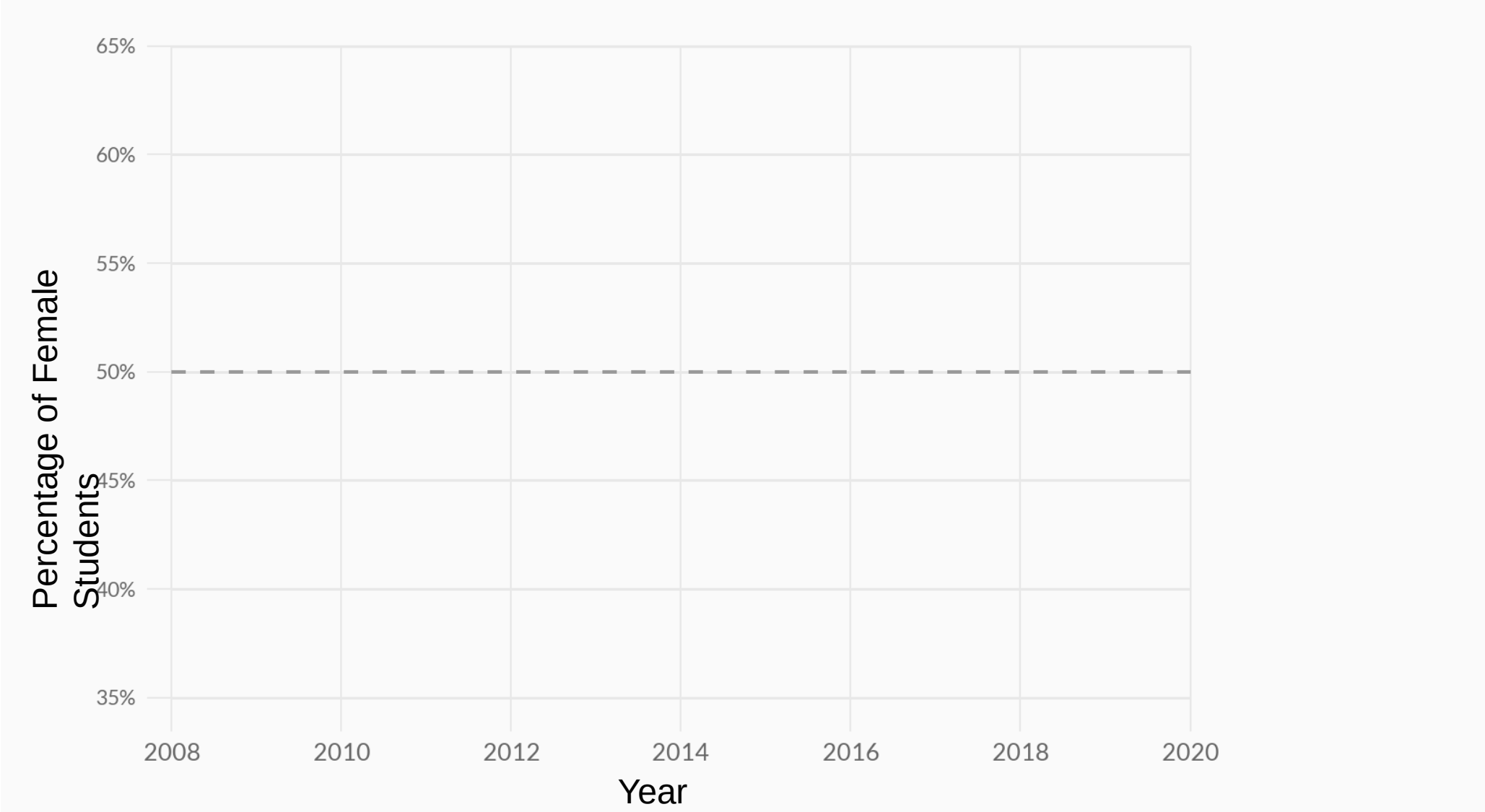
- Obtained 3-11 years of data from Ministries of Education
- Reported total male and total female enrolments for all publicly funded secondary schools in each province
- Data included grade 10-12 university stream Science and Math Courses required for undergraduate admissions



Data collected for the following courses (or equivalents)

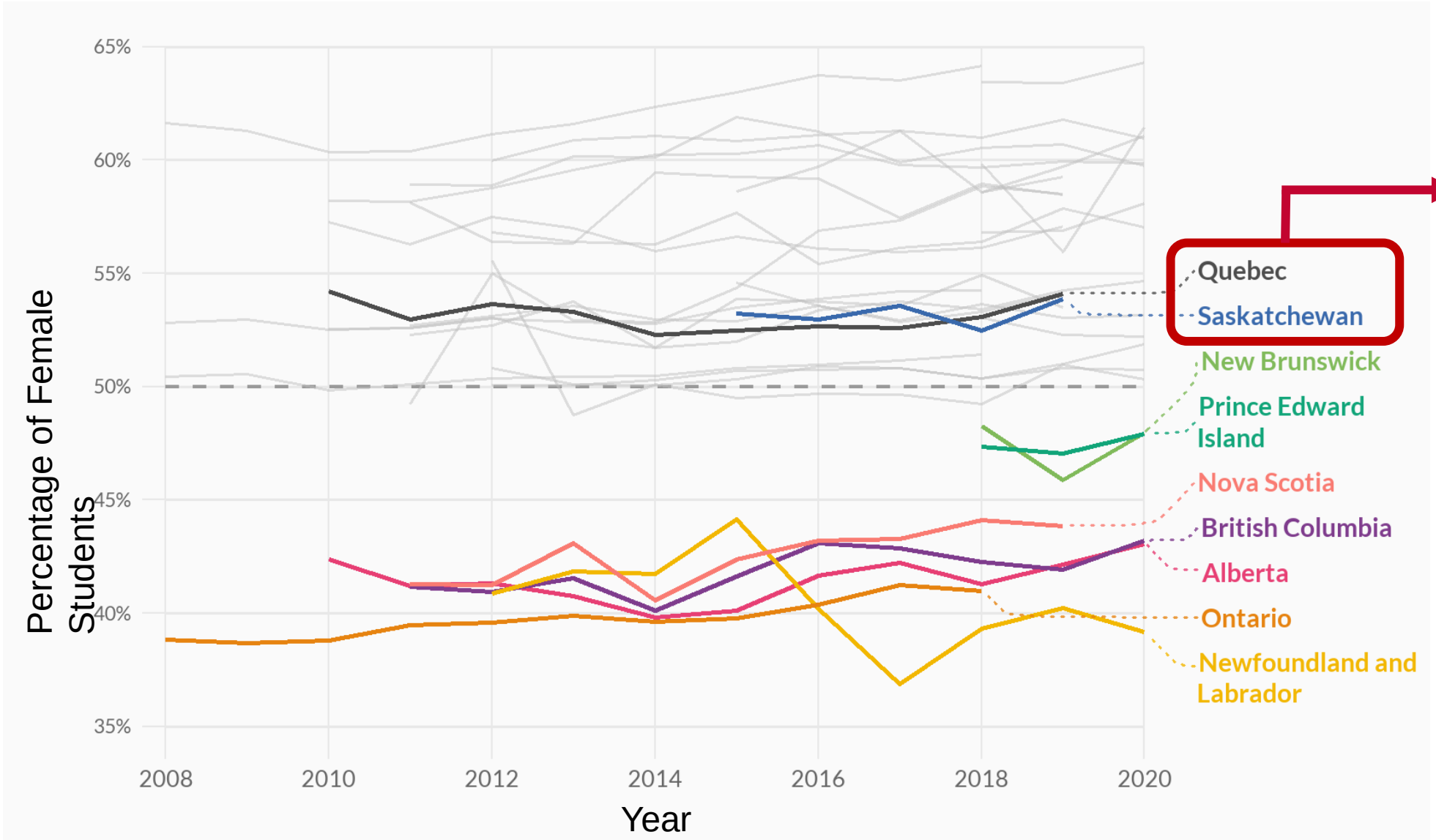
Canadian Enrolment Trends

Female Participation Over Time – Grade 11



Canadian Enrolment Trends

Female Participation Over Time – Grade 11



The two provinces with distinctly different course pathways

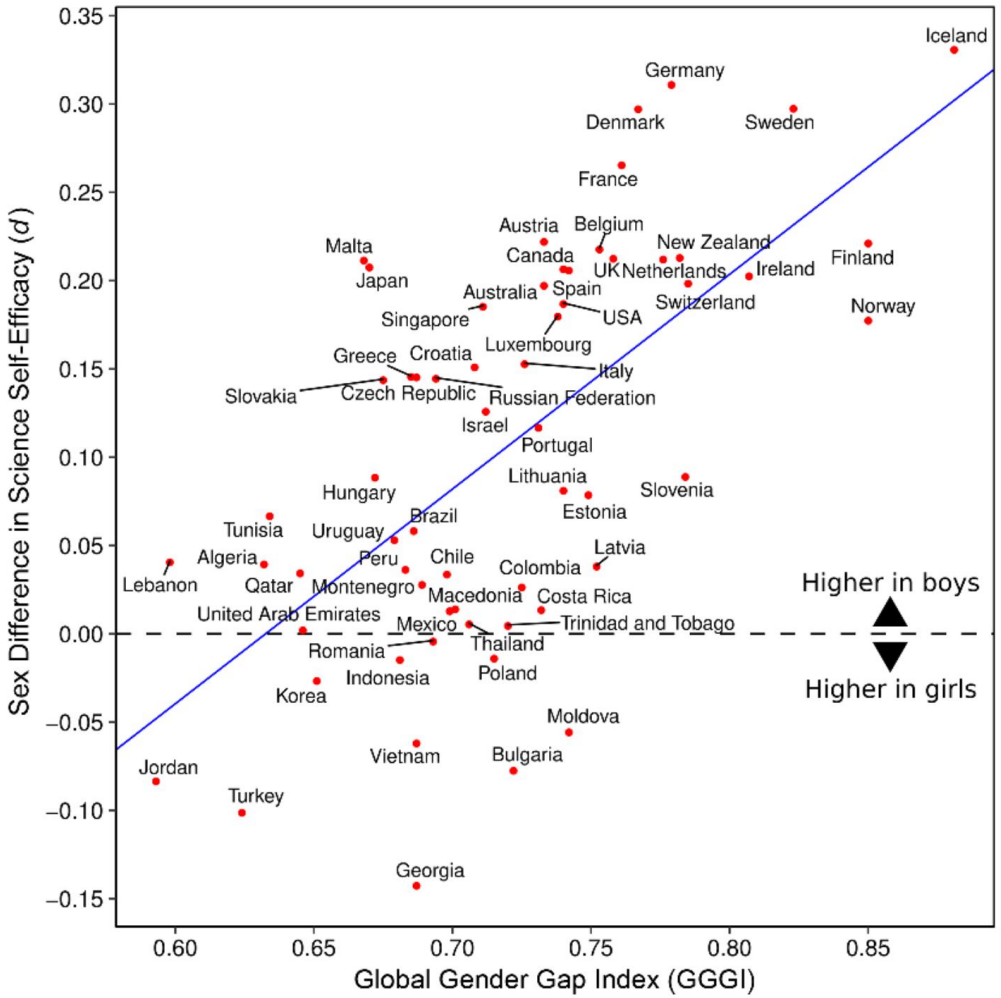
3 of Canada's 4 largest provinces are the lowest (62.5% of Canada)

High School Curricula Differences

Quebec	Overlap	Saskatchewan
❖ Gr. 11 Physics and Chemistry both required for most CÉGEP science programs	❖ Mandatory Grade 10 Science ❖ Reduced Grade 11 Science courses	❖ One gr. 11/12 science course required for graduation

Lead to reduced choice for students

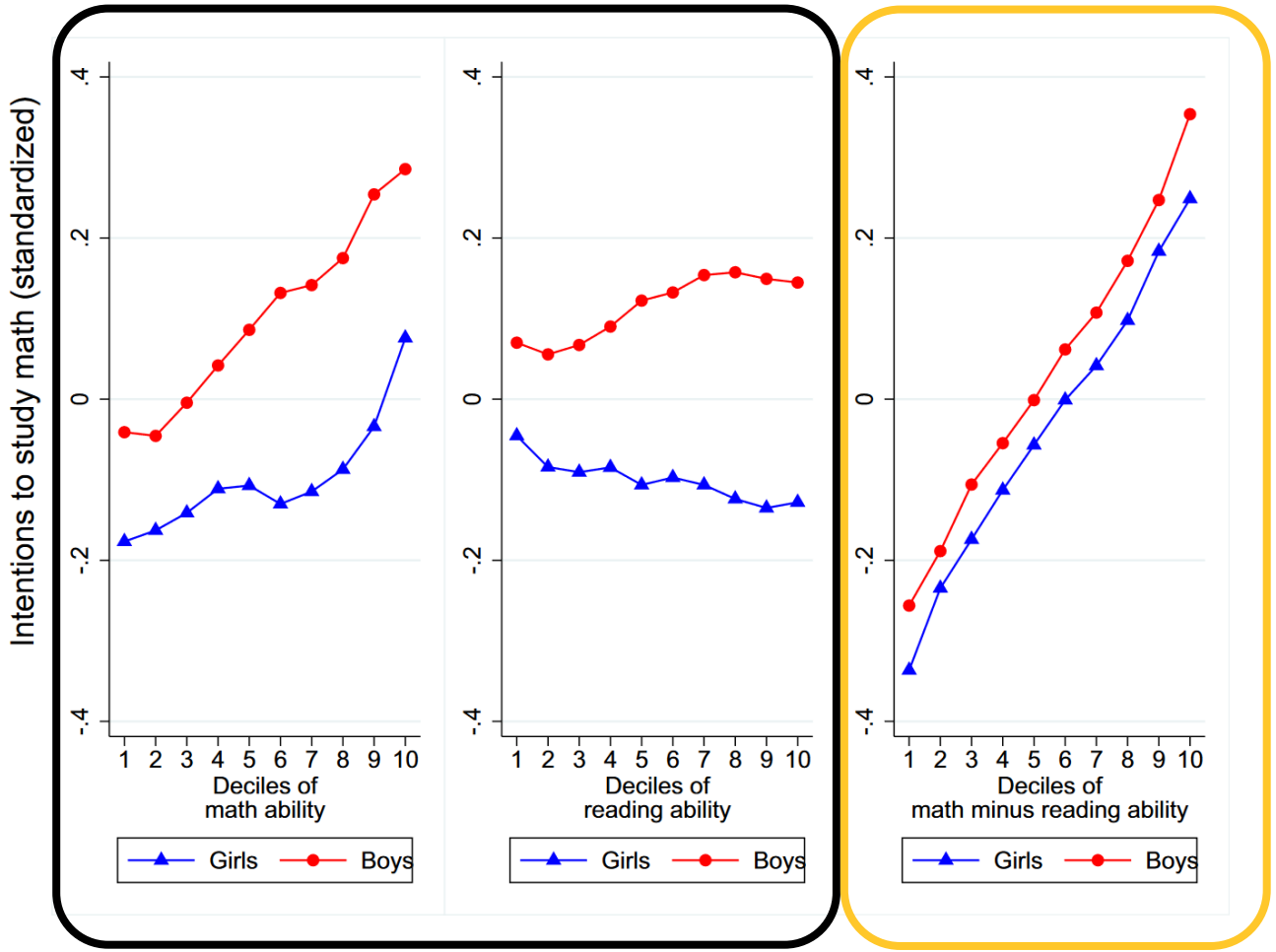
Evidence for Negative Self-Selection



Stoet & Geary (2018)

Countries with higher levels of gender equity have larger gender gaps in STEM

Evidence for Negative Self-Selection



Breda & Napp (2019)

- Large gender gaps persists when at math and reading ability separately
- Controlling for the difference in reading vs. math ability accounted for ~75% of the gender gap

The Impact of Student Choice

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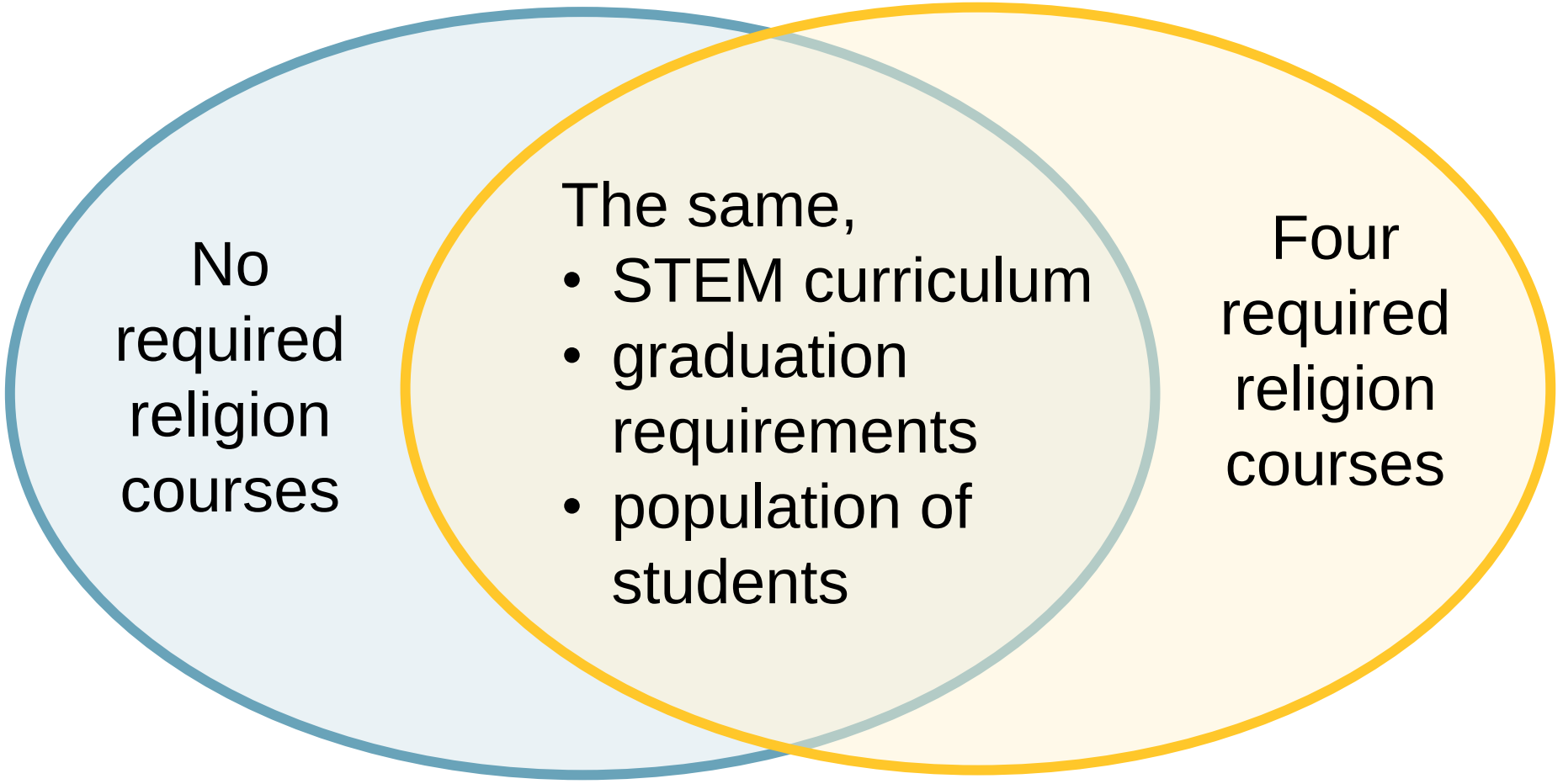
Comparing Ontario's Public and Catholic Schools

Ontario's Two-Part School System



Public Schools

Context: Ontario students require 30 courses to graduate

Catholic Schools

Comparing Public and Catholic Schools

Using Census data, we controlled for school demographics

Internal Context

- Proportion of racialized and Indigenous people

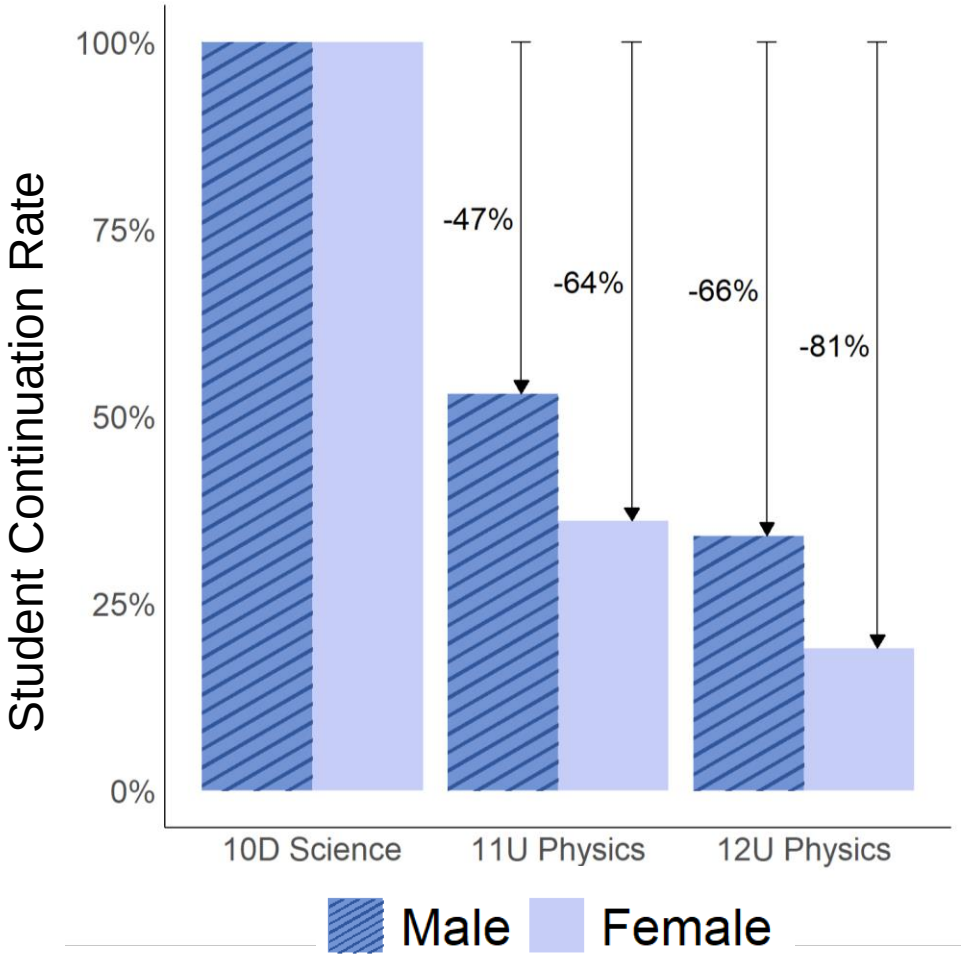
Family Context

- Parental education
- Socioeconomic status
- Immigration status

School Context

- Continuation in Other STEM courses

Student Continuation Rate at Public and Catholic Schools



Regression Results Comparing SCR Between Catholic and Public Schools in Ontario

Grade 11 Physics		
Female	$-2.9 \pm 0.3^{***}$	$p = .49$
Male	$-3.2 \pm 0.3^{***}$	
Grade 12 Physics		
Female	$-1.9 \pm 0.3^{***}$	$p < .001$
Male	$-2.7 \pm 0.3^{***}$	

$^{***}Indicates\ p < .001$

Conclusions

Progress Has Been Made

- Gender representation in Canadian high schools has been improving, albeit slowly

Interprovincial Differences

- Large gaps exist between provinces; may be attributable to structural differences in high school curricula

Course Choice Can Make an Impact

- Data suggest their may be a negative correlation between amount of choice and female representation in physics

Questions, Comments, Thoughts?

Extra Slides

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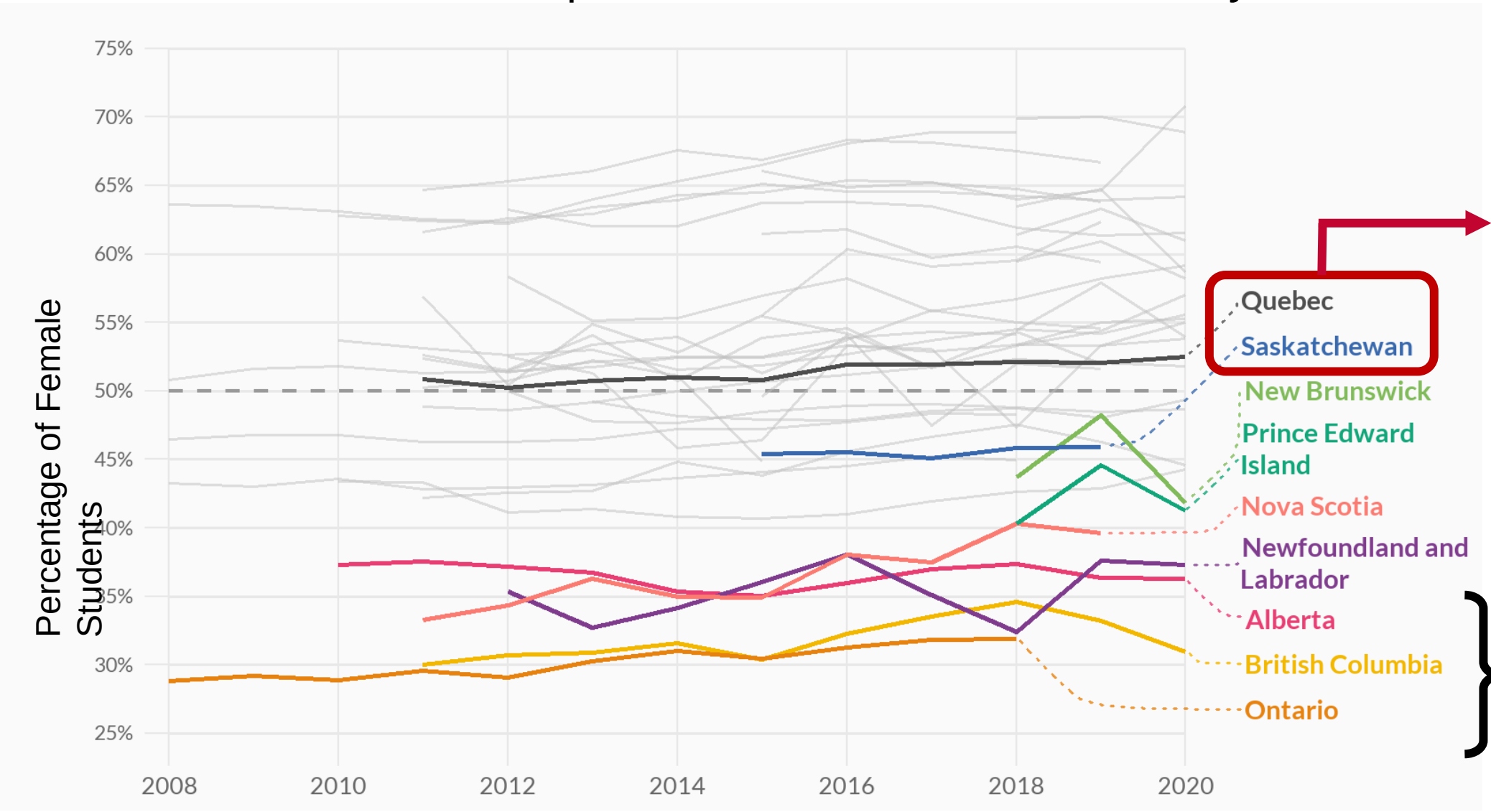
I thought you might ask…

Canadian Enrolment Trends

Female Participation Over Time – Grade 12 Physics



The two provinces with distinctly different course pathways

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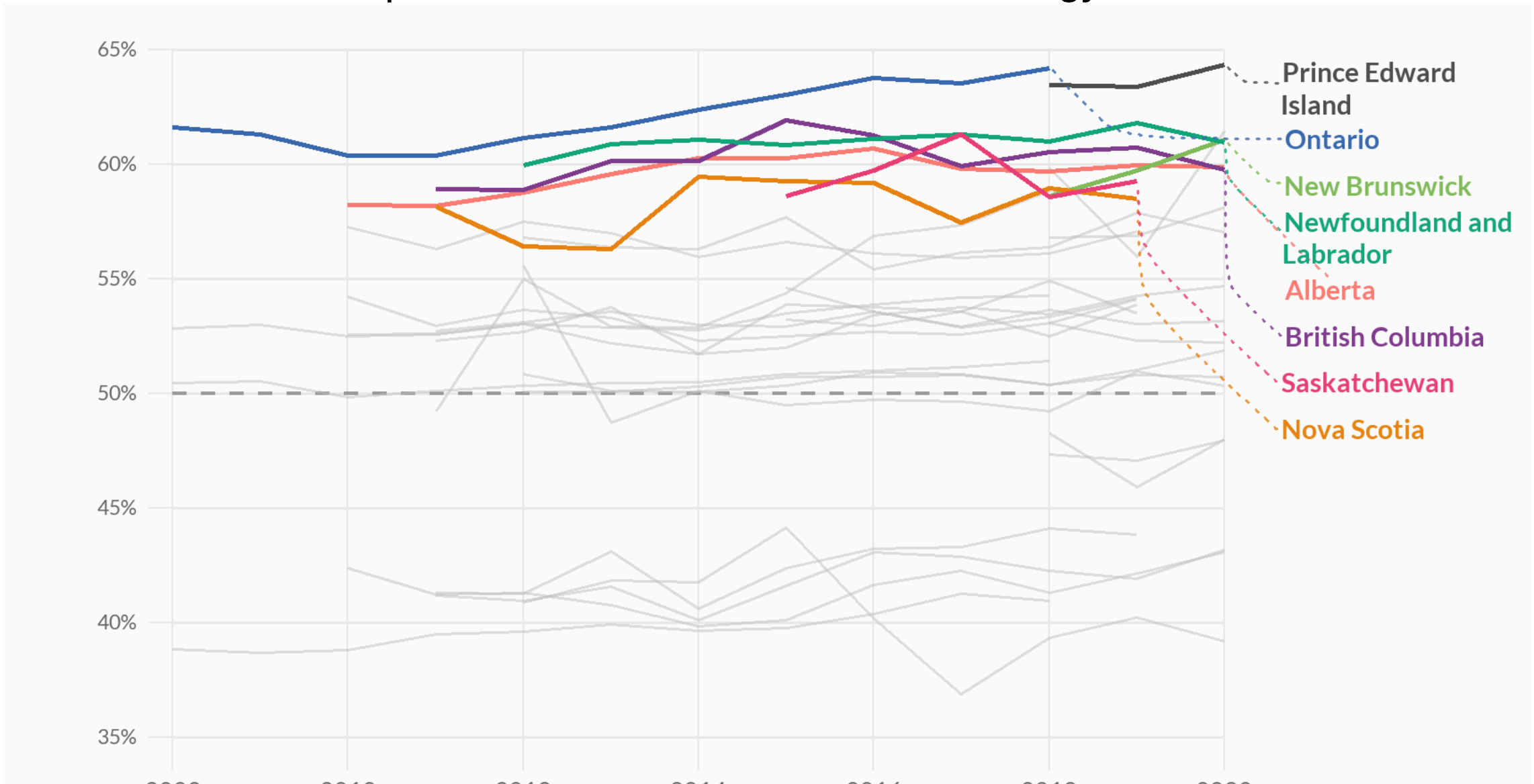
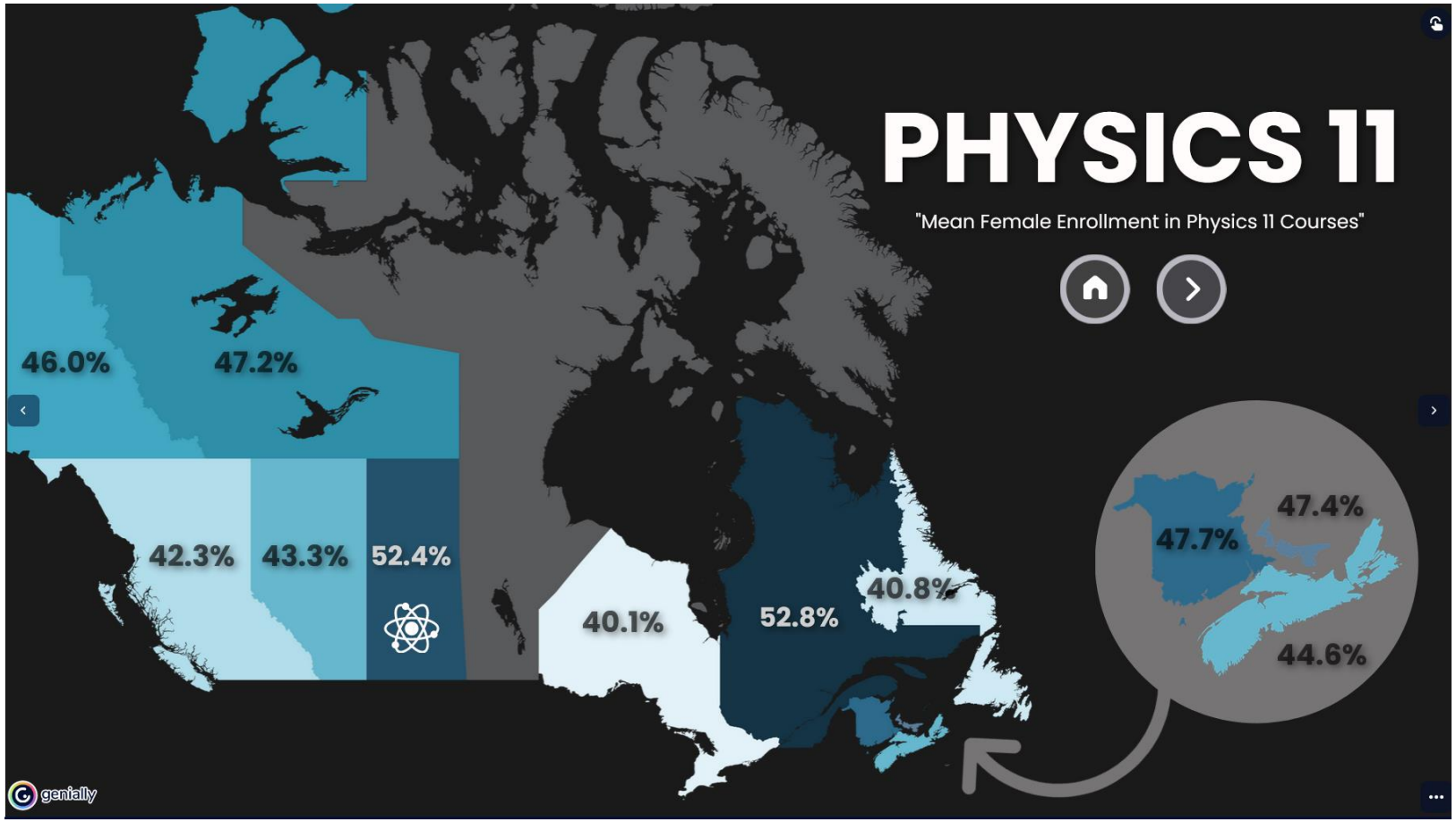
Ontario Enrolment Trends

Female Proportion Over Time – Grade 11 Biology



Data Visualization Project

- Interactive web app
- Let’s visitors explore stats nationwide (for different STEM courses)
- Data also available for individual provinces (for all STEM courses we have)



Check Out The Visualization

Visit:

https://tinyurl.com/STEMviz