Influence of simulated risk group turnover in STI epidemics with assortative mixing

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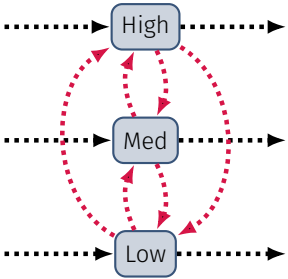

Canadian Student Health Research Forum

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Disclosures

None

Acknowledgements

Stefan Baral, Sheree Schwartz, Linwei Wang, Huiting Ma, Katherine Young, Harry Hausler

CIHR IRSC NSERC CRSNG NIH

Background

[1]Rowley et al. 2019.
[2]UNAIDS 2020.
[3]Mishra et al. 2014.

Background

STI — *Sexually Transmitted Infections*

- 1+ million new STI infections per day[1]
- 1.7 million new HIV infections per year[2]

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Background

STI — *Sexually Transmitted Infections*

- 1+ million new STI infections per day[1]
- 1.7 million new HIV infections per year[2]

tPAF — *Transmission Population Attributable Fraction*[3]

- based on epidemic simulation models
- % onward infections from unmet needs of risk group → inform interventions

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Key Modelling Concepts

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movement between risk groups

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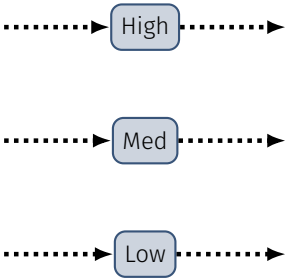

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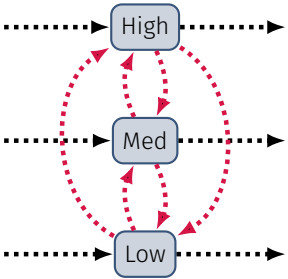

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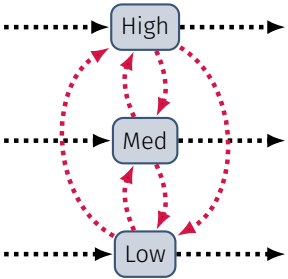

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like-with-like (vs random) partnerships

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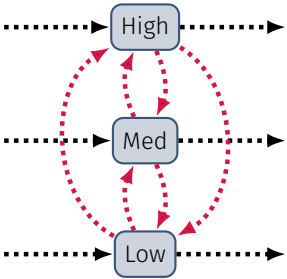

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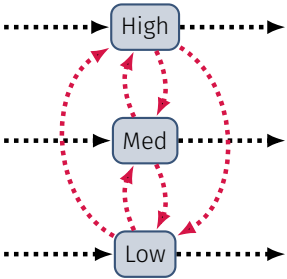

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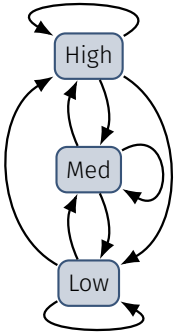

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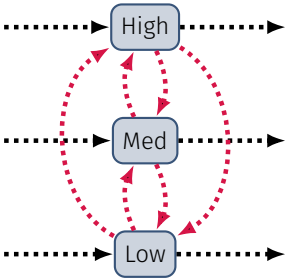

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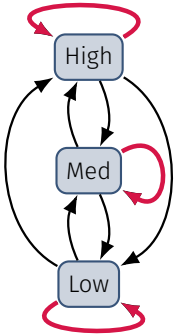

Research Questions

Influence of turnover on:

1. equilibrium STI prevalence
2. tPAF of High Risk group

…under **random** vs **assortative** mixing

Methods

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- Susceptible, Infectious, Recovered (SIR)

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- 4 model variants:

Random		**No Turnover**
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- 4 model variants:

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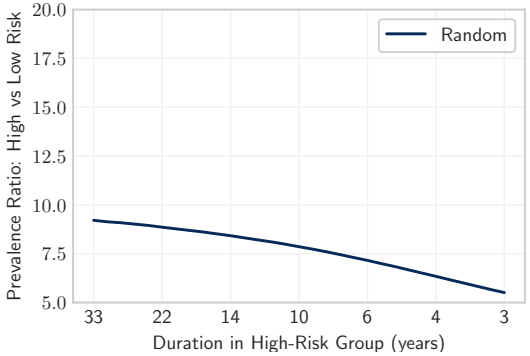
Assortative		**Turnover**

- tPAF of High Risk for each variant

Random mix — turnover “homogenizes” STI prevalence



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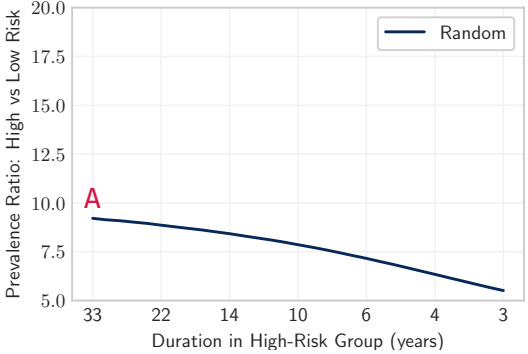

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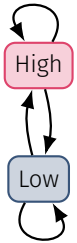

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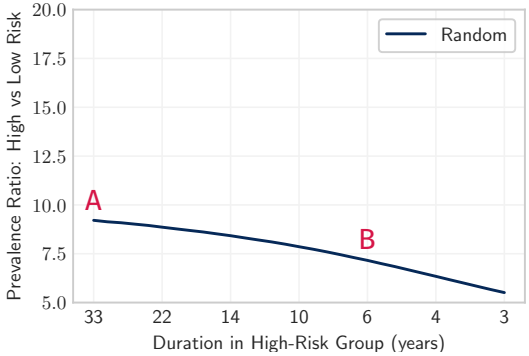

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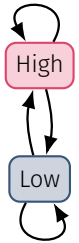

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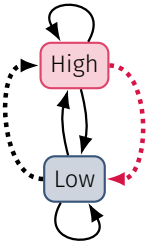

Random mix — infer larger risk ratio with turnover → higher tPAF+

	No Turnover	Turnover
STI prevalence *		
Partners per year *		
10-year tPAF (Cal)		

* Ratios = (High : Low) Risk; Pre → Post-Calibration

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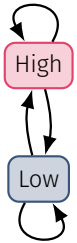

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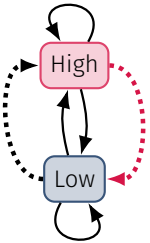

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STI prevalence *	9.2 → 6.7	6.7 → 6.7
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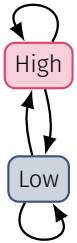

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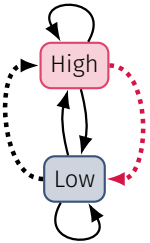

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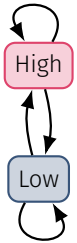

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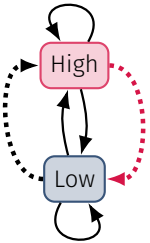

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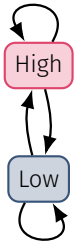

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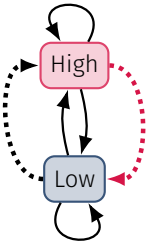

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- Ignore turnover → underestimate tPAF (5.6%)

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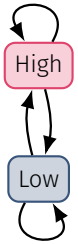

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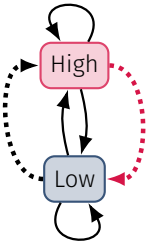

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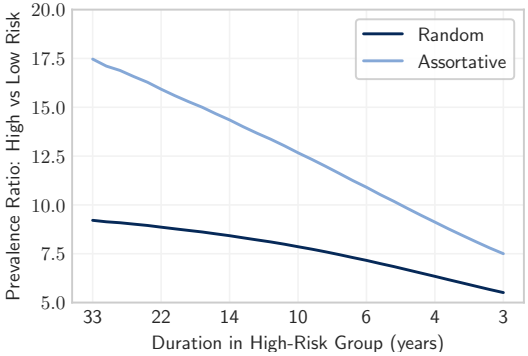

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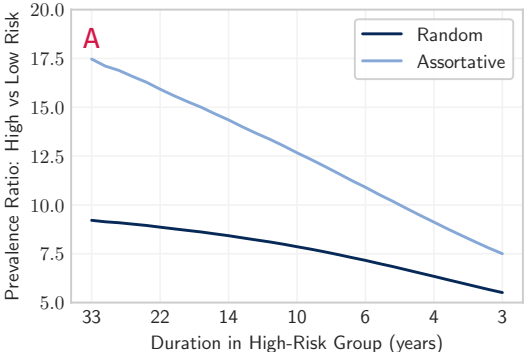

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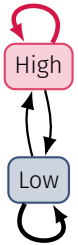

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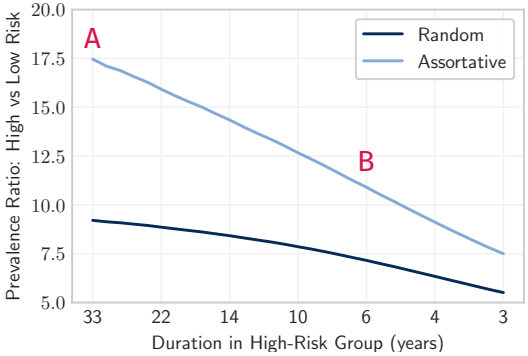

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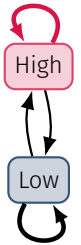

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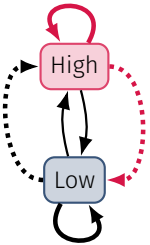

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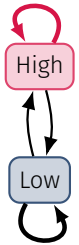

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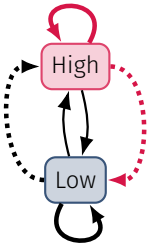

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STI prevalence *	17.5 → 6.7	9.8 → 6.7
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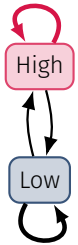

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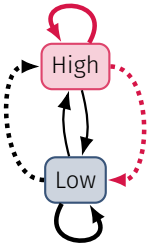

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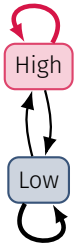

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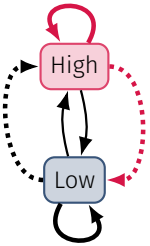

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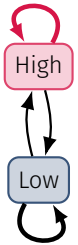

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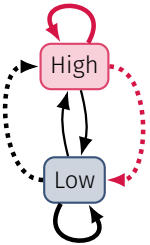

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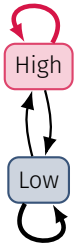

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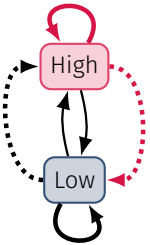

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May be relevant to some non-STI epidemics