Social Distancing to Reduce Transmission of Influenza-Like-Illness on College Campuses

Brian Richardson

Department of Biostatistics,
University of North Carolina at Chapel Hill

February 6, 2026

Scan for slides

About Me

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Greensboro
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Durham
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CARRBORO
Asheville
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Greenville
New Bern
Greenville, SC
Wilmington

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About Me

UNC CFAR
Center for AIDS Research

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UNC CFAR
Center for AIDS Research

UNC Causal Inference Research Lab (CIRL)

Why Biostatistics?

Humans

Why Biostatistics?

Humans

Collect Data

Data

X	Y	Z
0	100	H
0	50	L
1	100	H
1	120	H

Why Biostatistics?

Humans

Collect Data

*Me

Data

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Why Biostatistics?

Humans
(complicated)

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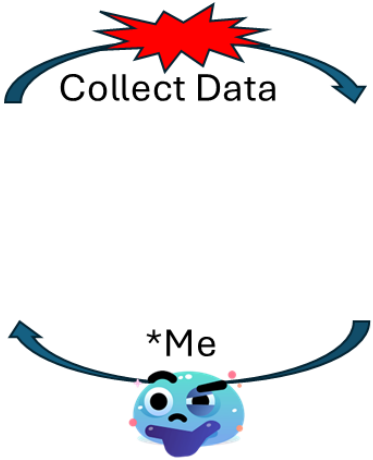

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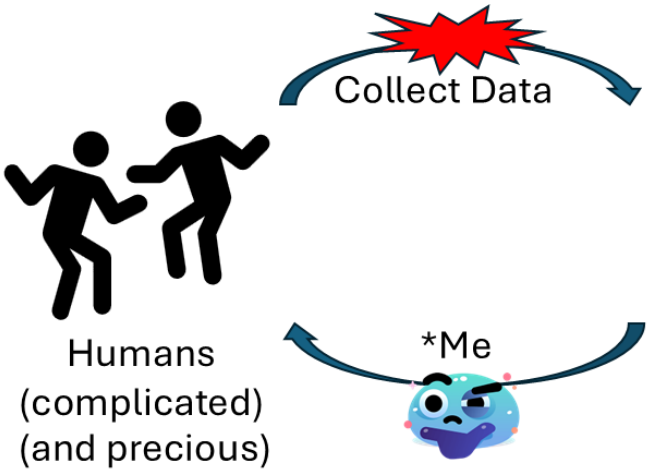
Why Biostatistics?



Data

X	Y	Z
0	100	H
NA	>100	L or H
NA	100	L or H
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Social Distancing

Does encouragement to social distance when sick with the flu reduce transmission?

eX-FLU Trial

- **eX-FLU**: trial to evaluate a social distancing intervention on a college campus during flu season (Aiello et al., 2016; Zivich et al., 2020)

Design and methods of a social network isolation study for reducing respiratory infection transmission: The eX-FLU cluster randomized trial

Allison E. Aiello[a,*], Amanda M. Simanek[b,1], Marisa C. Eisenberg[c], Alison R. Walsh[c], Brian Davis[c], Erik Volz[d,1], Caroline Cheng[c], Jeanette J. Rainey[e], Amra Uzicanin[e], Hongjiang Gao[e], Nathaniel Osgood[f], Dylan Knowles[f], Kevin Stanley[f], Kara Tarter[c], Arnold S. Monto[c]

eX-FLU Trial

- **eX-FLU**: trial to evaluate a social distancing intervention on a college campus during flu season (Aiello et al., 2016; Zivich et al., 2020)
- **Intervention**: encouragement to isolate in dorm for three days upon developing symptoms of **influenza-like illness** (ILI)

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- **Intervention**: encouragement to isolate in dorm for three days upon developing symptoms of **influenza-like illness** (ILI)
- **Central question**: does the encouragement-to-isolate intervention reduce transmission of ILI?

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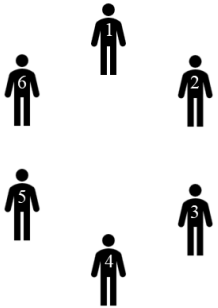
Transmission of Influenza-Like-Illness



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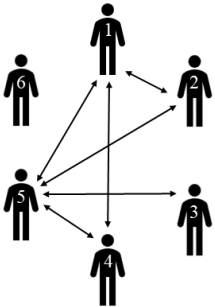

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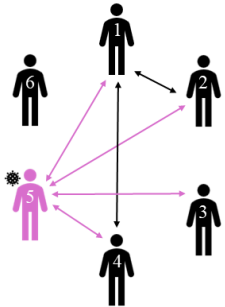

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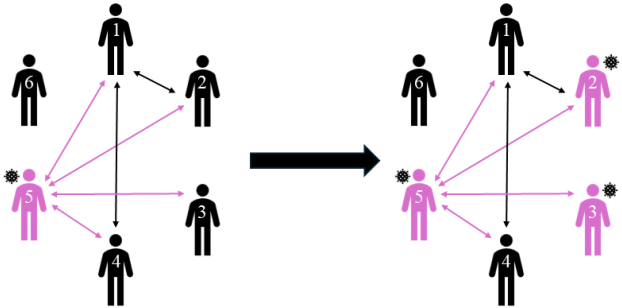
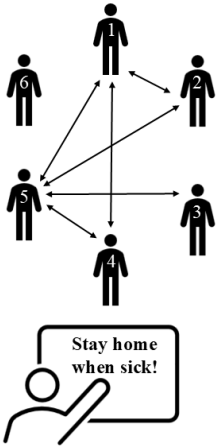


Example I: Intervention Affects Network and Transmission



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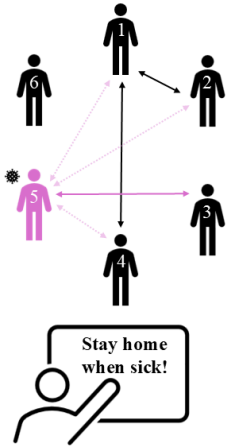

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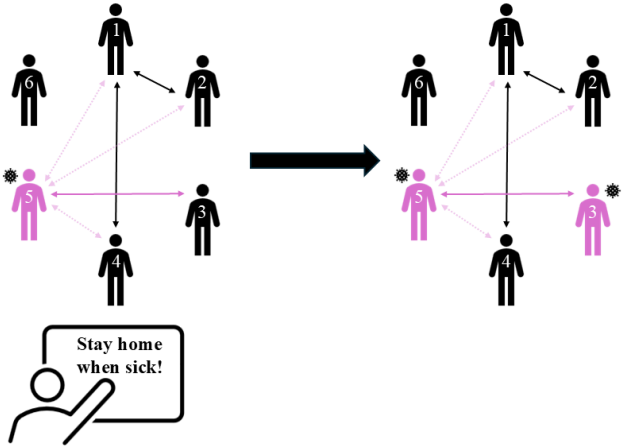
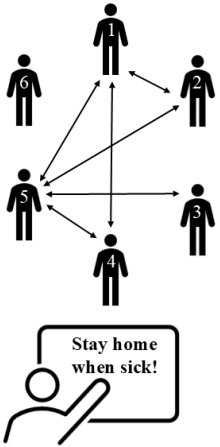


Example II: Intervention Affects Network, Not Transmission



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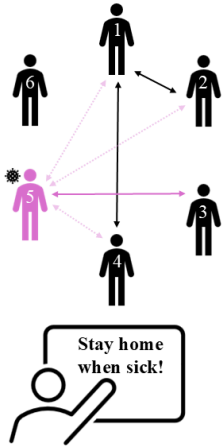

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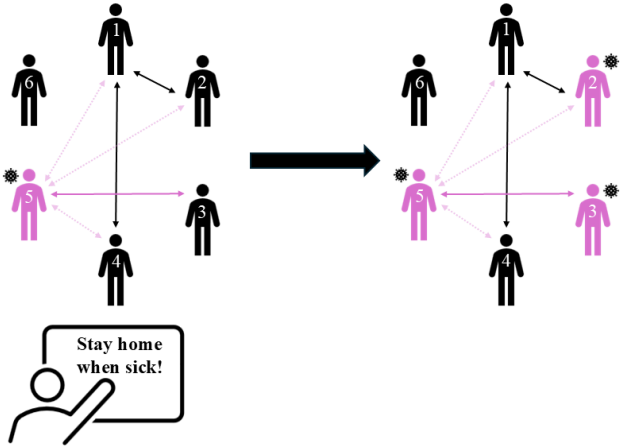
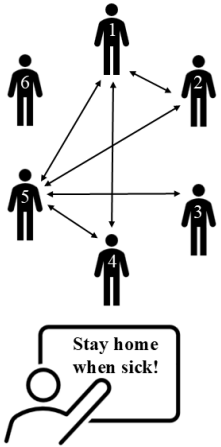


Example III: Intervention Affects Transmission, Not Network



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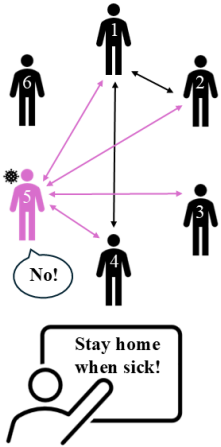

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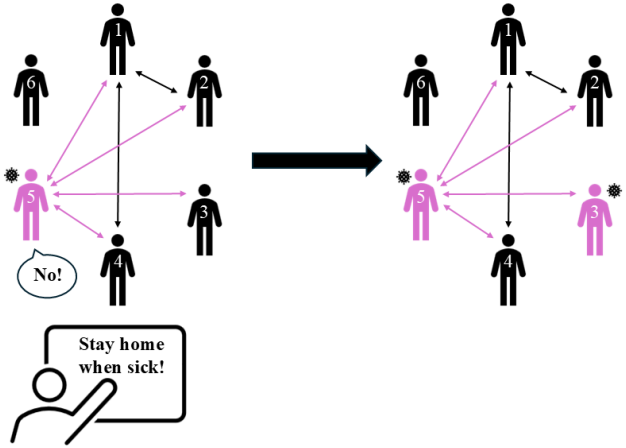
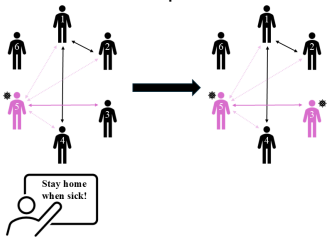


Central Question: Does the Intervention Affect Transmission of ILI?

Example I:



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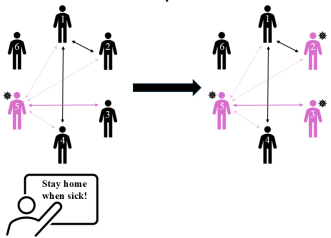
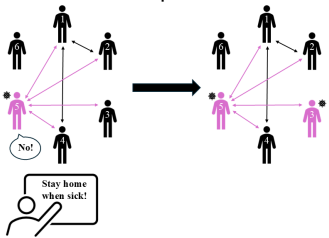


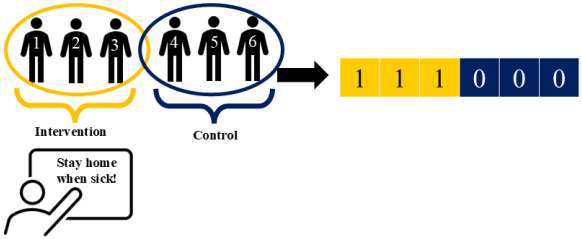
Example III:



In Examples I and III, the answer is yes

eX-FLU Observed Data

- Baseline randomization assignments $\mathbf{Z} = (Z_1, \ldots, Z_n) \in \mathcal{Z}$, for $Z_i = \mathbb{1}(\text{student } i \text{ gets intervention})$



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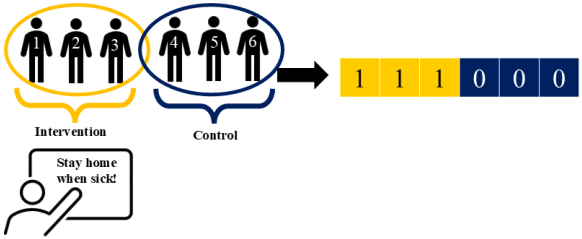

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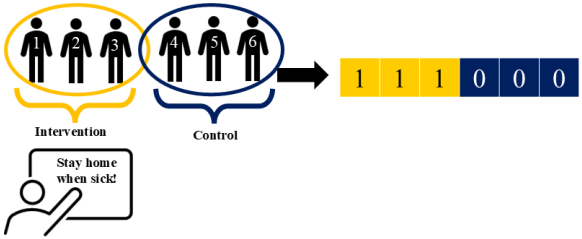
- At weeks $k = 1, \ldots, \tau$, we observe:



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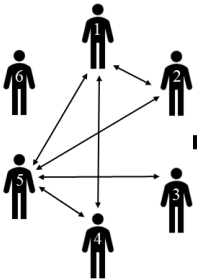

	1	2	3	4	5	6
1	0	1	0	1	1	0
2	1	0	0	0	1	0
3	0	0	0	0	1	0
4	1	0	0	0	1	0
5	1	1	1	1	0	0
6	0	0	0	0	0	0

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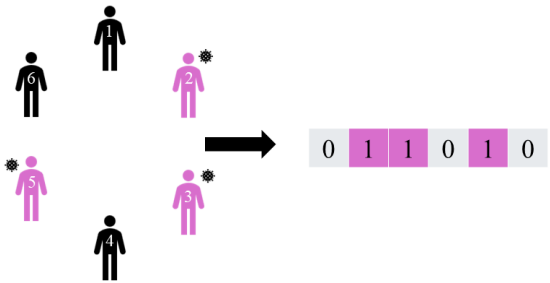

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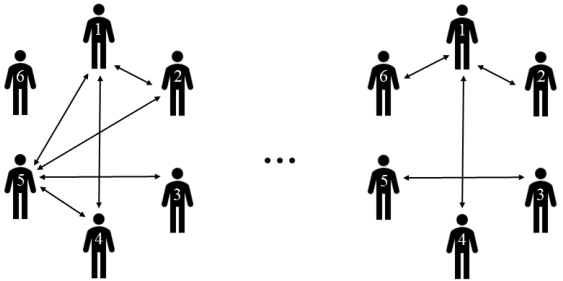

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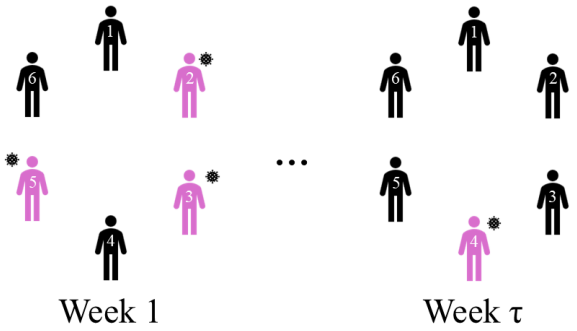

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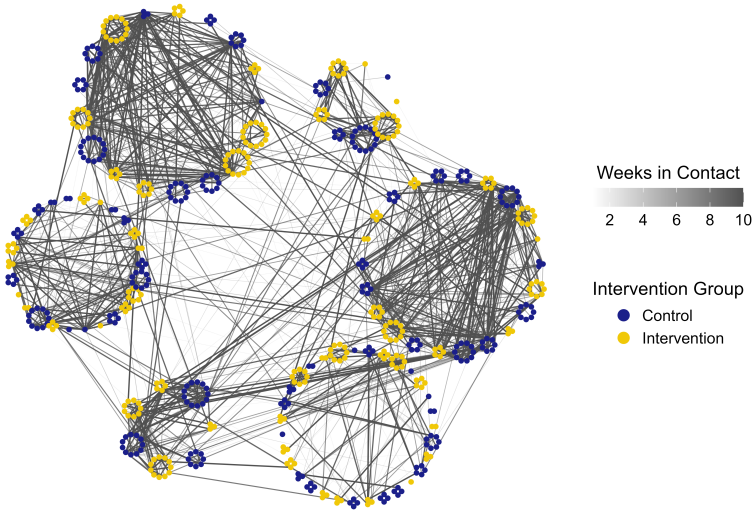

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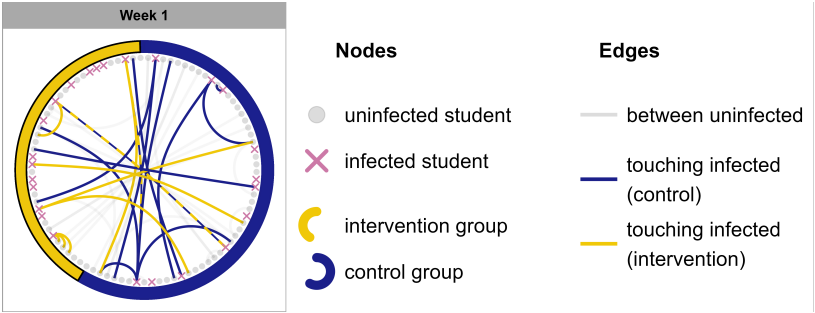
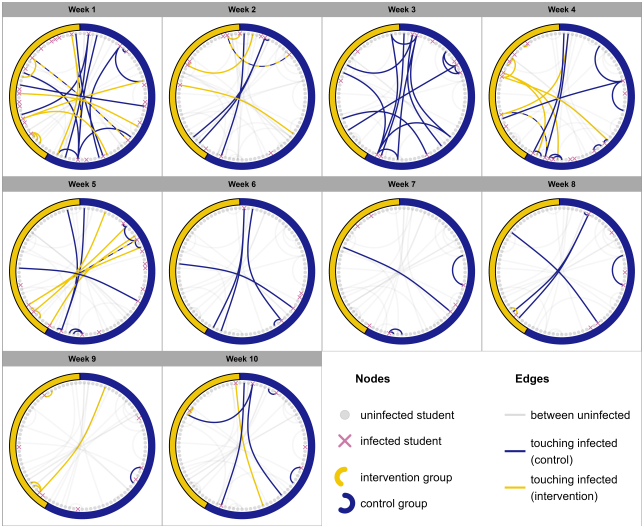


(93 out of 579 students with at least one infection)

eX-FLU Observed Data



eX-FLU Data Challenges

Humans
(complicated)
(and precious)

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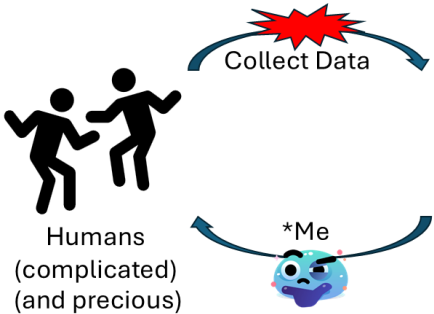
eX-FLU Data Challenges

1. Self-reported social contact data may **measured with error**



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2. Observations are **dependent**

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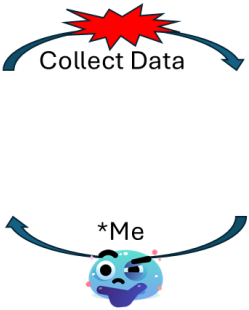

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NA	>100	L or H
NA	100	L or H
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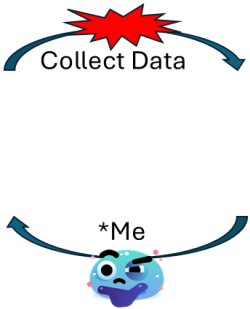
eX-FLU Data Challenges

1. Self-reported social contact data may **measured with error**
2. Observations are **dependent**
3. Presence of **interference**

Humans
(complicated)
(and precious)



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Thank you!

Questions?

Contact: brichson@ad.unc.edu

References I

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P.N. Zivich, M.C. Eisenberg, A.S. Monto, A. Uzicanin, R. S. Baric, T. P. Sheahan, J. J. Rainey, H. Gao, and A. E. Aiello. Transmission of viral pathogens in a social network of university students: the eX-FLU study. *Epidemiology and Infection*, 148:e267, 2020. ISSN 0950-2688, 1469-4409. doi: 10.1017/S0950268820001806. URL https://www.cambridge.org/core/product/identifier/S0950268820001806/type/journal_article.