Jesse Knight

Research Data Science Specialist, Mishra Lab
MAP Centre for Urban Health Solutions, Unity Health Toronto

2024.02
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Education

2019.09 – 2023.08 **PhD**, Institute of Medical Science, University of Toronto
- Supervisor: Sharmistha Mishra
- Thesis: Reexamining assumptions in compartmental models of HIV transmission

2015.09 – 2017.12 **MASc**, Engineering Systems & Computing, University of Guelph
- Supervisors: Graham Taylor & April Khademi
- Thesis: Voxel-wise image analysis for white matter hyperintensity segmentation

2011.09 – 2015.04 **BEng**, Biomedical, University of Guelph
- Mentor: Bob Dony
- Foci: medical image & signal processing, computational modelling, engineering design

Experience

RESEARCH

2023.09 – present **Research Data Science Specialist: Mathematical Modeler**, Mishra Lab, Unity Health Toronto

2020.06 – 2023.08 **Data Science Specialist: Mathematical Modeler** (part time)

2018.04 – 2019.09 **Data Science Specialist: Mathematical Modeler** (full time)
- Co-develop research questions with academic, public health, & community collaborators
- Lead & support transmission model design & implementation (R, Python, Matlab)
- Support timely epidemic response with model-based evidence (HIV, mpox, covid-19)
- Analyze epidemiologic data for model inputs & independent research questions (R)
- Present & provide feedback in seminars & meetings about ongoing work
- Lead & co-author abstracts, presentations, manuscripts, & grants

2015.06 – 2015.07 **Technician Assistant**, Summer Institute, Engineering World Health, Rwanda
- Worked with local technicians at Kibuye Hospital to repair medical equipment
- Pitched & supported engineering design projects at Guelph upon return

2014.05 – 2014.08 **Research Assistant**, Dr. Aviv, Dept. Medical Imaging, Sunnybrook Research Institute
- Project: Mapping the impact of collateral circulation in acute ischemic stroke
- Developed reproducible pipelines & tools for brain MRI analysis (Matlab)

2013.05 – 2013.08 **Research Assistant**, Dr. Eberl, Biophysics Interdept. Group, University of Guelph
- Project: A mass-balance model of the human anaerobic colon
- Designed & ran experiments on model sensitivity to numerical methods (Matlab)

MEMBERSHIPS

2023.03 – present **Member**, UNAIDS Reference Group on Estimates, Modelling, and Projections

2022.09 – present **Member**, Society for Medical Decision Making

2021.01 – present **Member**, Data Sciences Institute, University of Toronto

SERVICE & EXTRACURRICULAR

2020.11 – present **Maintainer**, ut-thesis: official LaTeX thesis document class for University of Toronto
- Rewrote from scratch to refine scope & add documentation; provide user support

2020.09 – 2023.08 **Mentor**, UofT IMS Mentorship Program (4 mentees)

2020.09 – 2022.02 **Reviewer**, SRSA Internal Peer Review Program (3 reviews)

2019.07 – 2021.12 **Website** (2019.07–) **& Exec Producer** (2020.07–), Raw Talk Podcast (1–10 h/wk)
- Built website from scratch; co-managed team of 30+ to produce 30-90 min episodes

2017.01 – 2017.03 **Faculty Hiring Committee**, Guelph School of Engineering (1 position)

2013.08 – 2016.12 **Engineering Peer Helper**, Guelph Engineering Peer Helpers (0–5 h/wk)
- Led problem-solving workshops & exam-review sessions for 1-100 students

TEACHING

2020.03 – 2023.08 **Workshop Lead & LaTeX Support**, University of Toronto Map and Data Library (paid)
Intro to LaTeX: 25 total workshops (1.5h)
Intermediate LaTeX: 15 total workshops (1.5h)

2015.09 – 2017.12 **Teaching Assistant**, Guelph School of Engineering (paid)
ENGG 4040 Medical Imaging Modalities: 2017.09–12, 2015.09–12
ENGG 4660 Medical Image Processing: 2017.01–04, 2016.01–04
ENGG 3410 Systems and Control Theory: 2017.01–04
ENGG 3390 Signal Processing: 2016.09–12
ENGG 4060 Biomedical Signal Processing: 2016.01–04
- Developed content & led weekly labs & tutorials for 5–80 students
- Marked 500+ student lab reports; revised lab manuals for 3 courses
- Gave 3 full lecturess during professor absences

CONTRACT

2020.01 – 2024.01 **Invoice Automation**, The Biglieri Group (Python)

2019.11 – 2023.05 **Typesetting**, Noēsis: U of T Undergraduate Journal of Philosophy, 4 volumes (LaTeX)

2021.03 – 2021.06 **Website**, IMS Magazine (Web)

ACADEMIC COMPETITIONS

2020.02 Pharmaco-Epi Data Analysis Challenge, ISPE UofT Chapter (2nd/3)

2017.09 WMH Segmentation Challenge, MICCAI 2017 (15th/20)

2016.10 MSSEG Challenge, MICCAI 2016 (4th/15)

MISCELLANEOUS PROJECTS

2020.12 DK Designs Website, an interior design small business (Web)

2019.07 Atom Filter Lines, a package for the Atom editor (RIP); 3000+ downloads (Web)

2018.02 EWH Repairs Database, a dashboard of medical equipment field repairs (Web)

2017.06 WMH Papers Table, an interactive table of research papers (Web)

Funding & Awards

GRANTS

2024.02 – 2025.01 **Co-Investigator**, NPI: Sharmistha Mishra $100,000
Catalyst Grant
Data Sciences Institute, University of Toronto
Examining biases due to confounders and colliders in observational health data using individual-based simulation models

2023.03 – 2024.02 **Co-Applicant**, NPI: Darrell H Tan $3,000,000
Team Grant: Monkeypox Rapid Research Response
Canadian Institutes of Health Research
Canada-Africa Monkeypox Partnership: Characterizing transmission dynamics and evaluating medical countermeasures to inform the clinical and public health response to Mpox

FELLOWSHIPS

CIHR Fellowship, (submitted) $100,000
Canadian Institutes of Health Research
Modelling the potential impact of addressing structural factors on transmission of HIV and elimination of AIDS among men who have sex with men in Sub-Saharan Africa

SCHOLARSHIPS

2022.09 – 2023.08 Queen Elizabeth II Graduate Scholarship in Science & Technology $15,000
Ontario Ministry of Colleges and Universities
Representing Female Sex Workers in Transmission Models of HIV in Sub-Saharan Africa

2019.09 – 2022.08 Canada Graduate Scholarship – Doctoral $105,000
Natural Sciences and Engineering Research Council of Canada
Impacts of heterogeneity on deterministic models of HIV epidemics in Southern Africa

2016.09 – 2017.08 Ontario Graduate Scholarship – Master's $15,000
Ontario Ministry of Colleges and Universities
FLAIR MRI: Template Development and Improved Automated Lesion Segmentation

2015.09 – 2016.08 Canada Graduate Scholarship – Master's $17,500
Natural Sciences and Engineering Research Council of Canada
FLAIR MRI: Template Development and Improved Automated Lesion Segmentation

AWARDS

2023 Student Leadership Award, University of Toronto
Outstanding student leadership, service, & commitment to the university

2022 Li Ka Shing Excellence Award, Unity Health Toronto $500
Embodies the values & advances the mission of UHT through research & leadership

2022 Open Fellowship Award, Institute of Medical Science, University of Toronto $5000
Academic excellence & progress towards degree completion

2022 Stephen Pauker Lusted Award, SMDM 44th North American Meeting $250
Outstanding presentation in quantitative methods & theoretical developments

2019 Entrance Award, Institute of Medical Science, University of Toronto $5000

2017 Engineering Teaching Assistant of the Year, University of Guelph

2015, 2016 Graduate Dean's Scholarship, College of Phys & Eng Science, University of Guelph $1125
Outstanding academic & research performance

2015, 2016 Engineering Peer Helper of the Year, University of Guelph

2015	E.B. MacNaughton Convocation Prize, University of Guelph *College nominee for the W.C. Winegard Medal: top overall convocation award*	
2015	Helen Grace Tucker Design Prize, University of Guelph *Best performance in engineering design courses, years 2–4*	$500
2015	Association of the Professional Engineers Medal, University of Guelph *Highest average all coursework in graduating year*	
2015	Society of Excellence, College of Phys & Eng Science, University of Guelph *Academic achievement & contributions to the U of G community*	
2013, 2014	Dean's Scholarship, University of Guelph	$1000
2011	Entrance Scholarship, University of Guelph	$2000

Publications

JOURNAL ARTICLES

1. Fanyu Xiu, Jorge Luis Flores Anato, Joseph Cox, et al. "Characteristics of the sexual networks of gay, bisexual, and other men who have sex with men in Montreal, Toronto, and Vancouver: implications for the transmission and control of mpox". *Journal of Infectious Diseases (JID)* (Apr. 2024). doi.org/10.1093/infdis/jiae033.
2. Mackenzie Hamilton, **Jesse Knight**, and Sharmistha Mishra. "Examining the influence of imbalanced social contact matrices in epidemic models". *American Journal of Epidemiology (AJE)* (Sept. 2023). doi.org/10.1093/aje/kwad185.
3. Korryn Bodner, **Jesse Knight**, Mackenzie Hamilton, and Sharmistha Mishra. "Testing whether higher contact among the vaccinated can be a mechanism for observed negative vaccine effectiveness". *American Journal of Epidemiology (AJE)* 192.8 (Mar. 2023), pp. 1335–1340. doi.org/10.1093/aje/kwad055.
4. **Jesse Knight**, Darrell H S Tan, and Sharmistha Mishra. "Maximizing the impact of limited vaccine supply under different early epidemic conditions: a 2-city modelling analysis of monkeypox virus transmission among men who have sex with men". *Canadian Medical Association Journal (CMAJ)* 194.46 (Nov. 2022), e1560–e1567. doi.org/10.1503/cmaj.221232.
5. **Jesse Knight**, Rupert Kaul, and Sharmistha Mishra. "Risk heterogeneity in compartmental HIV transmission models of ART as prevention in Sub-Saharan Africa: a scoping review". *Epidemics* 40 (Sept. 2022), p. 100608. doi.org/10.1016/j.epidem.2022.100608.
6. **Jesse Knight**, Huiting Ma, Amir Ghasemi, Mackenzie Hamilton, Kevin Brown, and Sharmistha Mishra. "Adaptive data-driven age and patch mixing in contact networks with recurrent mobility". *MethodsX* 9 (Jan. 2022), p. 101614. doi.org/10.1016/j.mex.2021.101614.
7. Sharmistha Mishra, Romain Silhol, **Jesse Knight**, Refilwe Phaswana-Mafuya, Daouda Diouf, Linwei Wang, Sheree Schwartz, Marie-Claude Boily, and Stefan D Baral. "Estimating the epidemic consequences of HIV prevention gaps among key populations". *Journal of the International AIDS Society (JIAS)* 24.S3 (July 2021), e25739. doi.org/10.1002/jia2.25739.
8. Linwei Wang, Nasheed Moqueet, Anna Simkin, et al. "Mathematical modelling of the influence of serosorting on the population-level HIV transmission impact of pre-exposure prophylaxis". *AIDS* 35.7 (June 2021), pp. 1113–1125. doi.org/10.1097/QAD.0000000000002826.
9. **Jesse Knight** and Sharmistha Mishra. "Estimating effective reproduction number using generation time versus serial interval, with application to Covid-19 in the Greater Toronto Area, Canada". *Infectious Disease Modelling* 5 (Oct. 2020), pp. 889–896. doi.org/10.1016/j.idm.2020.10.009.
10. **Jesse Knight**, Stefan D Baral, Sheree Schwartz, Linwei Wang, Huiting Ma, Katherine Young, Harry Hausler, and Sharmistha Mishra. "Contribution of high risk groups' unmet needs may be underestimated in epidemic models without risk turnover: a mechanistic modelling analysis". *Infectious Disease Modelling* 5 (July 2020), pp. 549–562. doi.org/10.48550/arXiv.2001.02744.

11. Linwei Wang, Nasheed Moqueet, Gilles Lambert, et al. "Population-level sexual mixing according to HIV status and preexposure prophylaxis use among men who have sex with men in Montreal, Canada: implications for HIV prevention". *American Journal of Epidemiology (AJE)* 189.1 (Oct. 2019), pp. 44–54. doi.org/10.1093/aje/kwz231.
12. Hugo J Kuijf, J Matthijs Biesbroek, Jeroen de Bresser, et al. "Standardized Assessment of Automatic Segmentation of White Matter Hyperintensities and Results of the WMH Segmentation Challenge". *IEEE Transactions on Medical Imaging* 38.11 (Mar. 2019), pp. 2556–2568. doi.org/10.1109/TMI.2019.2905770.
13. **Jesse Knight**, Graham Taylor, and April Khademi. "Voxel-Wise Logistic Regression and Leave-One-Source-Out Cross Validation for white matter hyperintensity segmentation". *Magnetic Resonance Imaging* 54 (Dec. 2018), pp. 119–136. doi.org/10.1016/j.mri.2018.06.009.
14. Olivier Commowick, Audrey Istace, Michael Kain, et al. "Objective evaluation of multiple sclerosis lesion segmentation using a data management and processing infrastructure". *Scientific Reports* 8.1 (Sept. 2018), p. 13650. doi.org/10.1038/s41598-018-31911-7.
15. **Jesse Knight**, Graham W Taylor, and April Khademi. "Equivalence of histogram equalization, histogram matching and the Nyul algorithm for intensity standardization in MRI". *Journal of Computational Vision and Imaging Systems* 3.1 (Oct. 2017). doi.org/10.15353/vsnl.v3i1.170.
16. Dan C Huynh, Mark W Parsons, Max Wintermark, et al. "Can CT perfusion accurately assess infarct core?" *Neurovascular Imaging* 2.1 (Mar. 2016), p. 7. doi.org/10.1186/s40809-016-0018-1.
17. Evgenia Maria Fanou, **Jesse Knight**, Richard I Aviv, Seyed-Parsa Hojjat, Sean P Symons, Lining Zhang, and Max Wintermark. "Effect of collaterals on clinical presentation, baseline imaging, complications, and outcome in acute stroke". *American Journal of Neuroradiology (AJNR)* 36.12 (Dec. 2015), pp. 2285–2291. doi.org/10.3174/ajnr.A4453.

ARTICLES IN PREPARATION

1. **Jesse Knight**, Siyi Wang, and Sharmistha Mishra. "Adjusting for hidden biases in sexual behaviour data: a mechanistic approach". *medRxiv* (preprint). doi.org/10.1101/2023.08.16.23294164.
2. **Jesse Knight**, Huiting Ma, Bheki Sithole, et al. "Quantifying the impact of cascade inequalities: a modelling study on the prevention impacts of antiretroviral therapy scale-up in Eswatini". *Lancet HIV* (submitted). github.com/mishra-lab/hiv-model-eswatini/tree/master/docs/art.
3. Katherine Rucinski, **Jesse Knight**, Kalai Willis, et al. "Big data science to address health inequities and focus the HIV response across Sub-Saharan Africa". *Current HIV/AIDS Reports* (with co-authors).
4. **Jesse Knight** and Sharmistha Mishra. "Beyond instantaneous partnerships in compartmental models of HIV transmission: re-examining assumptions and a new incidence equation". *TBD* (drafting). github.com/mishra-lab/hiv-model-eswatini/tree/master/docs/foi.

CONFERENCES (SELECTIVE)

1. Fanyu Xiu, Jorge Luis Flores Anato, Joseph Cox, et al. "Characteristics of the sexual networks of gay, bisexual, and other men who have sex with men in Montréal, Toronto, and Vancouver: implications for the transmission and control of mpox in Canada". *Oral: International Conference on Infectious Disease Dynamics (Epidemics)*. Vol. 9. Nov. 2023. elsevier.com/events/conferences/all/international-conference-on-infectious-disease-dynamics.
2. Ruth Mwatelah, **Jesse Knight**, Huiting Ma, et al. "Developing a screening tool to reach men who have sex with men living with undiagnosed HIV in Kenya". *Poster: Canadian Conference on HIV/AIDS Research (CAHR)*. Apr. 2023. www.cahr-acrv.ca/conference/.
3. **Jesse Knight** and Sharmistha Mishra. "Beyond instantaneous partnerships: capturing partnership-level herd effects in compartmental models of sexually transmitted infections". *Poster: Society for Medical Decision Making North American Meeting (SMDM)*. Vol. 44. Nov. 2022. www.smdmmeeting.org/.
4. Mackenzie Hamilton, **Jesse Knight**, and Sharmistha Mishra. "Failure to balance social contact matrices can bias models of SARS-CoV-2 transmission". *Poster: Society for Medical Decision Making North American Meeting (SMDM)*. Vol. 44. Nov. 2022. www.smdmmeeting.org/.

5. **Jesse Knight**, Huiting Ma, Amir Ghasemi, Mackenzie Hamilton, Kevin Brown, and Sharmistha Mishra. "Contact patterns by age and geography with recurrent mobility: influence of relaxing assumptions". *Poster: International Conference on Infectious Disease Dynamics (Epidemics)*. Vol. 8. Nov. 2021. elsevier.com/events/conferences/all/international-conference-on-infectious-disease-dynamics.
6. **Jesse Knight** and Sharmistha Mishra. "Importance of high risk groups may be further underestimated without simulated turnover in STI epidemics with assortative mixing". *Poster: Canadian Student Health Research Forum*. Aug. 2020. umanitoba.ca/outreach/conferences/research˙days/.
7. Linwei Wang, Nasheed Moqueet, Anna Simkin, et al. "Influence of serosorting on the population-level HIV transmission impact of pre-exposure prophylaxis (PrEP) among men who have sex with men (MSM): a mathematical modeling study". *Poster: AIDS*. July 2020. programme.aids2020.org/Abstract/Abstract/5283.
8. Linwei Wang, Nasheed Moqueet, Gilles Lambert, et al. "Quantifying sexual mixing by HIV status and Pre-Exposure Prophylaxis (PrEP) use among men who have sex with men". *Poster: STI & HIV 2019 World Congress (ISSTDR)*. July 2019. doi.org/10.1136/sextrans-2019-sti.592.
9. **Jesse Knight**, Linwei Wang, Huiting Ma, Sheree Schwartz, Stefan Baral, and Sharmistha Mishra. "The influence of risk group turnover in STI/HIV epidemics: mechanistic insights from transmission modeling". *Oral: STI & HIV 2019 World Congress (ISSTDR)*. July 2019. doi.org/10.1136/sextrans-2019-sti.214.
10. **Jesse Knight**, Huiting Ma, Stefan D Baral, et al. "Who is left in 10-10-10? Importance of reaching key populations with the HIV cascade". *Poster: Conference on Retroviruses and Opportunistic Infections (CROI)*. Mar. 2019. croiconference.org/sessions/who-left-10-10-10.
11. **Jesse Knight**, Graham W Taylor, and April Khademi. "Voxel-Wise Logistic Regression for white matter hyperintensity segmentation in FLAIR MRI". *Competitor: WMH Segmentation Challenge at MICCAI (MICCAI)*. Sept. 2017. wmh.isi.uu.nl/#˙Toc122355715.
12. **Jesse Knight** and April Khademi. "MS lesion segmentation using FLAIR MRI only". *Competitor: MSSEG Challenge at MICCAI (MICCAI)*. Oct. 2016. www.hal.inserm.fr/inserm-01397806.
13. Seyed-Parsa Hojjat, **Jesse Knight**, Dan C Huynh, Daniel Eftekhari, Rita Vitorino, David Gladstone, Sean P Symons, and Richard I Aviv. "Topographic mapping of collateral impacts: effect of occlusion location and recanalization status in acute ischemic stroke". *Oral: Canadian Stroke Congress*. Sept. 2016. doi.org/10.1177/1747493016659793.
14. **Jesse Knight**, Alan R Moody, and April Khademi. "Noise in parallel MRI: how to determine whether single-coil assumptions still hold (they don't)". *Poster: Imaging Network Ontario Symposium (ImNO)*. Mar. 2016. doi.org/10.13140/RG.2.2.11028.91527.

* Competitor: trained model on challenge dataset; containerized model for blinded evaluation by organizers; drafted methods abstract; presented methods at challenge day; discussed challenge results at roundtable.

PRESENTATIONS (INVITED & NON-REVIEWED)

1. **Jesse Knight**. "Beyond instantaneous partnerships: re-examining the force of infection equation in compartmental HIV transmission models". *Seminar: Colloquium on Mathematics for Public Health*. Feb. 2024.
2. **Jesse Knight**. "Adjusting for Biases in Sexual Behaviour Data". *Seminar: Dry Bench Seminar, Unity Health Toronto Research Training Center*. Nov. 2023.
3. **Jesse Knight** and Korryn Bodner. "Introduction to infectious disease modelling". *Guest Lecture: HAD5738 Advanced Methods for Economic Evaluation, University of Toronto*. June 2023.
4. **Jesse Knight**. "Beyond instantaneous partnerships: re-examining the force of infection equation in compartmental HIV transmission models". *Seminar: HIV Modelling Consortium*. May 2023.
5. Sharmistha Mishra, **Jesse Knight**, Trystan Leng, et al. "Methods for Key Populations Indicators". *Proposal: UNAIDS Reference Group on Estimates, Modelling, and Projections*. May 2023.
6. **Jesse Knight**, Linwei Wang, Oliver Gatalo, Huiting Ma, and Sharmistha Mishra. "Mpox network transmission modelling". *Meeting: Toronto Public Health*. Sept. 2022.
7. **Jesse Knight**. "Mixing by patch & age with recurrent mobility for Covid-19". *Seminar: Canadian Network for Modelling Infectious Diseases*. Sept. 2022.

8. **Jesse Knight**. "Compartmental modelling of infection transmission at scale applied to Eswatini". *Seminar: Thursday Seminar Series, Vector Institute*. July 2022.
9. Sharmistha Mishra, **Jesse Knight**, Oliver Gatalo, and Darrell HS Tan. "Mpox mathematical modeling". *Meeting: Ontario Mpox Community Mobilization*. June 2022.
10. **Jesse Knight** and Sharmistha Mishra. "Heterosexual HIV transmission in Eswatini: a descriptive modelling analysis". *Poster: IMS Scientific Day*. May 2022.
11. **Jesse Knight**. "Table 1 for transmission models: plots to describe simulated epidemics with multiple risk groups and contact types". *Seminar: Dry Bench Seminar, Unity Health Toronto Research Training Center*. Mar. 2022.
12. Korryn Bodner, **Jesse Knight**, Mackenzie Hamilton, and Sharmistha Mishra. "Introduction to infectious disease modelling". *Guest Lecture: HAD5738 Advanced Methods for Economic Evaluation, University of Toronto*. Feb. 2022.
13. **Jesse Knight**. "Mixing by Patch & age with recurrent mobility for Covid-19". *Seminar: MfPH Next Generation Seminar Series*. Nov. 2021.
14. **Jesse Knight** and Sharmistha Mishra. "Time between infections versus time between symptom onset in Covid-19: implications for estimating the reproduction number". *Seminar: Canadian Society of Applied and Industrial Mathematics Annual Meeting (CAIMS) Mini-Symposium: Mathematical modeling of Covid-19 transmission and mitigation strategies*. June 2021.
15. **Jesse Knight**. "White matter lesion segmentation: hyperparameter optimization for false positive reduction in FLAIR MRI". *Seminar: Guelph Engineering Society Graduate Engineering Symposium*. Mar. 2016.
16. **Jesse Knight**. "Engineering equipment design for the developing world". *Guest Lecture: ENGG 3100 Engineering Design III, University of Guelph*. Jan. 2016.
17. **Jesse Knight**. "Mapping collateral impacts: regional sparing in acute ischemic stroke". *Poster: Sunnybrook Research Institute Summer Research Project Day*. Aug. 2014.

BOOK CHAPTERS

1. **Jesse Knight** and Sharmistha Mishra. "Contact Matrices in Compartmental Disease Transmission Models". *Mathematics of Public Health*. Ed. by Jummy David and Jianhong Wu. Springer Nature, Dec. 2023, pp. 87–110. doi.org/10.1007/978-3-031-40805-2.
2. Brittany Reiche, **Jesse Knight**, Alan R Moody, and April Khademi. "Segmentation and Characterization of WML in FLAIR MRI". *Medical Image Analysis and Informatics: Computer-aided Diagnosis and Therapy*. Ed. by Paulo Mazzoncini de Azevedo Marques, Arianna Mencattini, Marcello Salmeri, and Rangaraj M Rangayyan. Vol. 2. CRC Press, Nov. 2017, pp. 1–28. doi.org/10.1201/9781351228343.
3. **Jesse Knight** and April Khademi. "Disease-Inspired Feature Design for Computer-Aided Diagnosis of Breast Cancer Digital Pathology Images". *Medical Image Analysis and Informatics: Computer-aided Diagnosis and Therapy*. Ed. by Paulo Mazzoncini de Azevedo Marques, Arianna Mencattini, Marcello Salmeri, and Rangaraj M Rangayyan. Vol. 2. CRC Press, Nov. 2017, pp. 427–450. doi.org/10.1201/9781351228343.

THESES

1. **Jesse Knight**. "Reexamining Assumptions in Compartmental Models of Heterosexual HIV Transmission applied to Eswatini". Doctor of Philosophy. University of Toronto, Nov. 2023. hdl.handle.net/1807/129897.
2. **Jesse Knight**. "Voxel-Wise Image Analysis for White Matter Hyperintensity Segmentation". Master of Applied Science. University of Guelph, Apr. 2018. hdl.handle.net/10214/12142.

REVIEWER SERVICE

2024.01 – present (1) Scientific Reports
2022.10 – present (5) Epidemiology & Infection
2021.04 – present (1) Annals of Epidemiology
2020.08 – 2023.05 (5) Canadian Medical Association Journal Open

2018.05 – 2021.03 (9) Journal of Digital Imaging

2017.04 (1) IEEE International Humanitarian Technology Conference

2015.11 – 2016.09 (2) Canadian Journal of Electrical and Computer Engineering

2016.02 (2) Canadian Conference of Electrical and Computer Engineering

Media & Science Communication

ARTICLES (INTERVIEWED)

2022.12 New Model Aims to Aid Monkeypox Vaccine Distribution, Medscape

2022.09 Toronto Monkeypox Studies Suggest Ways to Reduce Viral Spread, U of T Medicine Dean's Report

2022.09 Science Literacy Week 2022: Meet two mathematical modellers, U of T Emerging & Pandemic Infections Consortium

2022.01 Raw Talk Podcast Celebrates 100th Episode with Insulin 100, IMS Magazine

2020.12 Thanks to Alumni Support, Raw Talk Podcast Tells Powerful Stories About The Science of Medicine, U of T Alumni Website

PODCASTS

Guest

2023.04 Maximizing the impact of limited vaccine supply under different early mpox epidemic conditions, Mod4PH Research Highlights

Producer, Raw Talk Podcast

2022.02 #104 A New Era of Knowledge: Science on Social Media

2021.10 #100 Years Later: Insulin and Beyond

2021.09 #98 Podium Pills: Fame or Folly?

2021.09 #97 Let's Talk Grad School

2021.05 #96 Genetic Testing: What it Means for Families and the Future

2021.04 #94 Child Maltreatment: Healing and Breaking the Cycle

2021.03 #92 Producing and Pricing Drugs in Canada

2021.02 #90 Anti-Black Racism in Healthcare

2021.01 #88 Tuberculosis: The Forgotten Pandemic

2020.12 #86 Global Health

2020.11 #84 Passports and Procedures: Receiving and Providing Care Abroad

2020.10 #82 Making Strides: Amputation and Prosthetics

2020.09 #80 COVID Decoded: Science and Society in the New Normal

Show Host, Raw Talk Podcast

2020.02 #74 Outbreak Transmission: When Diseases Go Viral

2020.01 #72 Burning Up: The Health Impacts of Climate Change

EVENTS

2021.06 Our Health on Thin Ice, **Tech & Content Co-Lead**, Raw Talk Podcast & U of T Talks
Two panel discussions on climate change & health

2021.02 Podcast Festival, **Tech & Content Co-Lead**, Raw Talk Podcast
Virtual 2-day conference on podcasting & science communication

2020.06 COVID Decoded, **Co-Host & Content**, Raw Talk Podcast
Live-streamed 8-part 1-hour YouTube series on COVID-19 topics

Skills & Research Interests

SKILLS

- **Code, Advanced:** Python: Numpy, SciPy, Matplotlib; LaTeX
- **Code, Intermediate:** R: base, ggplot, JAGS; Matlab; bash; Git; web: Bootstrap, Jinja, jQuery
- **Analysis:** transmission modelling, differential equations, optimization, infectious disease epidemiology
- **Research:** systematic review, experiment design, data management, visualization, writing, reviewing

RESEARCH INTERESTS

- **Mathematical Disease Modelling:** influence of model structure & assumptions on outputs; sensitivity & uncertainty analysis; new models of epidemiological phenomena; simulation-based study design validation
- **Infectious Disease Modelling:** risk heterogeneity & contact patterns; highly stratified compartmental models; individual-based models; dynamic network-based models
- **HIV & STI Modelling:** complex sexual networks; men who have sex with men; sex work; sexual life course; intervention equity & impact estimation; qualitative insights; combating stigma
- **Data Science:** intuitive visualization; bias identification & adjustment; Bayesian methods; optimization; parallel computing; reusable & open-source code