

LINYING ZHANG

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EDUCATION

Columbia University 2018 - 2023

PhD in Biomedical Informatics

Advisors: George Hripcsak and David Blei

Thesis: Causal machine learning for reliable real-world evidence generation in healthcare.

Harvard University 2016 - 2018

MS in Computational Biology and Quantitative Genetics

Advisor: Giovanni Parmigiani

Thesis: Interactions between multiple myeloma cells and bone marrow stromal cells impact epigenetic profiles of multiple myeloma.

Boston University 2011 - 2014

BA with Honors (*Summa Cum Laude*) in Biochemistry and Molecular Biology

Advisor: Ulla Hansen

Thesis: Establishing hepatocellular carcinoma cell lines with inducible expression of degradable LSF to investigate LSF regulation in cell cycle.

APPOINTMENT

Washington University in St. Louis October 2023 - Present

Assistant Professor of Biostatistics

Institute for Informatics, Data Science, and Biostatistics (I2DB)

PUBLICATIONS

1. **Zhang L**, Richter LR, Kim T, Hripcsak G. Evaluating and improving performance and racial fairness of algorithms for GFR estimation. *IEEE International Conference on Artificial Intelligence × Medicine, Health, and Care (AIMHC)*, 2024.
2. **Zhang L**, Richter LR, Wang Y, Ostropolets A, Elhadad N, Blei DM, Hripcsak G. Causal fairness assessment of treatment allocation with electronic health records. *Journal of Biomedical Informatics*, 2023. [Accepted]
3. **Zhang L**, Wang Y, Schuemie MJ, Blei DM, and Hripcsak G. Adjusting for indirectly measured confounding using large-scale propensity score. *Journal of Biomedical Informatics*, 2022.
4. **Zhang L**, Wang Y, Ostropolets A, Mulgrave JJ, Blei DM, and Hripcsak G. The medical deconfounder: Assessing treatment effects with electronic health records. *Machine Learning for Healthcare Conference (MLHC)*, 2019.
5. Song W, Liu L, Rice H, Sainlaire M, Min L, **Zhang L**, Thai T, Kang MJ, Li S, Tejeda C, Lipsitz S, Samal L, Carroll D, Adkison L, Herlihy L, Ryan V, Bates D, Latham N, Dykes P. From traditional fall injury risk screening to a temporal machine learning-based approach: improving algorithm generalizability and clinical action. *Journal of the American Geriatrics Society*, 2024.
6. Ostropolets A, Albogami Y, Conover M, Banda JM, Baumgartner WA Jr, Blacketer C, Desai P, DuVall SL, Fortin S, Gilbert JP, Golozar A, Ide J, Kanter AS, Kern DM, Kim C, Lai L.Y.H, Li C, Liu F,

- Lynch K.E, Minty E, Ins Neves M, Ng DQ, Obene T, Pera V, Pratt N, Rao G, Rappoport N, Reinecke I, Saroufim P, Shoaibi A, Simon K, Suchard MA, Swerdel JN, Voss EA, Weaver J, **Zhang L**, Hripcsak G, and Ryan PB. Reproducible Variability: Assessing investigator discordance across nine research teams attempting to reproduce the same observational study. *JAMIA*, 2023.
7. Richter LR, Albert BI, **Zhang L**, Ostropolets A, Zitsman JL, Fennoy I, Albers D, Hripcsak G. Data assimilation on mechanistic models of glucose metabolism predicts glycemic states in adolescents following bariatric surgery. *Frontiers in Physiology*, 2022.
 8. Song W, **Zhang L**, Liu L, Sainlaire M, Karvar M, Kang M, Pullman A, Lipsitz S, Massaro A, Patil N, Jasuja R, Dykes PC. Predicting hospitalization of COVID-19 positive patients using clinician-guided machine learning methods. *JAMIA*, 2022.
 9. Song W, Kang MJ, **Zhang L**, Jung W, Song J, Bates DW, Dykes PC. Predicting pressure injury using nursing assessment phenotypes and machine learning methods. *JAMIA*, 2021.
 10. Ostropolets A, **Zhang L**, and Hripcsak G. A scoping review of clinical decision support tools that generate new knowledge to support decision making in real time. *JAMIA*, 2020.
 11. Ostropolets A, Chen R, **Zhang L**, and Hripcsak G. Characterizing physicians information needs related to a gap in knowledge unmet by current evidence. *JAMIA Open*, 2020.
 12. Gottesman O, Johansson F, Meier J, Dent J, Lee D, Srinivasan S, **Zhang L**, Ding Y, Wihl D, Peng X, Yao J, Lage I, Mosch C, Lehman L.H, Komorowski M, Faisal A, Celi L, Sontag D, and Doshi-Velez F. Evaluating reinforcement learning algorithms in observational health settings. *arXiv preprint*, 2018.

CONFERENCE ABSTRACTS (PEER-REVIEWED)

1. **Zhang L**, Jiang X, Natarajan K, Hripcsak G. Building causally explainable fair learning health system. In *Symposium on Artificial Intelligence in Learning Health Systems (SAIL)*, 2024. [Poster]
2. **Zhang L**, Jiang X, Natarajan K, Hripcsak G. Explaining Treatment Disparities from a Causal Perspective with EHRs. In *AMIA Annual Symposium*, 2023. [Presentation]
3. Schuemie M, Suchard MA, Nishimura A, **Zhang L**, Hripcsak G. Evaluating confounding adjustment when sample size is small. In *OHDSI Global Symposium*, 2023. [Poster]
4. Sena AG, Reps J, Kim C, Brewster J, Black A, **Zhang L**, Cook M, Phuc PH, Suchard MA. Save Our Sisypheus Challenge: Lessons learned from Strategus execution on the OHDSI Network. In *OHDSI Global Symposium*, 2023. [Presentation]
5. Song W, Liu L, Sainlaire M, Cho S, Furlong D, Gilles-Fowler W, Herlihy L, Kang M.J, Lipsitz S, Melanson B, Massaro J, Martel T, Wolski P, **Zhang L**, Dykes P. An EHR-based Comparative Analysis of the Distribution of Pressure Injury Anatomical Locations and Stages and Associated Disparities Across a Large Healthcare System. In *AMIA Annual Symposium*, 2023. [Presentation]
6. **Zhang L**, Richter LR, Wang Y, Ostropolets A, Elhadad N, Blei DM, and Hripcsak G. A Bayesian causal inference approach for assessing fairness in clinical decision-making. In *Algorithmic Fairness through the Lens of Causality and Privacy Workshop, NeurIPS*, 2022. [Poster]
7. **Zhang L**, Richter LR, Blei DM, Wang Y, Ostropolets A, Elhadad N, and Hripcsak G. Assessing racial fairness of dialysis allocation in end-stage renal disease. In *OHDSI Global Symposium*, 2022. [Presentation]
8. **Zhang L**, Richter LR, Hripcsak G. Assessing the impact of race on glomerular filtration rate (GFR) prediction. In *OHDSI Global Symposium*. 2021. [Presentation]

9. Song W, **Zhang L**, Sainlaire M, Karvar M, Kang M, Pullman A, Massaro A, Patil N, Jasuja R, Dykes PC. Predicting hospitalization of COVID-19 positive patients using machine learning methods. In *AMIA Annual Symposium*. 2021. [Presentation]
10. **Zhang L**, Wang Y, Ostropolets A, Chen R, Blei DM, and Hripcsak G. The Multi-Outcome Medical Deconfounder: Assessing Treatment Effects on Multiple Renal Measures. In *AMIA Annual Symposium*. 2020. [Poster]
11. **Zhang L**, Wang Y, Ostropolets A, Chen R, Blei DM, and Hripcsak G. The multi-outcome medical deconfounder: assessing treatment effects on multiple renal measures. In *OHDSI Global Symposium*. 2020. [Poster]
12. Chen R, Schuemie M, Suchard M, Ostropolets A, **Zhang L**, Ryan P, Hripcsak G. Evaluation of large-scale propensity score modeling and covariate balance on potential unmeasured confounding in observational research. In *AMIA Annual Symposium*. 2020. [Poster]
13. **Zhang L**, Wang Y, Ostropolets A, Mulgrave JJ, Blei DM, and Hripcsak G. The medical deconfounder: assessing treatment effects with electronic health records. In *Women in Machine Learning (WiML) Workshop*. Vancouver, Canada. 2019. [Poster]
14. **Zhang L**, Wang Y, Ostropolets A, Mulgrave JJ, Blei DM, and Hripcsak G. The medical deconfounder: assessing treatment effects with electronic health records. In *Machine Learning for Health Workshop*. Vancouver, Canada. 2019. [Poster]
15. Ostropolets A, **Zhang L**, Mulgrave JJ, Hripcsak G. Investigating female-male differences in risk factors for myocardial infarction using OHDSI tools. In *AMIA Annual Symposium*. 2019. [Poster]
16. Song W, **Zhang L**, E. Gill, J.Z. Liu, A. Wright. Personalized treatment for type 2 diabetes using weighted k-nearest neighbors. In *AMIA Annual Symposium*. 2019. [Poster]
17. Szalat R, Samur MK, Ott CJ, Lawlor M, Epstein C, Abraham BJ, Lin CY, **Zhang L**, Prabhala R, Farrell N, Wes K, Tai YT, Fulciniti M, Parmigiani G, Young RA, Anderson KC, and Munshi NC. Integrative oncogenomic analysis combining whole genome, transcriptome and epigenome identifies altered chromatin accessibility landscape in multiple myeloma. In *American Society of Hematology Annual Meeting*. 2018. [Presentation]
18. **Zhang L**, Samur MK, Szalat R, Epstein CB, Prabhala R, Fulciniti M, Munshi NC.*, Parmigiani G.*. Interactions between multiple myeloma cells and bone marrow stromal cells impact epigenetic profiles of multiple myeloma. In *Program in Quantitative Genomics Conference*. Boston, MA. 2017. [Poster]
19. **Zhang L**, Samur MK, Szalat R, Epstein CB, Prabhala R, Fulciniti M, Munshi NC.*, Parmigiani G.*. Interactions between multiple myeloma cells and bone marrow stromal cells impact epigenetic profiles of multiple myeloma. In *Dana-Farber/Harvard Cancer Center Celebration of Junior Investigators*. Boston, USA. 2017. [Poster]

INVITED TALKS

Washington University in St. Louis

2024

Institute for Informatics, Data Science, and Biostatistics

Reliable real-world evidence with EHR

International Chinese Statistical Association (ICSA) International Conference

2023

Adjusting for indirectly measured confounding using large-scale propensity score

University of Colorado School of Medicine	2023
<i>Department of Biomedical Informatics</i>	
Improving the Reliability of Real-World Evidence Generation from Large-Scale Observational Data	
Ohio State University College of Medicine	2023
<i>Department of Biomedical Informatics</i>	
Improving the Reliability of Real-World Evidence Generation from Large-Scale Observational Data	
Vanderbilt University	2023
<i>Department of Biomedical Informatics</i>	
Improving the Reliability of Real-World Evidence Generation from Large-Scale Observational Data	
Washington University in St. Louis	2023
<i>Institute for Informatics, Data Science, and Biostatistics</i>	
Improving the Reliability of Real-World Evidence Generation from Large-Scale Observational Data	
Northeastern University	2023
<i>Department of Health Sciences</i>	
Improving the Reliability of Real-World Evidence Generation from Large-Scale Observational Data	
OHDSI Global Symposium	2022
When does statistical equality meet health equity: developing analytical pipelines to compare associational and causal fairness in their application to EHR data.	
OHDSI Global Symposium	2022
<i>Health Equity Work Group</i>	
Evaluating and improving performance and racial fairness of algorithms for GFR estimation.	
OHDSI Global Symposium	2022
<i>Population-Level Estimation Work Group</i>	
Adjusting for indirectly measured confounding using large-scale propensity score.	
Columbia University	2021
<i>Department of Biomedical Informatics</i>	
Algorithmic fairness in medicine: A case study in glomerular filtration rate (GFR) prediction.	
OHDSI Health Equity Work Group Monthly Meeting	2021
Assessing the impact of race on glomerular filtration rate (GFR) prediction.	
Columbia University	2020
<i>Department of Biomedical Informatics</i>	
Adjusting for unobserved confounding using large-scale propensity score.	
AMIA Annual Symposium	2020
<i>Causal Inference Panel</i>	
The medical deconfounder: assessing treatment effects with electronic health records.	
University of Pennsylvania School of Medicine	2020
<i>SC-TRM Working Group Meeting</i>	
The medical deconfounder: assessing treatment effects with electronic health records.	

AWARDS

• OHDSI Best Community Contribution Award in Methodological Research.	2022
• Women in Machine Learning Travel Award.	2019
• Senior Book Award. Boston University Department of Biology.	2014

- Dean's List. Boston University College of Arts and Sciences. 2011,2012,2013, 2014

PROFESSIONAL ACTIVITIES

Conference & Workshop Organizing

- Co-chair, I2BD Annual Symposium 2024
- Committee member, IEEE Conference on AI x Medicine, Health, and Care (AIMHC) 2024
- Session chair, Machine Learning for Health (ML4H) Symposium 2023
Causality in Health AI Research Roundtable
- Session chair, AMIA Symposium 2023
Precision Medicine and Disease Subtyping

Grant Reviewing

- Reviewer, Patient-Centered Outcomes Research Institute (PCORI) 2024-Present

Journal & Conference Reviewing

- JAMIA Open. 2024-Present
- Journal of Biomedical Informatics (JBI). 2023-Present
- Journal of Medical Internet Research (JMIR). 2023-Present
- Health Informatics Journal. 2022-Present
- Applied Clinical Informatics Journal. 2022-Present
- Machine Learning for Healthcare (MLHC). 2020, 2022
- AMIA Annual Symposium. 2022
- International Conference on Machine Learning (ICML). 2020
- Women in Machine Learning (WiML) Workshop. 2019
- Machine Learning for Health (ML4H) Workshop. 2019, 2020

Mentoring & Volunteering

- Mentor, AMIA Annual Symposium Career Development for Women Event. 2022
- Mentor, Columbia DBMI Summer Research Program. 2022
- Volunteer, OHDSI Global Symposium. 2022
- Volunteer, NeurIPS. 2022

TEACHING EXPERIENCE

- Computational Methods. *Columbia University*. Spring 2020
- Computer Applications in Health Care and Biomedicine. *Columbia University*. Fall 2019
- Principles of Biostatistics I&II. *Harvard T.H.Chan School of Public Health*. Summer 2017
- General Physics I&II. *Boston University*. 2012-2013

MENTORING & ADVISING

- Committee member, Hsin Yi (Cindy) Chen, PhD student
Columbia University Department of Biomedical Informatics 2023-present
- Committee member, Jenny Ji, MD student
Washington University School of Medicine in St. Louis 2023-present

UNIVERSITY SERVICE

- Member, Biomedical Informatics and Data Science (BIDS) PhD Admission Committee
Washington University School of Medicine in St. Louis 2023-present