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Professional Experience

2016- CARNEGIE MELLON UNIVERSITY
Assistant Professor, Department of Statistics & Data Science, Dietrich College.
Courtesy Faculty, Schools of Public Policy & Information Systems, Heinz College. (2017-present)

Education

2012-2016 UNIVERSITY OF PENNSYLVANIA
Ph.D. in Biostatistics. (Advisor: Dylan Small. Co-advisor: Marshall Joffe.)
Dissertation: “Doubly robust causal inference with complex parameters”.

2013-2014 THE WHARTON SCHOOL, UNIVERSITY OF PENNSYLVANIA
M.A. in Statistics. (Advisors: Marshall Joffe, Dylan Small.)
Thesis: “Optimal restricted estimation for more efficient longitudinal causal inference”.

2007-2009 UNIVERSITY OF MICHIGAN
M.S. in Biostatistics. (Advisor: Jeremy Taylor.)

2003-2007 UNIVERSITY OF PENNSYLVANIA
B.A. *magna cum laude* in Mathematics, with a minor in Statistics.

Other Experience & Training

2012-2016 *Research & Teaching Assistant*, Department of Biostatistics, University of Pennsylvania
Grant support: “Selective and future ignorability in causal inference” (NIH R01-DK090385).

2010-2012 *Research Health Science Specialist*, Ann Arbor VA Center for Clinical Management Research
Duties: statistical analysis and consulting for research in critical care medicine and patient safety.

2010-2011 *Statistical Consultant*, University of Michigan Law School
Research area: wrongful convictions. Supervisors: J.J. Prescott, Brandon Garrett, Samuel Gross.

2008-2010 *Research Assistant*, Department of Biostatistics, University of Michigan
Grant support: “PSA-based early detection of prostate cancer recurrence” (NIH CA-110518).

2006 *Student Trainee*, NHLBI Summer Institute for Training in Biostatistics, University of Wisconsin

2005 *Research Fellow*, NSF Summer Program in Computational Biology, University of Maryland

Awards & Honors

Academic & Research

- 2016 Saul Winegrad Award for outstanding dissertation, University of Pennsylvania
- 2013 Jonathan Raz Award for best performance on qualifying exam, University of Pennsylvania
- 2012 Superior Performance Award, Ann Arbor VA Center for Clinical Management Research
- 2007 Regents' Fellowship, University of Michigan
- 2004 Eric Palace Scholarship, University of Pennsylvania
- 2003 Trustee Scholarship, University of Pennsylvania

Conference Research

- 2017 David P. Byar Young Investigator Award, *Joint Statistical Meetings*
- 2016 Young Statistician Showcase Award, *International Biometric Conference*
- 2016 Young Researcher Award, *Conference of the International Society for Nonparametric Statistics*
- 2016 JSM Student Paper Award (Health Policy Statistics Section), *Joint Statistical Meetings*
- 2015 Ten Have Award for exceptional causal inference research, *Atlantic Causal Inference Conference*
- 2015 ENAR Distinguished Student Paper Award, *International Biometric Society ENAR Spring Meeting*
- 2014 Deming Student Scholar Award, *Deming Conference on Applied Statistics*

Conference Travel

- 2016 Travel Award, Institute of Mathematical Statistics
- 2015 Research Travel Grant, University of Pennsylvania Graduate and Professional Student Assembly
- 2015 NSF Travel Award, *Sackler Colloquium on Drawing Causal Inference from Big Data*
- 2014 NSF Travel Award, *Conference on Observational Studies, Complex Surveys, and Big Data*

Grants & Funding

- 2017-2021 Canadian Institutes of Health Research Project Grant (Co-Investigator)
Title: "Evaluating treatment effect heterogeneity and optimal regimens in multidrug resistant tuberculosis using causal inference modeling" (PI: Mireille Schnitzer, Andrea Benedetti)
- 2017-2018 Carnegie Mellon University Berkman Faculty Development Grant (Principal Investigator)
Title: "Nonparametric methods for high-dimensional capture-recapture designs"
- 2017 University of Pittsburgh CTSI Biomedical Modeling Pilot Award (Co-Investigator)
Title: "Modeling partial non-compliance in clinical trials" (PI: Ashley Naimi)

Publications & Submitted Manuscripts

Statistics

Kennedy EH, Balakrishnan S, G'Sell M. Sharp instruments for classifying compliers and generalizing causal effects. [arxiv.org:1801.03635](https://arxiv.org/abs/1801.03635)

Foster JC, Dong R, Kennedy EH, Taylor JMG, Adjei AA, Mandrekar SJ, Shi Q. Surrogate endpoint evaluation in the presence of treatment-by-covariate interactions. (under review).

Kennedy EH, Small DS. Paradoxes in instrumental variable studies with missing data and one-sided non-compliance. (under review). [arxiv.org:1705.00506](https://arxiv.org/abs/1705.00506)

Kennedy EH, Harris S, Keele LJ. Survivor-complier effects in the presence of selection on treatment, with application to a study of prompt ICU admission. (under revision). [arxiv.org:1704.05706](https://arxiv.org/abs/1704.05706)

Kennedy EH, Lorch SA, Small DS. Robust causal inference with continuous instruments using the local instrumental variable curve. (under review). [arxiv:1607.02566](https://arxiv.org/abs/1607.02566)

**won David P. Byar Young Investigator Award in 2017 & Young Statistician Showcase Award in 2016; an earlier version won the Thomas R. Ten Have Award in 2015.*

11. Kennedy EH. Nonparametric causal effects based on incremental propensity score interventions. *Journal of the American Statistical Association*. (to appear). doi:10.1080/01621459.2017.1422737 ([arxiv:1704.00211](https://arxiv.org/abs/1704.00211))
10. Kennedy EH, Kangovi S, Mitra N. Estimating scaled treatment effects with multiple outcomes. *Statistical Methods in Medical Research*. (to appear). doi:10.1177/0962280217747130 ([arxiv:1608.02273](https://arxiv.org/abs/1608.02273))
9. Kennedy EH. Semiparametric theory. *Wiley StatsRef: Statistics Reference Online*. (to appear). [arxiv:1709.06418](https://arxiv.org/abs/1709.06418)
8. Kennedy EH, Balakrishnan S. Discussion of “Data-driven confounder selection via Markov and Bayesian networks” by Jenny Häggström. *Biometrics*. (to appear). doi:10.1111/biom.12787 ([arxiv:1710.11566](https://arxiv.org/abs/1710.11566))
7. Kennedy EH, Ma Z, McHugh MD, Small DS. Nonparametric methods for doubly robust estimation of continuous treatment effects. *Journal of the Royal Statistical Society: Series B*. 2017; 79(4): 1229-1245. doi:10.1111/rssb.12212 ([arxiv:1507.00747](https://arxiv.org/abs/1507.00747))
**won JSM Student Paper Award (Health Policy Statistics Section) & Young Researcher Award in 2016.*
6. Kennedy EH. Semiparametric theory and empirical processes in causal inference. In *Statistical Causal Inferences and Their Applications in Public Health Research*, edited by He H, Wu P, Chen D. New York: Springer. 2016; 141-167. doi:10.1007/978-3-319-41259-7_8 ([arxiv:1510.04740](https://arxiv.org/abs/1510.04740))
5. Kennedy EH, Sjölander A, Small DS. Semiparametric causal inference in matched cohort studies. *Biometrika*. 2015; 102(3): 739-746. doi:10.1093/biomet/asv025
**won ENAR Distinguished Student Paper Award in 2015.*
4. Hsu JY, Kennedy EH, Roy JA, Stephens-Shields AJ, Small DS, Joffe MM. Surrogate markers for time-varying treatments and outcomes. *Clinical Trials*. 2015; 12(4): 309-316. doi:10.1177/1740774515583500
3. Kennedy EH, Joffe MM, Small DS. Optimal restricted estimation for more efficient longitudinal causal inference. *Statistics & Probability Letters*. 2015; 97: 185-191. doi:10.1016/j.spl.2014.11.022
2. Taylor JMG, Shen J, Kennedy EH, Wang L, Schaubel DE. Comparison of methods for estimating the effect of salvage therapy in prostate cancer when treatment is given by indication. *Statistics in Medicine*. 2014; 33(2): 257-274. doi:10.1002/sim.5890
1. Kennedy EH, Taylor JMG, Schaubel DE, Williams S. The effect of salvage therapy on survival in a longitudinal study with treatment by indication. *Statistics in Medicine*. 2010; 29(25): 2569-2580. doi:10.1002/sim.4017

Zhou M, Abhishek V, Kennedy EH, Sinha R. Linking clicks to bricks: estimating causal effects of email ads on offline sales. (working paper).

Naimi AI, Kennedy EH. Nonparametric double robustness. (under review). [arxiv.org:1711.07137](https://arxiv.org/abs/1711.07137)

15. Bacak V, Kennedy EH. Principled machine learning using the Super Learner: an application to predicting prison violence. *Sociological Methods and Research*. (to appear).
14. Naimi AI, Cole SR, Kennedy EH. An introduction to G-methods. *International Journal of Epidemiology*. 2017; 46(2): 756-762. [doi:10.1093/ije/dyw323](https://doi.org/10.1093/ije/dyw323)
13. Wachtel H, Kennedy EH, Zaheer S, Bartlett EK, Fishbein L, Roses RE, Fraker DL, Cohen DL. Preoperative metyrosine improves cardiovascular outcomes for patients undergoing surgery for pheochromocytoma and paraganglioma. *Annals of Surgical Oncology*. 2015; 22(3): 646-654. [doi:10.1245/s10434-015-4862-z](https://doi.org/10.1245/s10434-015-4862-z)
12. Bacak V, Kennedy EH. Marginal structural models: an application to incarceration and marriage during young adulthood. *Journal of Marriage and Family*. 2015; 77(1): 112-125. [doi:10.1111/jomf.12159](https://doi.org/10.1111/jomf.12159)
11. Gross SR, O'Brien B, Hu C, Kennedy EH. Rate of false conviction of criminal defendants who are sentenced to death. *Proceedings of the National Academy of Sciences*. 2014; 111(20): 7230-7235. [doi:10.1073/pnas.1306417111](https://doi.org/10.1073/pnas.1306417111)
10. Kennedy EH, Greene MT, Saint S. Estimating hospital costs due to catheter-associated urinary tract infection. *Journal of Hospital Medicine*. 2013; 8(9): 519-522. [doi:10.1002/jhm.2079](https://doi.org/10.1002/jhm.2079)
9. Iwashyna TJ, Kennedy EH. Instrumental variable analyses: exploiting natural randomness to understand causal mechanisms. *Annals of the American Thoracic Society*. 2013; 10(3): 255-260. [doi:10.1513/AnnalsATS.201303-054FR](https://doi.org/10.1513/AnnalsATS.201303-054FR)
8. Chen LM, Kennedy EH, Sales AE, Hofer TP. Use of health information technology for higher-value critical care. *New England Journal of Medicine*. 2013; 368(7): 594-597. [doi:10.1056/NEJMp1213273](https://doi.org/10.1056/NEJMp1213273)
7. Kennedy EH, Wiitala WL, Hayward RA, Sussman JB. Improved cardiovascular risk prediction using nonparametric regression and electronic health record data. *Medical Care*. 2013; 51(3): 251-258. [doi:10.1097/MLR.0b013e31827da594](https://doi.org/10.1097/MLR.0b013e31827da594)
6. Chen LM, Render ML, Sales AE, Kennedy EH, Wiitala WL, Hofer TP. Intensive care unit admitting patterns in the Veterans Affairs healthcare system. *Archives of Internal Medicine*. 2012; 172(16): 1220-1226. [doi:10.1001/archinternmed.2012.2606](https://doi.org/10.1001/archinternmed.2012.2606)
5. Apisarnthanarak A, Khawcharoenporn T, Greene MT, Kennedy EH, Krein SL, Saint S. A national survey of Thai infection preventionists in the era of patient safety. *American Journal of Infection Control*. 2013; 41(4): 362-364. [doi:10.1016/j.ajic.2012.04.338](https://doi.org/10.1016/j.ajic.2012.04.338)
4. Cooke CR, Kennedy EH, Wiitala WL, Sales AE, Iwashyna TJ. Despite variation in volume, Veterans Affairs hospitals show consistent outcomes among patients with non-postoperative mechanical ventilation. *Critical Care Medicine*. 2012; 40(9): 2569-2575. [doi:10.1097/CCM.0b013e3182591eee](https://doi.org/10.1097/CCM.0b013e3182591eee)

3. Apisarnthanarak A, Greene MT, Kennedy EH, Khawcharoenporn T, Krein SL, Saint S. A national study of practices to prevent hospital-associated infections in Thailand. *Infection Control and Hospital Epidemiology*. 2012; 33(7): 711-717. doi:10.1086/666330
2. Fakh MG, Watson SR, Greene MT, Kennedy EH, Olmsted R, Krein SL, Saint S. Promoting patient safety by reducing inappropriate urinary catheter use: a statewide effort in Michigan. *Archives of Internal Medicine*. 2012; 172(3): 255-260. doi:10.1001/archinternmed.2011.627
1. Fakh MG, Greene MT, Kennedy EH, Meddings JA, Krein SL, Olmsted R, Saint S. Introducing a population-based outcome measure to evaluate the effect of interventions to reduce catheter-associated urinary tract infection. *American Journal of Infection Control*. 2012; 40(4): 359-364. doi:10.1016/j.ajic.2011.05.012

Software

npcausal: R package for nonparametric causal inference (available at github.com/ehkennedy/npcausal)

Presentations

Invited Seminars

21. *Princeton University, Quantitative Social Science Colloquium. (4/2018)
20. *Ohio State University, Division of Biostatistics. (2/2018)
19. *University of Washington, Department of Biostatistics. (2/2018)
18. Johns Hopkins University, Causal Inference & SLAM Working Groups. (11/2017)
17. University of California, Berkeley, Division of Biostatistics. (11/2016)
16. Carnegie Mellon University, Heinz College. (9/2016)
15. University of North Carolina, Chapel Hill, Causal Inference Research Group. (3/2016)
14. Carnegie Mellon University, Department of Statistics. (2/2016)
13. RAND Statistics Group. (2/2016)
12. University of California, Berkeley, Division of Biostatistics. (2/2016)
11. University of Minnesota, Division of Biostatistics. (2/2016)
10. University of Michigan, Department of Biostatistics. (2/2016)
9. Johns Hopkins University, Department of Biostatistics. (2/2016)
8. University of Illinois, Department of Statistics. (1/2016)
7. North Carolina State University, Department of Statistics. (1/2016)
6. University of Rochester, Department of Biostatistics & Computational Biology. (1/2016)
5. Emory University, Department of Biostatistics & Bioinformatics. (1/2016)
4. Yale University, Department of Biostatistics. (1/2016)
3. McGill University, Department of Epidemiology, Biostatistics & Occupational Health. (11/2015)
2. Johns Hopkins University, Causal Inference Working Group. (11/2015)
1. University of Pennsylvania, Center for Clinical Epidemiology & Biostatistics. (9/2015)

Invited Conference Presentations

19. *Joint Statistical Meetings, Vancouver, BC. (8/2018)
18. *Institute of Mathematical Statistics Annual Meeting, Vilnius, LT. (7/2018)
17. *Statistical Society of Canada Annual Meeting, Montreal, QC. (6/2018)
16. *Society for Epidemiologic Research Annual Meeting, Baltimore, MD. (6/2018)

15. International Conference on Health Policy Statistics, Charleston, SC. (1/2018)
14. International Conference on Computational & Methodological Statistics, London, UK. (12/2017)
13. Joint Statistical Meetings, Baltimore, MD. (8/2017)
12. International Biometric Society WNAR Meeting, Santa Fe, NM. (7/2017)
11. Southern Regional Council on Statistics Summer Conference, Jekyll Island, GA. (6/2017)
10. Atlantic Causal Inference Conference, Chapel Hill, NC. (5/2017)
9. International Biometric Society ENAR Spring Meeting, Washington, DC. (3/2017)
8. Joint Statistical Meetings, Chicago, IL. (8/2016)
7. International Biometric Conference, Victoria, BC. (7/2016)
6. Conference of the International Society of Nonparametric Statistics, Avignon, France. (6/2016)
5. Atlantic Causal Inference Conference, Philadelphia, PA. (5/2015)
4. Deming Conference on Applied Statistics, Atlantic City, NJ. (12/2014)
3. Joint Statistical Meetings, Boston, MA. (8/2014)
2. International Biometric Society ENAR Spring Meeting, Baltimore, MD. (3/2014)
1. Joint Statistical Meetings, Montreal, QC. (8/2013)

Referee Service

Statistical Journals

Annals of Statistics
 Biometrics
 Biometrika
 Clinical Trials
 Computational Statistics & Data Analysis
 Econometrics & Statistics
 Health Services & Outcomes Research Methodology
 International Journal of Biostatistics
 Journal of Causal Inference
 Journal of Educational and Behavioral Statistics
 Journal of Multivariate Analysis
 Journal of the American Statistical Association
 Journal of the Royal Statistical Society: Series B
 Journal of the Royal Statistical Society: Series C
 Stat
 Statistical Methods in Medical Research
 Statistical Science
 Statistics in Medicine

Medical & Other Scientific Journals

American Journal of Infection Control
 American Journal of Managed Care
 Archives of Internal Medicine
 Critical Care Medicine
 Health Services Research
 Infection Control and Hospital Epidemiology
 Journal of Critical Care
 Journal of Patient Safety
 Medical Decision Making
 PLOS ONE
 Proceedings of the American Thoracic Society
 Proceedings of the National Academy of Sciences

Advising

Ph.D. Advisor

2016- Jackie Mauro, Joint Ph.D. Program in Statistics & Public Policy

Ph.D. Committee Member

2017- Mi Zhou, Ph.D. Program in Information Systems & Management
 2016-2017 Maria Cuellar, Joint Ph.D. Program in Statistics & Public Policy

Advisor, Advanced Data Analysis Project

2017- Natalia Lombardi de Oliveira, Ph.D. Program in Statistics
2017- Matteo Bonvini, Joint Ph.D. Program in Statistics & Public Policy
2016- Kwangho Kim, Ph.D. Program in Statistics

Teaching Experience

Primary Instructor (at Carnegie Mellon University)

Spr 2018 Modern Causal Inference (36-732)
Spr 2018 Foundations of Causal Inference (36-731)
Fall 2017 Statistical Paradoxes (66-108)
Spr 2017 Experimental Design & Time Series (36-618)

Short Courses & Workshops

“Influence Functions & Machine Learning in Causal Inference”

- *Causal Inference and Big Data Summer Institute, University of Pennsylvania (6/2018)
- *Atlantic Causal Inference Conference (5/2018)
- Johns Hopkins University, Causal Inference & SLAM Working Groups (12/2017)
- Causal Inference and Big Data Summer Institute, University of Pennsylvania (7/2017)
- University of North Carolina, Chapel Hill, Causal Inference Reading Group (3/2016)

Guest Lecturer

Spr 2016 Semiparametrics & Empirical Processes (Causal Inference BSTA 790), *University of Pennsylvania*
Spr 2016 Machine Learning in Causal Inference (Causal Inference BSTA 790), *University of Pennsylvania*
Spr 2016 Estimating Equations and TMLE (Causal Inference BSTA 790), *University of Pennsylvania*
Spr 2016 Marginal Structural Models (Advanced Epidemiology EPID 640), *University of Pennsylvania*
Spr 2015 Survival Analysis (Fundamentals of Biostatistics EPID 802/803), *University of Pennsylvania*
Spr 2015 Missing Data (Applied Regression Analysis HPR 608), *University of Pennsylvania*
Spr 2015 Marginal Structural Models (Advanced Epidemiology EPID 640), *University of Pennsylvania*
Fall 2015 Machine Learning in Causal Inference (Causal Inference B9124), *Columbia University*
Fall 2014 Super Learning (Biostatistics Computing Seminar Series), *University of Pennsylvania*

Academic Service

Conferences

- Organizing Committee Member, Atlantic Causal Inference Conference, Pittsburgh, PA. (5/2018)
- Reviewer, Health Policy Statistics Student Paper Award, Joint Statistical Meetings, Baltimore, MD. (8/2017)
- Roundtable Discussion Leader, Joint Statistical Meetings, Chicago, IL. (8/2016)
- Organizing Committee Member, Atlantic Causal Inference Conference, Philadelphia, PA. (5/2015)
- Topic-Contributed Session Chair, Joint Statistical Meetings, Boston, MA. (8/2014)
- Topic-Contributed Session Organizer, Joint Statistical Meetings, Boston, MA. (8/2014)
- Invited Session Organizer, International Biometric Society ENAR Spring Meeting, Baltimore, MD. (3/2014)

Committees & Other Service (at Carnegie Mellon University)

Undergraduate Advising Committee (2017-)
Center for Machine Learning & Health Fellowship Review Committee (2017)
PhD Program Committee (2016-)
Faculty Senate Representative (2016-)
Social/Awards/PR Committee (2016-2017)

Committees & Other Service (at the University of Pennsylvania)

Seminar Committee Student Representative (2013-2016)
Computing Committee Student Representative (2013-2016)
Recruitment Visit Student Speaker & Student Buddy (2013, 2014, 2015)

Professional Memberships

American Statistical Association
Institute of Mathematical Statistics
International Biometric Society, Eastern North American Region (ENAR)
Irish Statistical Association