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Kwonsang Lee

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Research Interests

Causal Inference, Instrumental Variables, Design and Analysis of Observational Studies, Application in Environmental Health, Public Policy and Medicine.

Academic Appointments

2025 - present **Associate Professor**, Department of Statistics, Seoul National University

2021 - 2025 **Assistant Professor**, Department of Statistics, Seoul National University

2020 - 2021 **Assistant Professor**, Department of Statistics, Sungkyunkwan University

2019 - 2020 **Research Associate**, Department of Biostatistics, Harvard T.H. Chan School of Public Health

2017 - 2019 **Postdoctoral Research Fellow**, Department of Biostatistics, Harvard T.H. Chan School of Public Health

Mentor: Francesca Dominici

Education

2012 - 2017 **Ph.D.**, Applied Mathematics and Computational Science (emphasis in Statistics), University of Pennsylvania

Advisor: Dylan S. Small
Dissertation Committee: Dylan S. Small, Paul R. Rosenbaum, Bhaswar B. Bhattacharya

2015 - 2016 **M.A.**, Statistics, University of Pennsylvania

2006 - 2010 **B.S.**, Mathematics and **B.A.**, Economics, *summa cum laude*, Seoul National University

Honors and Awards

2024 *34th Outstanding Paper Award*
Awarded by the Korean Federation of Science and Technology Societies for the paper "A nonparametric binomial likelihood approach for causal inference in instrumental variable models."

2022	*Outstanding Teaching Award* Awarded by College of Natural Sciences, Seoul National University for excellence in teaching.
2018	*Statistics in Epidemiology (SIE) Young Investigator Award* Awarded by the American Statistical Association's Section on Statistics in Epidemiology for the paper "A powerful approach to the study of moderate effect modification in observational studies."
2016 - 2017	*Russell Ackoff Doctoral Student Fellowship Award* Awarded by the Wharton Risk Management and Decision Processes Center, University of Pennsylvania for pursuing research in decision making under risk and uncertainty
2012 - 2016	*Benjamin Franklin Fellowship* Awarded by School of Arts and Sciences, University of Pennsylvania
Summer 2015	*GAPSA Research Travel Grant Award* Awarded by Graduate and Professional Student Assembly (GAPSA), University of Pennsylvania
Spring 2014	*Department Good Teaching Award* Awarded by Department of Mathematics, University of Pennsylvania for excellence in teaching

Publications

∗: (co-)corresponding authors
†: co-first authors

1. Lee, Z. & **Lee, K.*** (2025+). Causal interaction and effect modification: A randomization-based approach to inference. *Journal of the Korean Statistical Society*, 54, 665—684.

2. Im, Y.†, **Lee, K.**†, Lee, S.†, Shin, S., Choi, Y., Lee, J., Oh, K., Kim, J., Oh, Y., Lee, H.*, & Park, H.* (2024). Causal inference analysis of the radiologic progression in the chronic obstructive pulmonary disease. *Scientific Reports*, 14(1), 17838.

3. Bong, S., **Lee, K.*** & Dominici, F. (2024). Differential recall bias in estimating treatment effects in observational studies. Biometrics, 80(2): Article uaje058.

4. Jung, D., Yoon, Y., & **Lee, K.*** (2024). Analyzing the causal impact of streaming service usage on IPTV viewing. *The Korean journal of Applied Statistics*, 37(5), 675-690.

5. **Lee, K.***, Bhattacharya, B. B., Qin, J., & Small, D. S. (2023). A nonparametric binomial likelihood approach for causal inference in instrumental variable models. *Journal of the Korean Statistical Society,* 52, 1055–1077.

6. Kong, I., Park, Y., Jung, J., **Lee, K.**, & Kim, Y.* (2023). Covariate balancing using the integral probability metric for causal inference. *Proceedings of the 40th International Conference on Machine Learning,* 202:17430–17461.

7. **Lee, K.**, & Hsu, J. Y. (2023). Effect Modification in Observational Studies. In Handbook of Matching and Weighting Adjustments for Causal Inference (pp. 205-226). Chapman and Hall/CRC.

8. Fogarty, C. B.*, **Lee, K.**, Kelz, R. R., & Keele, L. (2021). Biased encouragements and heterogeneous effects in an instrumental variable study of emergency general surgical outcomes. *Journal of the American Statistical Association*, 116(534), 1625–1636.

9. **Lee, K.***, Small, D. S., & Dominici, F. (2021). Discovering heterogeneous exposure effects using randomization inference in air pollution studies. *Journal of the American Statistical Association*, 116(534), 569–580.

10. **Lee, K.*** & Small, D. S. (2019). Estimating the malaria attributable fever fraction accounting for parasites being killed by fever and measurement error. *Journal of the American Statistical Association*, 114(525), 79–92.

11. Heo, S.*, Nori-Sarma, A., **Lee, K.**, Benmarhnia, T., Dominici, F., & Bell, M. L. (2019). Efficacy of heat wave warning system in reducing mortality risk of heat waves in South Korea, Utilizing difference-in-difference and propensity score weighting approaches. *Environmental Epidemiology*, 3, 290.

12. Heo, S.*, Nori-Sarma, A., **Lee, K.**, Benmarhnia, T., Dominici, F., & Bell, M. L. (2019). The use of a quasi-experimental study on the mortality effect of a heat wave warning system in South Korea. *International Journal of Environmental Research and Public Health*, 16(12), 2245.

13. **Lee, K.***, Lorch S. A., & Small, D. S. (2019). Sensitivity analyses for average treatment effect when outcome is censored by death in instrumental variable models. *Statistics in Medicine*, 38(13), 2303–2316.

14. Rose, E.B.*, **Lee, K.**, Roy, J. A., Small, D. S., Ross, M. E., Castillo-Neyra, R., & Levy. M. Z. (2018). Risk maps for cities: Incorporating streets into geostatistical models. *Spatial and Spatio-temporal Epidemiology*, 27, 47–59.

15. **Lee, K.***, Small, D. S., & Rosenbaum, P. R. (2018). A powerful approach to the study of moderate effect modification in observational studies. *Biometrics*, 74(4), 1161–1170.

16. **Lee, K.***, Small, D. S., Hsu, J. Y., Silver, J. H. & Rosenbaum, P. R. (2018). Discovering effect modification in an observational study of surgical mortality at hospitals with superior nursing. *Journal of the Royal Statistical Society, Series A*, 181(2), 535–546.

Submitted Work

- Bong, S. & Lee, K. Local causal effects with continuous exposures: A matching estimator for the average derivative effect.
- Bargagli-Stoffi, F. J., Cadei, R., Lee, K., & Dominici, F. Causal Rule Ensemble: Interpretable Discovery and Inference of Heterogeneous Treatment Effects.
- Lee, S. & Lee, K. Evaluating time-specific treatment effects in matched-pairs studies.
- Jang, J., Kim, S., & Lee, K. Improving causal estimation by mixing samples to address weak overlap in observational studies.

Grants

Grants as Principal Investigator

- "Matching and Weighting Methods for Causal Inference in Complex Data," The National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT), 2025-2030.
- "Developing Interpretable Causal Inference Methods Based on Discovering Heterogeneous Treatment Effects," The National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT), 2021-2025.
- "Development of a novel risk-set matching method for revealing causal mechanisms of COPD progression using CT," Samsung Medical Center (SMC) & Sungkyunkwan University (SKKU), 2020-2022.

Presentations

- 2025 Fall Center for Causal Inference (CCI) Seminar, University of Pennsylvania, United States (Sep. 2025)
- 2025 American Causal Inference Conference (ACIC), Detroit, United States (May. 2025)
- 2025 European Causal Inference Meeting (EuroCIM), Ghent, Belgium (April. 2025)
- "Nonparametric Inference in the Age of AI", Department of Statistics, Seoul National University, Republic of Korea (Feb. 2025)
- "Statistical Learning for Tackling Complex Data Challenges", CM2LA Serabeol Research Station, Gyeongju, Republic of Korea (Jan. 2025)
- "BK Academic Conference", Yonsei University, Republic of Korea (Jan. 2025)
- The Epidemiology Research Council of the Korean Stroke Society, Seoul, Republic of Korea (Nov. 2023)
- 2023 Korean Statistical Society (KSS) Summer Workshop, Yonsei University, Seoul, Republic of Korea (Aug. 2023)
- Department of Mathematical Sciences, Seoul National University, Republic of Korea (May. 2023)
- Department of Statistics, University of Seoul, Seoul, Republic of Korea (Aug. 2022)
- 2022 Korean Statistical Society (KSS) Conference, Tutorial on *Matching Methods for Causal Inference*, Seoul National University, Seoul, Republic of Korea (Jun. 2022)
- 2021 Korean Statistical Society (KSS) Conference, Korea University, Seoul, Republic of Korea (Nov. 2021)
- Institute of Social Science, Seoul National University, Republic of Korea (Nov. 2021)
- Department of Statistics, Korea University, Seoul, Republic of Korea (Nov. 2020)
- Research Institute of Applied Statistics, Sungkyunkwan University, Seoul, Republic of Korea (Oct. 2020)

- Department of Statistics, Ehwa Womans University (Causal Inference Workshop), Seoul, Republic of Korea (Aug. 2020)
- 2020 Korean Statistical Society (KSS) Conference, Asan, Republic of Korea (Jul. 2020)
- Joint Statistical Meeting, Denver, CO (Jul. 2019)
- Harvard Biostatistics Lightning Talks, Boston, MA (May. 2019)
- Harvard Data Science Initiative Conference, Boston, MA (Oct. 2018)
- Joint Statistical Meeting, Vancouver, Canada (Aug. 2018)
- Michelle L. Bell's Research Group, Yale University (Jun. 2018)
- European Causal Inference Meeting (EuroCIM), University of Florence, Florence, Italy (Apr. 2018)
- Michelle L. Bell's Research Group, Yale University (Mar. 2018)
- Harvard National Studies on Air Pollution and Health (NSAPH) Meeting , Harvard University (Mar. 2018)
- Harvard Biostatistics Seminar, Boston, MA (Feb. 2017)
- Joint Statistical Meeting, Chicago, IL (Aug. 2016)
- Atlantic Causal Inference Conference, New York University, New York, NY (May, 2016)
- World Malaria Day Symposium, "Global Malaria: The International Centers of Excellence", Johns Hopkins Bloomberg School of Public Health, Baltimore, MD (Apr. 2016)
- Joint Statistical Meeting, Seattle, WA (Aug. 2015)
- Atlantic Causal Inference Conference, University of Pennsylvania, Philadelphia, PA (May, 2015)
- Atlantic Causal Inference Conference, Brown University, Providence, RI (May, 2014)

Teaching Experience

Instructor **Seoul National University**:
"Causal Inference" (Fall 2022, Spring 2024, Spring 2025)
"Research Methods and Statistics" (Spring 2023, Spring 2024, Spring 2025)
"Statistical Computing and Lab." (Fall 2024)
"Data Analysis and Lab." (Fall 2022, Fall 2023, Fall 2024)
"Discrete Data Analysis and Lab." (Fall 2021, Fall 2023)
"Nonparametric Statistics and Lab." (Spring 2022, Spring 2024)
"Mathematical Statistics 1" (Spring 2023)

Sungkyunkwan University:
"Design and Analysis of Experiments" (Spring 2020, Spring 2021)
"Introduction to Biostatistics" (Spring 2021)
"Modern Statistical Methods" (Fall 2020)
"Introduction to Nonparametric Statistics" (Fall 2020)

University of Pennsylvania (as Recitation Instructor):
"Introduction to Business Statistics" (Fall 2015)
"Introduction to Statistics" (Spring 2015)
"Calculus III" (Spring 2014)
"Linear Algebra" (Fall 2013)

Short Courses

"Causal Inference for Real-World Evidence: An Introductory Guide," the Epidemiology Research Council of the Korean Stroke Society, November 25, 2023.

"Modern Matching and Weighting Adjustment Methods for Causal Inference," 2023 Korean Statistical Society (KSS) Summer Workshop, August 18, 2023.

"Matching Methods for Causal Inference: Design and Analysis of Observational Studies," 2022 Korean Statistical Society (KSS) Conference Tutorial, Jun 23, 2022.

Professional Experience

Editorial Positions

Statistics Editor, *Encephalitis*, 2022-present

Refereee Service

Air Quality, Annals of Statistics, Atmosphere & Health, Biometrics, Biometrika, Communications for Statistical Applications and Methods, Computational Statistics and Data Analysis, International Journal of Biostatistics, Journal of Causal Inference, Journal of Computational and Graphical Statistics, Journal of the American Statistical Association, Journal of the Royal Statistical Society: Series A, Journal of the Royal Statistical Society: Series B, Journal of the Royal Statistical Society: Series C, Statistical Methods in Medical Research, Statistics in Medicine, Statistical Theory and Related Fields.

Outreach Activities

Public Lectures

"Statistics and Causal Inference," 18th Annual Natural Science Experience Camp (for high school students), Seoul National University, August 7, 2024.

Student Advising

Ph.D. Student

Geondo Park	Department of Statistics, Seoul National University, 2028 (expected)
Zion Lee	Department of Statistics, Seoul National University, 2028 (expected)
Juyeon Kim	Department of Statistics, Seoul National University, 2029 (expected)

Master Student

Suhwan Bong	Department of Statistics, Seoul National University, 2022-2024
Sangjin Lee	Department of Statistics, Seoul National University, 2023-2025
Jaehyuk Jang	Department of Statistics, Seoul National University, 2023-2025
Junho Jang	Department of Statistics, Seoul National University, 2023-2025 (expected)
Suehyun Kim	Department of Statistics, Seoul National University, 2024-2026 (expected)
Sangyong Park	Department of Statistics, Seoul National University, 2024-2026 (expected)

Postdoctoral Student

Hajeong Lee	Institute of Data Innovation in Science, Seoul National University, 2023 -

References

Professor Dylan S. Small, Department of Statistics, The Wharton School, University of Pennsylvania, 400 Jon M. Huntsman Hall, Philadelphia, PA 19104. Ph.:(215)-573-5241. E-mail: dsmall@wharton.upenn.edu

Professor Paul R. Rosenbaum, Department of Statistics, The Wharton School, University of Pennsylvania, 400 Jon M. Huntsman Hall, Philadelphia, PA 19104. Ph.:(215)-898-3120. E-mail: rosenbap@wharton.upenn.edu

Professor Francesca Dominici, Department of Biostatistics, Harvard T.H. Chan School of Public Health, 655 Huntington Avenue, Boston, MA 02115. Ph.:(617)-432-4908. E-mail: fdominic@hsph.harvard.edu