XIAO WU

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EDUCATION

Harvard University *Cambridge, MA*
Ph.D., Biostatistics *September 2017 - March 2021*
Dissertation: Causal Inference with Complex Exposures in Observational Studies
Committee: Dr. Francesca Dominici, Dr. Jose R. Zubizarreta, Dr. Danielle Braun

Harvard T.H. Chan School of Public Health *Boston, MA*
M.S., Biostatistics *September 2015 - May 2017*

Peking University *Beijing, China*
B.S., Mathematics *September 2011 - July 2015*
LL.B., Laws *September 2011 - July 2015*

ACADEMIC EXPERIENCE

Stanford University *Stanford, CA*
Data Science Postdoctoral Fellow; Mentor: Dr. Trevor J. Hastie *October 2021 - Present*

Harvard T.H. Chan School of Public Health *Boston, MA*
Postdoctoral Researcher; Mentor: Dr. Francesca Dominici *March 2021 - September 2021*

Harvard T.H. Chan School of Public Health *Boston, MA*
Predoctoral Researcher; Mentor: Dr. Francesca Dominici *June 2017 - October 2020*

Harvard Business School *Boston, MA*
Research Associate; Mentor: Dr. Lauren Cohen *July 2016 - March 2017*

Stanford University School of Medicine *Stanford, CA*
Statistical Researcher; Mentor: Dr. Ying Lu *June 2014 - August 2014*

ACADEMIC AWARDS & HONORS

Forbes 30 Under 30 - Healthcare *2022*
Forbes Magazine

Ram and Vijay Shriram Data Science Fellowship *2021*
Stanford Data Science

Barry R. and Irene Tilenius Bloom Fellowship *2021*
Harvard T.H. Chan School of Public Health

IMS Hannan Graduate Student Travel Award *2020*
Institute of Mathematical Statistics

American Statistical Association Scholarship Award *2020*
ASA Biopharmaceutical Section

ISEE Annual Conference Travel Award *2020*
International Society for Environmental Epidemiology

American Statistical Association Student Paper Award *2019*
ASA Statistics and the Environment Section

American Statistical Association Student Travel Award *2019*
ASA Biopharmaceutical Section Regulatory-Industry Statistics Workshop

Summer Institute in Statistics for Big Data Scholarship *2017*
University of Washington

1st Prize of the National Mathematics Contest *2009*
The Chinese Mathematical Society (CMS)

INDUSTRY EXPERIENCE

Facebook Inc *Menlo Park, CA*
Research Scientist Intern; Mentors: Drs. Abbas Zaidi, Will Bullock *June 2020 - August 2020*

Google LLC *Sunnyvale, CA*
Data Scientist Intern; Mentors: Drs. Li Pan, Meeyoung Park *May 2019 - August 2019*

Sanofi Genzyme *Cambridge, MA*
Biostatistician Intern; Mentor: Dr. Yi Xu *June 2017 - August 2017, February 2019 - May 2019*

Peking University Clinical Research Institute *Beijing, China*
Data Analyst; Mentor: Prof. Chen Yao *February 2014 - June 2014*

TEACHING EXPERIENCE

Harvard T.H. Chan School of Public Health *Boston, MA*

Teaching Fellow, Bayesian Methodology in Biostatistics; Instructor: Dr. Jeffrey Miller *Spring 2020*
Teaching Fellow, Theory and Methods for Causality II; Instructor: Dr. Andrea Rotnitsky *Fall 2019*
Teaching Fellow, Introduction to Statistical Genetics; Instructor: Dr. Martin Aryee *Fall 2019*
Teaching Fellow, Applied Bayesian Analysis; Instructor: Dr. Lorenzo Trippa *Fall 2018*
Teaching Fellow, Applied Survival Analysis; Instructor: Dr. Rui Wang *Spring 2017*

Stanford University School of Medicine *Stanford, CA*
Guest Lecturer, Causal Inference in Clinical Trials and Observational Study *May 2022*

Emory Rollins School of Public Health *Atlanta, GA*
Guest Lecturer, Causal Inference and Its Application to Environmental Studies with R *March 2022*
Guest Lecturer, Air Quality in the Urban Environment *March 2021*

Massachusetts Institute of Technology *Cambridge, MA*
Guest Lecturer, Global Health Informatics to Improve Quality of Care *March 2021*

Harvard T.H. Chan School of Public Health *Boston, MA*
Guest Lecturer, Computing for Big Data - Working with Medicare Data *December 2018*

Harvard Medical School *Boston, MA*
Guest Lecturer, An Introduction to Propensity Score Methods *September 2018*

ADVISING EXPERIENCE

Sophie Woodward, Bachelor student, Harvard College *April 2021 - Present*
Zhewen Hou, Bachelor student, Peking University *April 2020 - March 2021*
Josh Villarreal, Bachelor student, Harvard College *May 2020 - August 2020*

PROFESSIONAL ACTIVITIES

Grant Peer Reviewer
The Tel Aviv University Center for Combatting Pandemics Research Grants

Journal Peer Reviewer
Biometrics, Statistics in Medicine, Biometrical Journal, Journal of Agricultural, Biological, and Environmental Statistics, International Journal of Biostatistics, Statistical Sinica, Clinical Trials, American Journal of Respiratory and Critical Care Medicine, American Journal of Epidemiology, American Journal of Preventive Medicine, Environmental International, Environmental Research, Atmospheric Environment

Mentor
MIT COVID-19 Datathon 2020

Session Chair
Recent Advances in Nonparametric Statistical Methods, Joint Statistical Meeting (JSM) 2018

Biostatistics Consultant
Biostatistics Student Consulting Center, Harvard T.H. Chan School of Public Health

Legal Consultant
Legal Aid Association, Peking University Law School

TECHNICAL SKILLS

Programming Languages	R, Python, SAS, SQL
Software & Tools	Tensorflow, Stan, R Studio, Matlab, Github, Latex
Certificates	SAS Base and Advanced Programming

PRESENTATIONS

Conference Presentations

1. Air pollution and COVID-19 mortality in the United States, Stanford Data Science Inaugural Conference, 2022, Stanford, CA (**Poster**).
2. The Intersection between Air Quality and COVID-19 Disease, American Thoracic Society (ATS) International Conference, 2021 (**Panel Discussant**).
3. Exposure to Air Pollution and COVID-19 Mortality in the United Sates, Annual Conference of the International Society for Environmental Epidemiology (ISEE), 2020, Washington, D.C. (**Oral**).
4. Impacts of Long-term Exposure to Fine Particulate Matter on Mortality Among the Elderly, Annual Conference of the International Society for Environmental Epidemiology (ISEE), 2020, Washington, D.C. (**E-Poster**).
5. Causal effects of long-term $PM_{2.5}$ exposure on all cause mortality, Harvard Data Science Initiative Conference, 2019, Boston, MA.
6. Optimizing Interim Analysis Timing for Bayesian Adaptive Commensurate Designs, ASA Biopharmaceutical Section Regulatory-Industry Statistics Workshop (BIOP), 2019, Washington, D.C. (**Poster**).
7. Matching on generalized propensity scores with continuous treatments, Joint Statistical Meeting (JSM), 2019, Denver, CO.
8. Matching on generalized propensity scores with continuous treatments, Atlantic Causal Inference Conference (ACIC), 2019, Montreal, QC, Canada (**Invited**).
9. Causal Inference Challenges in Air Pollution Research, Atlantic Causal Inference Conference (ACIC), 2019, Montreal, QC, Canada (**Discussant**).

10. Statistical methods for pooling categorical biomarkers from multiple studies, Joint Statistical Meeting (JSM), 2018, Vancouver, BC, Canada.

11. Causal inference in air pollution epidemiology using generalized propensity score matching, Harvard/MIT ACE Center Science Advisory Committee (SAC) Meeting, 2018, Boston, MA (**Invited**).

12. Matching on generalized propensity scores with continuous treatments, European Causal Inference Meeting (EuroCIM), 2018, Florence, Italy.

13. Causal inference in the context of an error prone exposure: air pollution and mortality, International Chinese Statistical Association (ICSA), Applied Statistics Symposium, 2018, New Brunswick, NJ (**Invited**).

14. Causal inference in the context of an error prone exposure: air pollution and mortality, Eastern North American Region (ENAR) International Biometric Society Meeting, 2018, Atlanta, GA.

15. Methods to estimate causal effects adjusting for confounding when an ordinal exposure is mismeasured in the context of air pollution, Harvard/MIT ACE Center Science Advisory Committee (SAC) Meeting, 2017, Boston, MA (**Invited**).

Invited Presentations

1. Air Pollution, COVID-19 Pandemic, and Human Health: Statistical Applications of Causal Inference. Peking University School of Public Health, 2022.

2. Assessing the Causal Effects of a Stochastic Intervention in Time Series Data. Columbia University Mailman School of Public Health, 2022.

3. Causal Inference with Complex Exposures in Climate and Health Research. Boston University School of Public Health, 2022.

4. Causal Inference with Complex Exposures in Climate and Health Research. Columbia University Mailman School of Public Health, 2021.

5. Air Pollution, COVID-19 Pandemic, and Human Health: Connecting the Science with Statistics and Causal Inference. The Center for Statistical Science at Peking University, 2020.

6. Pulmonary Health, ARDS, COVID-19 and Air Pollution: Connecting the Science. The Collaborative on Health and the Environment (CHE), 2020.

7. Air Pollution, Covid-19, and Communities of Color: What We Can Do About It. MetroWest Climate Solutions, 2020.

8. Historical Exposure to Air Pollution and COVID-19 Mortality in the United Sates. All-Party Parliamentary Group (APPG) on Air Pollution, 2020, London, U.K.

9. Historical Exposure to Air Pollution and COVID-19 Mortality in the United Sates. The U.S. House Select Committee on the Climate Crisis, 2020, Washington, D.C.

10. Coronavirus Tracking Project for Rapid-prototyping Response. MIT Center for Bits and Atoms, 2020, Cambridge, MA.

11. Harvard Public Health Symposium for Young Leaders in China. Harvard T.H. Chan School of Public Health, 2019, Boston, MA.

PUBLICATIONS

Journal Articles

1. Dominici, F., Zanobetti, A., Schwartz, J., Braun, D., Sabath, B.M., and **Wu, X.**, 2022. Assessing adverse health effects of long-term exposure to low levels of ambient air pollution: Implementation of causal inference methods. Research Reports: Health Effects Institute.

2. Yao, Y., Lv, X., Qiu, C., Li, J., **Wu, X.**, Zhang, H., Yue, D., Liu, K., Eshak, E.S., Lorenz, T. and Anstey, K.J., 2022. The effect of China's Clean Air Act on cognitive function in older adults: a population-based, quasi-experimental study. The Lancet Healthy Longevity, 3(2), pp.e98-e108.

3. Xiong, J., Li, J., **Wu, X.**, Wolfson, J.M., Lawrence, J., Stern, R.A., Koutrakis, P., Wei, J. and Huang, S., 2022. The association between daily-diagnosed COVID-19 morbidity and short-term exposure to PM1 is larger than associations with PM2.5 and PM10. Environmental research, p.113016.

4. Mendy, A., **Wu, X.**, Keller, J.L., Fassler, C.S., Apewokin, S., Mersha, T.B., Xie, C. and Pinney, S.M., 2021. Air pollution and the pandemic: Long-term PM2.5 exposure and disease severity in COVID19 patients. Respirology, 26(12), pp.1181-1187.

5. Weinberger, K.R., **Wu, X.**, Sun, S., Spangler, K.R., Nori-Sarma, A., Schwartz, J., Requia, W., Sabath, B.M., Braun, D., Zanobetti, A., Dominici, F. and Wellenius, G.A., 2021. Heat warnings, mortality, and hospital admissions among older adults in the United States. Environment International, 157, p.106834.

6. Klompmaker, J.O., Hart, J.E., James, P., Sabath, M.B., **Wu, X.**, Zanobetti, A., Dominici, F. and Laden, F., 2021. Air pollution and cardiovascular disease hospitalization - Are associations modified by greenness, temperature and humidity?. Environment International, 156, p.106715.

7. Field, R.D., Moelis, N., Salzman, J., Bax, A., Ausiello, D., Woodward, S.M., **Wu, X.**, Dominici, F. and Edwards, D.A., 2021. Inhaled water and salt suppress respiratory droplet generation and COVID-19 incidence and death on US coastlines. Molecular Frontiers Journal, pp.1-13.

8. Klompmaker, J.O., Hart, J.E., Holland, I., Sabath, M.B., **Wu, X.**, Laden, F., Dominici, F. and James, P., 2021. County-level exposures to greenness and associations with COVID-19 incidence and mortality in the United States. Environmental research, p.111331.

9. Mendy, A., **Wu, X.**, Keller, J.L., Fassler, C.S., Apewokin, S., Mersha, T.B., Xie, C. and Pinney, S.M., 2021. Long-term exposure to fine particulate matter and hospitalization in COVID-19 patients. Respiratory medicine, 178, p.106313.

10. **Wu, X.**†, Nethery, R.C.†, Sabath, B.M., Braun, D. and Dominici, F., 2020. Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis. Science Advances, 6(45), p.eabd4049.

11. **Wu, X.**†, Braun, D.†, Schwartz, J., Kioumourtzoglou, M.A. and Dominici, F., 2020. Evaluating the impact of long-term exposure to fine particulate matter on mortality among the elderly. Science Advances, 6(29), p.eaba5692.

12. Shi, L.†, **Wu, X.**†, Yazdi, M., Braun, D., Liu, P., Awad, Y., Di, Q., Wei, Y., Wang, Y., Schwartz, J.D., Dominici, F., Kioumourtzoglou, M.A. and Zanobetti, A., 2020. Long-term effects of PM2.5 on neurological disorders in the American Medicare population: a longitudinal cohort study. The Lancet Planetary Health, 4(12), pp.e557-e565.
*** Runner-up of China Health Policy and Management Society (CHPAMS) Rising Scholar Best Paper Award in 2020**

13. **Wu, X.**, Xu, Y. and Carlin, B.P., 2020. Optimizing interim analysis timing for Bayesian adaptive commensurate designs. Statistics in Medicine, 39(4), pp.424-437.
*** Winner of American Statistical Association Student Poster Award in 2019**

14. Wei, Y., Wang, Y., **Wu, X.**, Di, Q., Shi, L., Koutrakis, P., Zanobetti, A., Dominici, F. and Schwartz, J.D., 2020. Causal effects of air pollution on mortality in Massachusetts. American Journal of Epidemiology, 189(11), pp.1316-1323.

15. Zhang, Z., Li, X., **Wu, X.**, Qiu, H. and Shi, H., 2020. Propensity score analysis for time-dependent exposure. Annals of Transnational Medicine, 8(5).

16. **Wu, X.**, Braun, D., Kioumourtzoglou, M.A., Choirat, C., Di, Q. and Dominici, F., 2019. Causal inference in the context of an error prone exposure: air pollution and mortality. The Annals of Applied Statistics, 13(1), pp.520-547.

17. Won, J.H., **Wu, X.**, Lee, S.H. and Lu, Y., 2017. Cross-sectional design with a short-term follow-up for prognostic imaging biomarkers. Computational Statistics & Data Analysis, 113, pp.154-176.

Submitted Manuscripts

1. Woodward, S.M.†, **Wu, X.**†, Hou, Z., Mork D., Braun, D., and Dominici, F., 2022. Combining aggregate and individual-level data to estimate individual-level associations between air pollution and COVID-19 mortality in the United States. *under review* at Science Advances.

2. **Wu, X.**, Weinberger, K.R., Wellenius, G.A., Dominici, F. and Braun, D., 2021. Assessing the causal effects of a stochastic intervention in time series data: Are heat alerts effective in preventing deaths and hospitalizations?. arXiv preprint arXiv:2102.10478. *revision invited* at Biostatistics.

3. **Wu, X.**, Mealli, F., Kioumourtzoglou, M.A., Dominici, F. and Braun, D., 2021. Matching on generalized propensity scores with continuous exposures. arXiv preprint arXiv:1812.06575. *revision invited* at Journal of the American Statistical Association.
   *** Winner of American Statistical Association Student Paper Award in 2019**

4. Ren, B., **Wu, X.**, Braun, D., Pillai, N. and Dominici, F., 2021. Bayesian modeling for exposure response curve via Gaussian processes: Causal effects of exposure to air pollution on health outcomes. arXiv preprint arXiv:2105.03454. *under review* at The Annals of Applied Statistics.

5. Josey, K.P., deSouza, P., **Wu, X.**, Braun, D. and Nethery, R., 2021. Estimating a causal exposure response function with a continuous error-prone exposure: A study of fine particulate matter and all-cause mortality. arXiv preprint arXiv:2109.15264. *revision invited* at Journal of Agricultural, Biological, and Environmental Statistics.

6. Kodros, J.K., Bell, M.L., Dominici, F., L'Orange, C., Godri Pollitt, K.J., Weichenthal, S., **Wu, X.**, Volckens, J., 2021. Racial segregation and an unequal exposure burden to particulate transition metals. *under review* at Nature Communications.

7. Lee, W., Heo, S., Stewart, R., **Wu, X.**, Fong, K.C., Son, J-Y., Sabath, M.B., Braun, D., Park, J.Y., Kim, Y.C., Lee, J.P., Schwartz, J.D., Kim, H., Dominici, F. and Bell, M.L., 2021. Associations between greenness and kidney disease in Massachusetts: the US Medicare longitudinal cohort study. *under review* at American Journal of Epidemiology.

In Preparation

1. Weinberger K.R., Veeravalli N., Henk H.J., **Wu, X.**, Nassikas N., Wellenius G.A., 2021+. Long-term impact of tropical cyclones on disease exacerbation among children with asthma in the eastern United States, 2000-2018.

2. **Wu, X.**, Li, X., Dominici, F. and DAmour, A., 2020+. Identifying and estimating heterogeneous causal effects of continuous exposures.

3. **Wu, X.**, Gail, M.H. and Wang, M., 2020+. Statistical method for pooling categorical biomarkers from multi-center matched/nested case-control studies.

†indicates co-first authorship