Hao Wu, M.S.

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SUMMARY

PhD candidate in Biostatistics with strong training in causal inference, doubly robust estimation, semiparametric methods and longitudinal missingness. Experienced in analyzing large-scale healthcare and longitudinal data and collaborating with clinical researchers.

Seeking Summer 2026 Biostatistics Intern roles in pharmaceutical or biotech industry.

EDUCATION
- 2023.8-present **Vanderbilt University**   *PhD in Biostatistics*
- 2021.8-2023.5 **University of Michigan-Ann Arbor**   *Master in Biostatistics*
- 2017.9-2021.7 **China Agricultural University**

Bachelor in Food science and Engineering   Minor: *Bachelor in Data Science*

TECHNICAL SKILLS
- Semiparametric theory: doubly robust estimation, debiased machine learning
- Causal Inference: TMLE, quantile treatment effects, probability treatment effects
- Longitudinal and missing data analysis
- Real world data analysis: randomized clinical trials, longitudinal studies, claims data

RESEARCH & DATA EXPERIENCE

Methodological Research

Project 1: Doubly Robust Estimation for Quantile and Probability Treatment Effects
- Developed doubly robust estimators for quantile and probability treatment effects using semiparametric cumulative probability models, motivated by skewed outcomes and detection limits common in real-world evidence studies
- Implemented efficient influence function–based estimators with variance estimation
- Applied methods to real biomedical data (HIV studies) to demonstrate practical utility beyond mean-based causal effects
- A manuscript based on this project is currently in prepared for submission.

Project 2: Limits of Double Robustness in Variance Estimation
- Developed a theoretical framework demonstrating that double robustness does not extend to variance estimation under parametric nuisance model misspecification
- Identified risks in uncertainty quantification when influence function–based variance estimators are used in practice
- Proposed alternative variance estimation strategies, including joint inference and sample-splitting / cross-fitting, with improved robustness under model misspecification
- This work is available as an arXiv preprint

Project 3: Doubly Robust Estimation for Longitudinal Data with Monotone Missingness
- Developed an augmented weighted generalized estimating equation for longitudinal outcomes subject to monotone dropout
- Unified IPW and imputation-based approaches within an estimating equation framework

- Improved estimation efficiency through augmentation with re-imputed outcomes
- Applied the proposed method to real longitudinal psychiatric data.
- This project is being prepared for submission as a methodological manuscript.

Collaborative Research
(Details available on my [personal website](#))
- Applied causal inference methods and sensitivity analyses to strengthen findings from large-scale observational data
- Analyzed multicenter randomized clinical trial studies
- Conducted multiple projects focused on longitudinal data analysis
- Modeled ordinal clinical outcomes using proportional odds models
- My role: led statistical modeling and interpretation, and manuscript preparation

SELECTED PUBLICATIONS

Methodology
1. **Wu H**, Li C, Shepherd BE. *Doubly Robust Estimators of Quantile Treatment Effects with Semiparametric Cumulative Probability Models*. (Manuscript prepared)
2. **Wu H**, Lin T, Tu XM, Liu J. *Augmented Weighted Generalized Estimating Equations for Doubly Robust Estimation with Missingness*. (Manuscript prepared))
3. **Wu H**, Shao L, et al. *Why is the Doubly Robust Estimator for Causal Inference Not Doubly Robust?* (Under Review)

Collaboration
1. Liu J, Chen M, **Wu H**, et al. An effective short form of the UCLA Loneliness Scale version 3: item response theory and network psychometrics. *General Psychiatry* (2025).
2. S Dwivedi, MN Cichocki, **H Wu**, CA Kettaneh, L Wang, et al. (2024). Factors in Hand Surgery Access for Rheumatoid Arthritis Before vs After the Patient Protection and Affordable Care Act. JAMA surgery, 159(4)
3. M Jayaram, **H Wu**, AP Yoon, RL Kane, L Wang, et al. (2023). Comparison of distal radius fracture outcomes in older adults stratified by chronologic vs physiologic age managed with casting vs surgery. JAMA network open, 6(2).

Posters and conference proceedings
1. *Short course: Unlocking the Power of Semiparametric Models: A Practical Tutorial for Analyzing Complex Data with Minimum Assumptions, Joint Statistical Meetings (JSM):* **H Wu**, *T Lin, X Tu, JY Liu (2025). Augmented Weighted Generalized Estimating Equations of Longitudinal Data with Monotone Missing.*
2. *Conference: American Association of Plastic Surgeons (AAPS) (Poster): JN Fahmy, JS Nasser,* **H Wu**, *L Wang, KC Chung (2025). Decreasing Antibiotic and Surgical Site Infections in Reconstructive Breast Surgery: Results From a 2015 To 2022 National Evaluation.*

PROFESSIONAL SERVICES

2025-present   Vanderbilt Biostatistics Graduate Student Association: first-year liaison.
2023-present   Membership of ASA/ENAR/ICSA