

# Sarah M. Weinstein

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## Research interests

statistics in medical imaging, clinical trials, causal inference, spatial statistics.

## Education

- 2018 – present **University of Pennsylvania, Perelman School of Medicine** – Philadelphia, PA  
PhD, Biostatistics (expected 2023)  
*Thesis:* Extracting and comparing patterns in multi-modal neuroimaging data in the presence of nuisance variables.  
*Mentors:* Russell Shinohara, PhD and Kristin Linn, PhD  
*Fellowship:* National Science Foundation Graduate Research Fellowship Program
- MS, Biostatistics (2020)  
*Thesis:* Using observational data and propensity score modeling to simulate and improve design of trials in psoriatic arthritis.  
*Mentors:* Alisa Stephens-Shields, PhD and Alexis Ogdie-Beatty, MD, MSCE
- 2012 – 2016 **Columbia University, Columbia College** – New York, NY  
BA (Cum Laude), double major in Statistics and Psychology

## Peer-reviewed publications

- 2022 **SM Weinstein**, SN Vandekar, EB Baller, D Tu, A Adebimpe, TM Tapera, RC Gur, RE Gur, JA Detre, A Raznahan, AF Alexander-Bloch, TD Satterthwaite, RT Shinohara, JY Park. “Spatially-enhanced clusterwise inference for testing and localizing intermodal correspondence.” *NeuroImage*.
- 2022 VM Leavitt, AM Kever, **SM Weinstein**, RT Shinohara, H Schmidt, SM Aoun, A Solari, AJ Solomon. “Patient-reported experience of multiple sclerosis diagnosis is associated with subsequent disclosure and concealment.” *Multiple Sclerosis and Related Disorders* (in press).
- 2022 **SM Weinstein**, C Davatzikos, J Doshi, KA Linn, RT Shinohara, for the Alzheimer’s Disease Neuroimaging Initiative (ADNI). “Penalized Decomposition Using Residuals (PeDecURE) for Feature Extraction in the Presence of Nuisance Variables.” *Biostatistics*.
- 2022 D Jacobs, N Garland, V Zimmerman, **SM Weinstein**, E Reilly. “Impact of a Virtual Wellness Program on Quality-of-Life Measures for Patients Living with MS During the COVID-19 Pandemic.” *International Journal of MS Care*.
- 2022 F Hu, **SM Weinstein**, EB Baller, AM Valcarcel, A Adebimpe, A Raznahan, DR Roalf, TE Robert-Fitzgerald, V Gonzenbach, RC Gur, RE Gur, S Vandekar, JA Detre, KA Linn, A Alexander-Bloch, TD Satterthwaite, RT Shinohara. “Voxel-wise Intermodal Coupling Analysis of Two or More Modalities using Local Covariance Decomposition.” *Human Brain Mapping*.
- 2022 AR Pines, B Larsen, Z Cui, VJ Sydnor, MA Bertolero, A Adebimpe, AF Alexander-Bloch, C Davatzikos, DA Fair, RC Gur, RE Gur, H Li, MP Milham, TM Moore, K Murtha, L Parkes, SL Thompson-Schill, S Shanmugan, RT Shinohara, **SM Weinstein**, DS Bassett, Y Fan, TD Satterthwaite. “Dissociable multi-scale patterns of development in personalized brain networks.” *Nature Communications*.

- 2021 **SM Weinstein**, SN Vandekar, A Adebimpe, TM Tapera, T Robert-Fitzgerald, RC Gur, RE Gur, A Raznahan, TD Satterthwaite, AF Alexander-Bloch, RT Shinohara. "A simple permutation-based test of intermodal correspondence." *Human Brain Mapping*.
- 2021 **SM Weinstein**, LC Coates, PS Helliwell, A Ogdie, AJ Stephens-Shields. "Simulation-based design of pragmatic trials in psoriatic arthritis using propensity scores." *Clinical Trials*.
- 2021 AJ Solomon, M Kaisey, SC Krieger, S Chahin, RT Naismith, **SM Weinstein**, RT Shinohara, BG Weinshenker. "Multiple sclerosis diagnosis: Knowledge gaps and opportunities for educational intervention in neurologists in the United States." *Multiple Sclerosis Journal*.
- 2020 J Poeran, C Cozowicz, N Zubizarreta, **SM Weinstein**, SG Deiner, RM Leipzig, JI Friedman, J Liu, M Mazumdar, SG Memtsoudis. "Modifiable factors associated with postoperative delirium after hip fracture repair: an age-stratified retrospective cohort study." *European Journal of Anaesthesiology*.
- 2019 SG Memtsoudis, C Cozowicz, N Zubizarreta, **SM Weinstein**, J Liu, DH Kim, LA Poultides, MM Berger, M Mazumdar, J Poeran. "Risk factors for postoperative delirium in patients undergoing lower extremity joint arthroplasty: a retrospective population-based cohort study." *Regional Anesthesia & Pain Medicine*.
- 2019 L Pichler, **SM Weinstein**, C Cozowicz, J Poeran, J Liu, LA Poultides, JN Saleh, SG Memtsoudis. "Perioperative impact of sleep apnea in a high-volume specialty practice with a strong focus on regional anesthesia: a database analysis." *Regional Anesthesia & Pain Medicine*.
- 2019 C Cozowicz, J Poeran, N Zubizarreta, J Liu, **SM Weinstein**, L Pichler, M Mazumdar, SG Memtsoudis. "Non-opioid analgesic modes of pain management are associated with reduced postoperative complications and resource utilisation: a retrospective study of obstructive sleep apnoea patients undergoing elective joint arthroplasty." *British journal of anaesthesia*.
- 2018 **SM Weinstein**, JT YaDeau, SG Memtsoudis. "Lack of association between levels and length of intraoperative controlled hypotension and acute kidney injury in total hip arthroplasty patients receiving neuraxial anesthesia." *Regional Anesthesia & Pain Medicine*.
- 2018 **SM Weinstein**, LR Baaklini, J Liu, LA Poultides, C Cozowicz, J Poeran, JN Saleh, SG Memtsoudis. "Neuraxial anaesthesia techniques and postoperative outcomes among joint arthroplasty patients: is spinal anaesthesia the best option?" *British journal of anaesthesia*.
- 2018 **SM Weinstein**, LA Poultides, LR Baaklini, EE Mörwald, C Cozowicz, JN Saleh, MB Arrington, J Poeran, N Zubizarreta, SG Memtsoudis. "Postoperative delirium in total knee and hip arthroplasty patients: a study of perioperative modifiable risk factors." *British journal of anaesthesia*.

### Manuscripts under review

- 2022+ AA Chen, **SM Weinstein**, A Adebimpe, RC Gur, RE Gur, KR Merikangas, TD Satterthwaite, RT Shinohara, H Shou. "Similarity-Based Multimodal Regression." *bioRxiv*.
- 2022+ AR Pines, AS Keller, B Larsen, M Bertolero, A Ashourvan, DS Bassett, M Cieslak, S Covitz, Y Fan, E Feczko, A Houghton, A R Rueter, T Tapera, J Vogel, **SM Weinstein**, RT Shinohara, D Fair, T Satterthwaite. "Development of Top-Down Cortical Propagations in Youth." *bioRxiv*.

## Research experience

- 2019 – present **University of Pennsylvania** – Philadelphia, PA  
Statistical analyst and consultant for research collaborations in psychiatry, neurology, and rheumatology.
- 2016 – 2018 **Hospital for Special Surgery** – New York, NY  
Research Data Analyst in the Department of Anesthesiology, Critical Care, and Pain Management, working with Dr. Stavros Memtsoudis, MD, PhD, MBA.
- 2013 – 2016 **Columbia University Medical Center, Department of Psychiatry** – New York, NY  
Undergraduate Research Assistant in the Perinatal Pathways Lab of Catherine Monk, PhD.

## Teaching and mentoring experience

- Fall 2022 – present **Haverford College** – Haverford, PA  
Visiting Instructor of Mathematics and Statistics, senior thesis advisor for undergraduate student. Secondary reader on statistics senior theses.
- 2020 – present **University of Pennsylvania** – Philadelphia, PA  
*Fall 2022:* Co-mentor (with Prof. Taki Shinohara) of lab rotation for first-year Biostatistics PhD student.  
*Spring 2020, Spring 2021:* Teaching Assistant for Linear and Generalized Linear Models (BSTA 651).
- Fall 2015 – Spring 2016 **Columbia University** – New York, NY  
Teaching Assistant in Department of Statistics Help Room.  
Private tutor for undergraduate students enrolled in introductory statistics courses.

## Awards and honors

- 2020 – present **National Science Foundation Graduate Research Fellowship Program**  
Recipient of three-year NSF fellowship in Mathematical Sciences (Biostatistics). Awarded in 2018, funding in effect 2020-2023.
- 2022 **Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania**  
First place award recipient at Department's annual Research Day for flash talk "Penalized Decomposition Using Residuals for Mitigating Nuisance Variables in Multivariate Pattern Analysis."
- 2021 **American Statistical Association Section on Statistics in Imaging**  
Student Paper Award (runner-up) for "A simple permutation-based test of intermodal correspondence."
- 2017 **Society for Anesthesia and Sleep Medicine**  
Second place abstract award.
- 2016 **Columbia University (Columbia College)**  
Cum Laude.
- 2012 – 2016 **Columbia University (Columbia College)**  
Dean's List (every semester).

## Select presentations

★ *invited talks*

- ★ 10/2022 “Dimension reduction in neuroimaging: principal component analysis, partial least squares, and extensions.” Statistical Methods in Neuroimaging (BSTA 7510), Guest Lecturer, University of Pennsylvania (Philadelphia, PA).
- ★ 10/2022 “Statistical methods for extracting and comparing patterns in multi-modal neuroimaging studies.” Bi-College Math/Stat joint colloquium at Haverford and Bryn Mawr Colleges (Haverford, PA).
- ★ 08/2022 “Nuisance variable-adjusted feature extraction through penalized decomposition using residuals.” Joint Statistical Meetings (JSM), Topic-Contributed Session (Washington, DC).
- 06/2022 “Penalized decomposition using residuals for confounding mitigation in multivariate pattern analysis.” Organization for Human Brain Mapping (OHBM), Poster Presentation (Glasgow, Scotland).
- 05/2022 “Adjusting for nuisance variables in neuroimaging studies via penalized decomposition using residuals.” Statistical Methods in Imaging (SMI), Poster Presentation (Nashville, TN).
- 03/2022 “Penalized decomposition using residuals for confounding control and enhanced pattern extraction in neuroimaging.” Eastern North American Region of the International Biometrics Society (ENAR) conference, Contributed Oral Presentation (Houston, TX).
- 12/2021 “Permutation testing of network enrichment in neuroimaging.” Computational and Methodological Statistics, Contributed Oral Presentation (hybrid/London, UK).
- ★ 08/2021 “A simple permutation-based test of intermodal correspondence.” Joint Statistical Meetings (JSM), Section on Statistics in Imaging Student Paper Award Winners – Topic Contributed Session (virtual).
- ★ 08/2021 “Permutation-based tests of intermodal similarity within functional brain networks.” Vanderbilt University Statistical Imaging Collective, Seminar Speaker (Nashville, TN).
- 06/2021 “Permutation-based testing of intermodal correspondence within large-scale functional networks.” Organization for Human Brain Mapping (OHBM), Poster Presentation (virtual).
- 03/2021 “A simple permutation-based test of intermodal correspondence.” Eastern North American Region of the International Biometrics Society (ENAR) conference, Contributed Oral Presentation (virtual).
- 08/2020 “Two-stage stratified PCA for dimension reduction and nuisance variable mitigation.” Joint Statistical Meetings (JSM), Poster Presentation (virtual).
- 03/2020 “Two-stage PCA for dimension reduction and mitigation of nuisance variable associations.” Eastern North American Region of the International Biometrics Society (ENAR) conference, Contributed Oral Presentation (virtual).
- 04/2018 “Is subtype of neuraxial anesthesia associated with risk for adverse perioperative outcomes in hip and knee arthroplasty patients?” World Congress on Regional Anesthesia & Pain Medicine, Oral Presentation (New York, NY).
- 10/2017 “Delirium After Unilateral Total Hip and Knee Arthroplasty: A Retrospective Analysis of Modifiable Risk Factors.” American Society of Anesthesiologists Annual Meeting, Oral Presentation (Boston, MA).

## Additional activities

- Fall 2022 – present Co-founder of Hypothesis Testing subgroup in the Penn Statistics in Imaging and Visualization Center (PennSIVE)
- 08/2022 Organizer of Topic-Contributed Session at Joint Statistical Meetings (JSM) conference  
*Session:* Statistical Advances in Dimension Reduction and Feature Interpretability in Neuroimaging (Washington, DC).
- 05/2022 Session Chair at Statistical Methods in Imaging (SMI) conference  
*Session:* Statistical analysis of high-dimensional neuroimaging data (Nashville, TN).
- 03/2021 Session Chair at Eastern North American Region of the International Biometric Society conference  
*Session:* Contributed Papers: Machine Learning (virtual).
- 2016 – 2018 Columbia University Alumni Recruitment Committee  
Interviewer for prospective students.

## Memberships

- 2022 – present Institute of Mathematical Statistics
- 2020 – present Organization for Human Brain Mapping
- 2019 – present American Statistical Association
- 2019 – present American Statistical Association Section on Statistics in Imaging
- 2019 – present Eastern North American Region of the International Biometric Society (ENAR IBS)

## Technical skills

R, Python, MATLAB, Bash