Sarah M. Weinstein

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Research interests

statistical methods in neuroimaging, spatial statistics, causal inference, clinical trials.

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**, 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* (accepted).

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 Poultsides, 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 Poultsides, 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 Poultsides, 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 Poultsides, 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 anaesthsia.*

Manuscripts under review

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." *bioRxiv.* Revision requested by *NeuroImage.*

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.*

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."

Research experience

2019 – present	**University of Pennsylvania** – Philadelphia, PA Statistical analyst in psychiatry, neurology, and rheumatology research collaborations.
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 experience

Fall 2022 – Spring 2023	**Haverford College** – Haverford, PA Visiting Instructor of Mathematics and Statistics, advising undergraduate senior thesis.
Spring 2020, Spring 2021	**University of Pennsylvania** – Philadelphia, PA Teaching Assistant for Linear and Generalized Linear Models (BSTA 651) in the Department of Biostatistics, Epidemiology, and Informatics.
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.

Select presentations   ★ *invited talks*

★ 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).

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).

Additional activities

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.

Professional 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