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 **Penalized Decomposition Using Residuals (PeDecURe) for Feature Extraction in the Presence of Nuisance Variables.**
SM Weinstein, C Davatzikos, J Doshi, KA Linn, RT Shinohara, for the Alzheimer's Disease Neuroimaging Initiative (ADNI).
Biostatistics.

2022 **Impact of a Virtual Wellness Program on Quality-of-Life Measures for Patients Living with MS During the COVID-19 Pandemic.**
D Jacobs, N Garland, V Zimmerman, **SM Weinstein**, E Reilly.
International Journal of MS Care (accepted).

2022 **Voxel-wise Intermodal Coupling Analysis of Two or More Modalities using Local Covariance Decomposition.**
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.
Human Brain Mapping.

2022 **Dissociable multi-scale patterns of development in personalized brain networks.**
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.
Nature Communications.

2021 **A simple permutation-based test of intermodal correspondence.**
SM Weinstein, SN Vandekar, A Adebimpe, TM Tapera, T Robert-Fitzgerald, RC Gur, RE Gur, A Raznahan, TD Satterthwaite, AF Alexander-Bloch, RT Shinohara.
Human Brain Mapping.

2021 **Simulation-based design of pragmatic trials in psoriatic arthritis using propensity scores.**
SM Weinstein, LC Coates, PS Helliwell, A Ogdie, AJ Stephens-Shields.
Clinical Trials.

2021 **Multiple sclerosis diagnosis: Knowledge gaps and opportunities for educational intervention in neurologists in the United States.**
AJ Solomon, M Kaisey, SC Krieger, S Chahin, RT Naismith, **SM Weinstein**, RT Shinohara, BG Weinshenker.
Multiple Sclerosis Journal.

2020 **Modifiable factors associated with postoperative delirium after hip fracture repair: an age-stratified retrospective cohort study.**
J Poeran, C Cozowicz, N Zubizarreta, **SM Weinstein**, SG Deiner, RM Leipzig, JI Friedman, J Liu, M Mazumdar, SG Memtsoudis.
European Journal of Anaesthesiology.

2019 **Risk factors for postoperative delirium in patients undergoing lower extremity joint arthroplasty: a retrospective population-based cohort study.**
SG Memtsoudis, C Cozowicz, N Zubizarreta, **SM Weinstein**, J Liu, DH Kim, LA Poultsides, MM Berger, M Mazumdar, J Poeran.
Regional Anesthesia & Pain Medicine.

2019 **Perioperative impact of sleep apnea in a high-volume specialty practice with a strong focus on regional anesthesia: a database analysis.**
L Pichler, **SM Weinstein**, C Cozowicz, J Poeran, J Liu, LA Poultsides, JN Saleh, SG Memtsoudis.
Regional Anesthesia & Pain Medicine.

2019 **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.**
C Cozowicz, J Poeran, N Zubizarreta, J Liu, **SM Weinstein**, L Pichler, M Mazumdar, SG Memtsoudis.
British journal of anaesthesia.

2018 **Lack of association between levels and length of intraoperative controlled hypotension and acute kidney injury in total hip arthroplasty patients receiving neuraxial anesthesia.**
SM Weinstein, JT YaDeau, SG Memtsoudis.
Regional Anesthesia & Pain Medicine.

2018 **Neuraxial anaesthesia techniques and postoperative outcomes among joint arthroplasty patients: is spinal anaesthesia the best option?**
SM Weinstein, LR Baaklini, J Liu, LA Poultsides, C Cozowicz, J Poeran, JN Saleh, SG Memtsoudis.
British journal of anaesthesia.

2018 **Postoperative delirium in total knee and hip arthroplasty patients: a study of perioperative modifiable risk factors.**
SM Weinstein, LA Poultsides, LR Baaklini, EE Mörwald, C Cozowicz, JN Saleh, MB Arrington, J Poeran, N Zubizarreta, SG Memtsoudis.
British journal of anaesthsia.

Manuscripts under review

2022+ **Spatially-enhanced clusterwise inference for testing and localizing intermodal correspondence.**
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.
bioRxiv. Revision requested by *NeuroImage*.

2022+ **Similarity-Based Multimodal Regression.**
AA Chen, **SM Weinstein**, A Adebimpe, RC Gur, RE Gur, KR Merikangas, TD Satterthwaite, RT Shinohara, H Shou.
bioRxiv.

2022+ **Development of Top-Down Cortical Propagations in Youth.**
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.
bioRxiv.

2022+ **Patient-reported experience of multiple sclerosis diagnosis is associated with subsequent disclosure and concealment.**
VM Leavitt, AM Kever, **SM Weinstein**, RT Shinohara, H Schmidt, SM Aoun, A Solari, AJ Solomon.

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   ⋆ *denotes invited presentation.*

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 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