Stanford

# Kanhao (Alex) Zhao

Postdoctoral Scholar, Psychiatry

NIH Biosketch available Online

## Bio

### BIO

Dr. Zhao is a postdoctoral researcher at Stanford University specializing in computational neuroscience, neuroimaging, and integrative multi-omics approaches to brain health. His research integrates supervised and unsupervised machine learning, functional neuroimaging, microbiome sequencing, metabolomics, and large-scale clinical datasets (e.g., Alzheimer's Disease Neuroimaging Initiative and National Health and Nutrition Examination Survey) to investigate how modifiable risk factors such as obesity, diet, and gut dysbiosis contribute to accelerated brain aging, cognitive vulnerability, and psychiatric symptoms.

His work focuses on developing multimodal frameworks that combine functional brain connectivity, cognitive and emotional phenotyping, microbiome profiles, and metabolomic signatures to uncover biological mechanisms underlying early cognitive decline and neuropsychiatric disorders. Through these approaches, Dr. Zhao aims to identify personalized intervention strategies—including dietary modification, microbiome-targeted therapies, and metabolite-guided treatments—to mitigate obesity-related brain aging and reduce the risk of cognitive impairment, Alzheimer's disease, anxiety, and depression.

In addition to translational neuroscience research, Dr. Zhao develops machine learning and computational methods for biomarker discovery, disease prediction, and precision psychiatry. His recent work also explores autonomous AI research agents and self-improving computational systems for large-scale neuroimaging and multi-omics foundational analysis. His publications were in online Nature Mental Health, Molecular Psychiatry, JAMA Network Open. He serves as a peer reviewer for leading journals, including Nature Mental Health, Medical Image Analysis, IEEE Transactions on Medical Imaging, npj Digital Health, and Neuropsychopharmacology.

### PROFESSIONAL EDUCATION

- PhD, Lehigh University , Bioengineering (2025)

### STANFORD ADVISORS

- Yu Zhang, Postdoctoral Faculty Sponsor

## Research & Scholarship

### RESEARCH INTERESTS

- Brain and Learning Sciences
- Child Development
- Data Sciences

- Psychology

## Publications

### PUBLICATIONS

- **Generalizable structure-function covariation predictive of antidepressant response revealed by target-oriented multimodal fusion** *NATURE MENTAL HEALTH*
  Tong, X., Zhao, K., Fonzo, G. A., Xie, H., Carlisle, N. B., Keller, C. J., Oathes, D. J., Sheline, Y., Nemeroff, C. B., Trivedi, M., Etkin, A., Zhang, Y.
  2025
- **Functional Connectome of Superagers Reveals Early Markers of Resilience and Vulnerability to Alzheimer's Disease.** *bioRxiv : the preprint server for biology*
  Zhao, K., Xie, H., Fonzo, G. A., Carlisle, N. B., Jacobs, T., Osorio, R. S., Church, A., Lin, F. V., Zhang, Y., ADNI Study Group
  2025
- **Multiband EEG signatures decoded using machine learning for predicting rTMS treatment response in MDD.** *Journal of affective disorders*
  Arteaga, A., Tong, X., Zhao, K., Carlisle, N. B., Oathes, D. J., Fonzo, G. A., Keller, C. J., Zhang, Y.
  2025: 119483
- **Deep graph learning of multimodal brain networks defines treatment-predictive signatures in major depression.** *Molecular psychiatry*
  Jiao, Y., Zhao, K., Wei, X., Carlisle, N. B., Keller, C. J., Oathes, D. J., Fonzo, G. A., Zhang, Y.
  2025
- **Multiband EEG signature decoded using machine learning for predicting rTMS treatment response in major depression.** *medRxiv : the preprint server for health sciences*
  Arteaga, A., Tong, X., Zhao, K., Carlisle, N. B., Oathes, D. J., Fonzo, G. A., Keller, C. J., Zhang, Y.
  2024
- **Dementia Subtypes Defined Through Neuropsychiatric Symptom-Associated Brain Connectivity Patterns.** *JAMA network open*
  Zhao, K., Xie, H., Fonzo, G. A., Carlisle, N. B., Osorio, R. S., Zhang, Y.
  2024; 7 (7): e2420479
- **Optimizing Antidepressant Efficacy: Multimodal Neuroimaging Biomarkers for Prediction of Treatment Response.** *medRxiv : the preprint server for health sciences*
  Tong, X., Zhao, K., Fonzo, G. A., Xie, H., Carlisle, N. B., Keller, C. J., Oathes, D. J., Sheline, Y., Nemeroff, C. B., Williams, L. M., Trivedi, M., Etkin, A., Zhang, et al
  2024
- **Discriminative functional connectivity signature of cocaine use disorder links to rTMS treatment response.** *Nature. Mental health*
  Zhao, K., Fonzo, G. A., Xie, H., Oathes, D. J., Keller, C. J., Carlisle, N. B., Etkin, A., Garza-Villarreal, E. A., Zhang, Y.
  2024; 2 (4): 388-400
- **Symptom dimensions of resting-state electroencephalographic functional connectivity in autism.** *Nature. Mental health*
  Tong, X., Xie, H., Fonzo, G. A., Zhao, K., Satterthwaite, T. D., Carlisle, N. B., Zhang, Y.
  2024; 2 (3): 287-298
- **Early prediction of dementia using fMRI data with a graph convolutional network approach.** *Journal of neural engineering*
  Han, S., Sun, Z., Zhao, K., Duan, F., Caiafa, C. F., Zhang, Y., Solé-Casals, J.
  2024; 21 (1)
- **Individualized fMRI connectivity defines signatures of antidepressant and placebo responses in major depression.** *Molecular psychiatry*
  Zhao, K., Xie, H., Fonzo, G. A., Tong, X., Carlisle, N., Chidharom, M., Etkin, A., Zhang, Y.
  2023; 28 (6): 2490-2499
- **A generalizable functional connectivity signature characterizes brain dysfunction and links to rTMS treatment response in cocaine use disorder.** *medRxiv : the preprint server for health sciences*
  Zhao, K., Fonzo, G. A., Xie, H., Oathes, D. J., Keller, C. J., Carlisle, N., Etkin, A., Garza-Villarreal, E. A., Zhang, Y.
  2023

- **A dynamic graph convolutional neural network framework reveals new insights into connectome dysfunctions in ADHD.** *NeuroImage*
  Zhao, K., Duka, B., Xie, H., Oathes, D. J., Calhoun, V., Zhang, Y.
  2022; 246: 118774

- **Modified GAN Augmentation Algorithms for the MRI-Classification of Myocardial Scar Tissue in Ischemic Cardiomyopathy** *FRONTIERS IN CARDIOVASCULAR MEDICINE*
  Sharma, U. C., Zhao, K., Mentkowski, K., Sonkawade, S. D., Karthikeyan, B., Lang, J. K., Ying, L.
  2021; 8: 726943