

## Biostatistics and Data Coordination

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Annual Update for Division of Biostatistics in Psychiatry  
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### Overview

The Biostatistics Division at the New York State Psychiatric Institute (NYSPI) provides researchers access to and training in state-of-the-art statistical techniques needed for optimal use of their research data. The Division's activities include developing and applying new methodologies for the design and analysis of psychiatric studies, participating in major, funded research projects, teaching statistics to researchers and fellows of training grants, mentoring PhD candidates from the Department of Biostatistics at the Mailman School of Public Health at Columbia University, and providing consultations on data-analytic and design issues for grant submission and manuscript preparation. The division holds a weekly seminar series inviting external and internal speakers on topics describing biostatistical methods relevant to psychiatry. The seminars are open and well attended by researchers from all divisions of NYPSI and provide an environment to discuss current biostatistical data analysis problems.

In July 2012, Melanie Wall, PhD, became the new director of the division, taking over from the retiring Naihua Duan, PhD. Over the past year the division has grown to include 5 PhD faculty and 3 Masters level biostatisticians. In addition to Yuanjia Wang, PhD, and Sue Marcus, PhD, new members of the division include: Jean Choi, MS, Andrew Glass, MS, Tianshu Feng, MS, and starting in summer 2013 Hanga Galfalvy, PhD, and Seonjoo Lee, PhD. Moreover, the division also has a new administrator, Ms. Jina James.

Specific recent methodological work has included developments in the areas of psychometrics, instrument assessment, longitudinal data analysis, causal analysis, generalizability, functional data analysis, modern statistical learning, mapping genetic determinants of complex traits, and implementation science. In synergy with these recent methodological developments and incorporating expertise in clinical trial and observational data analysis, our biostatistics faculty participates in extensive collaborations with many psychiatry researchers including projects studying anxiety disorders, cardiovascular response to emotions, stress markers and birth outcomes of teen pregnancy, substance dependence clinical trials and epidemiology, mental health services research, suicide prevention, eating disorders, and complicated grief.

### Current Research

**Jean Choi** has collaborated as the primary data analyst with Richard Sloan in Behavioral Medicine working on several clinical trials examining the effects on cardiovascular responses due to aerobic conditioning as well as varying emotions and participated in one paper being published in Psychophysiology. Jean has been involved in ongoing development of new statistical methods for relating the high dimensional cardiac monitoring data to the momentary assessment of emotions.

Substance abuse clinical trials have been the focus of **Andrew Glass** who has provided extensive statistical support including being involved in two papers accepted in the

American Journal of Addiction and Drug and Alcohol Dependence with Maria Sullivan, Francis Levin, and Ned Nunez and others from the Substance Abuse division.

**Tianshu Feng** collaborates as the primary data analyst with Catherine Monk in Behavioral Medicine working on several studies looking at stress markers and birth outcomes in teen pregnancy. Tianshu has been working on methods to analyze ambulatory assessments.

Dr. **Yuanjia Wang** is leading a biostatistical core including **Jean Choi** and 2 biostatistics student interns working on the Recovery After Initial Schizophrenia Episode (RAISE) grant (PI: Lisa Dixon) which would support a two-site observational study of functioning outcomes and engagement of persons experiencing a first episode of psychosis.

Dr. **Yuanjia Wang** continues to work on two clinical trials in the eating disorder group: Olanzapine vs. Placebo for Outpatients with Anorexia Nervosa (PI: Dr. Evelyn Attia); Physical Activity in Anorexia Nervosa: Characteristics and Clinical Significance (PI: Dr. Tim Walsh) and has recently finished up work on a manuscript summarizing trial results with Dr. Joanna Steinglass comparing a novel intervention for anorexia nervosa -- Exposure and Response Prevention for Anorexia Nervosa -- as compared with an active control psychotherapy, cognitive remediation therapy, among individuals receiving inpatient treatment. She is also mentoring a graduate student to examine physical activity data in Anorexia Nervosa patient by modern functional data analysis techniques.

Dr. **Yuanjia Wang** has continued collaboration with Dr. Kathy Shear's clinical trial research program on complicated grief. She has mentored a biostatistics PhD student Christine Mauro as the data analyst on a recent outcomes paper appearing in Depression and Anxiety and in a synergy between real psychiatric applications and new methods, published a new statistical classification method using auxiliary markers in the Journal of the American Statistical Association.

Furthering methodological development in clustering methods, flexible modeling of complicated longitudinal and genetic data, **Dr. Yuanjia Wang** was highly productive publishing nine additional method papers in the past year including articles in the Journal of the American Statistical Association, Biometrics, Biostatistics and Applied Statistics of the Journal of the Royal Statistical Society

Dr. **Sue Marcus** has continued to provide statistical collaboration for several clinical trials conducted within the Anxiety Disorder group and has been involved in papers being published with Blair Simpson including one in JAMA Psychiatry where she led analysis done by former division biostatistician **Jamie Weaver** and another with Caroline Rodriguez in Neuropsychopharmacology where she led analysis done by **Tianshu Feng**.

Dr. **Sue Marcus** continued her development and applications of propensity score matching methodology in the area of health services. Two new publication including biostatistical collaborators Dr. Naihua Duan and Jamie Weaver were in Psychiatric Services with Lisa Dixon looking at a wait-list control trial for family members of persons with serious mental illness and in Health Services and Outcomes Methodology looking at the effect of housing vouchers for decreasing homelessness in veterans. Another publication with biostatistical collaborator Bo Lu at Ohio State University looked at matching and instrumental variable approaches to evaluate long term effects of psychiatric treatment and was published in Health Services and Outcomes Methodology.

Dr. **Melanie Wall** collaborated with Dr. Debbie Hasin to obtain a newly funded NIDA R01 (PI: Hasin) to investigate the impact of state level medical marijuana law passage on

adolescent marijuana use. Melanie Wall is extending small area estimation methodology for use on 20 years of national survey data collected in the Monitoring the Future study to develop state level trend estimates of marijuana use pre-post law changes. **Tianshu Feng** is also working on implementation for this project.

A new NIMH R01 longitudinal study to examine the impact of interagency collaboration on providers' implementation of CDC's Diffusion of Effective Behavioral Interventions was secured by Rogerio Pinto (Social Work) with the close collaboration of Dr. **Melanie Wall** and **Jean Choi**. This study involves hierarchical modeling of agency and HIV service provider characteristic associated with implementation of evidence based practices. Working in tandem with this grant, the team published two new papers including one in the American Journal of Public Health using structural equation modeling to examine the role of transdisciplinary collaboration and one in the Journal of Mixed Methods.

Dr. **Melanie Wall** collaborated with Dr. Carlos Blanco to secure a new NIDA R01 (PI: Blanco) focused on a life course developmental model to understand the interrelationships among risk factors for substance use disorders. Utilizing data from the NESARC, Dr Wall has published two new papers with Dr. Blanco on the latent structure of fears and social anxiety disorder in Psychological Medicine and latent structure of generalized anxiety disorder and major depression disorder in Depression and Anxiety.

Dr. **Melanie Wall** in collaboration with Dr. Debbie Hasin has been involved in papers focused on changes to the criteria set for substance use disorders for DSM-5. A paper was published in Drug and Alcohol Dependence demonstrating unidimensionality of criteria sets across different substance disorders and a paper validating the nicotine criteria was published in Journal of Studies on Alcohol and Drugs. Also in collaboration with Dr. Hasin, Dr. Wall was involved in new nosological work describing the latent structure of psychiatric disorders on a paper led by Kerry Keyes in Psychological Medicine and one by Nick Eaton in Journal of Abnormal Psychology.

Dr. **Melanie Wall** continues to collaborate on a research project focused on adverse childhood experiences, personality psychopathology and alcohol disorder (PI: Hasin) and with the team has published a paper in British Journal of Psychiatry demonstrating the negative effects of different types of childhood adversities on adult mental health.

Using an item response theory to create a combat exposure severity scale and focusing on additive interactive effects using nonlinear modeling, Dr. **Melanie Wall** finished a paper with Dr. Doherenwend and colleagues on PTSD among Vietnam war veterans published in Clinical Psychological Science.

Expanding applications of structural equation models to clinical research, **Dr. Melanie Wall** published a new paper with colleagues Matt Kushner and Bob Krueger from University of Minnesota on treatment for internalizing psychopathology in Psychological Medicine. With funding from the Policy Scholars program, Dr. **Melanie Wall** and **Andrew Glass** collaborated closely with Neil Aggarwal on developing and accessing a new fidelity measure for the Cultural Formulation Interview.

Making good use of previously collected data from two discontinuation drug trials for depression completed several years ago (PI: Jon Stewart), Dr. **Melanie Wall** and **Andrew Glass** discovered an interesting pattern of placebo effect in HAM-D scores and are working closely with both Jon Stewart and Bret Rutherford on a new manuscript describing the results.

Dr. **Melanie Wall** has been involved in two different projects developing measurement scales for stigma among mentally ill. Working with Milton Wainberg and Karen McKinnon, Dr. Melanie Wall helped develop a manuscript examining a new questionnaire on sexual stigma and working with Jerel Ezell and Bruce Link, Dr. Wall and **Jean Choi** analyzed the psychometric properties of a new daily indignities scale.

Dr. **Melanie Wall** published eight new papers with her long term collaborators at the University of Minnesota examining the psychosocial and environmental risk factors of disordered eating and obesity in adolescents. One example includes a manuscript in Social Science and Medicine on the associations between friends' disordered eating and muscle-enhancing behaviors which was front page on the New York Times. Another is a first-authored paper looking at patterns of obesogenic neighborhood features published in the American Journal of Preventive Medicine.

## **Education and Training**

### **Statistical Mentorship for K-award recipients:**

The biostatistics in psychiatry faculty has served as statistical mentors for several new and ongoing K-award recipients: Kerry Keyes, Mark Hatzenbuehler, Ron Thompson, Nasir Naqvi, Neil Aggarwal

### **Graduate students:**

The biostatistics in psychiatry faculty actively participates in the advising of Columbia graduate students including:

Christine Mauro– biostatistics PhD student advised by Yuanjia Wang

Gary Yu – biostatistics Dr.PH student advised by Melanie Wall

Jung Yeon Park – education PhD student advised by Melanie Wall

Kim Glickman – social work (complicated grief) PhD student committee Melanie Wall

Minerva Wong – Neurobiology (Holly Moore's group) PhD student consulted by Yuanjia Wang

Jennifer DeCuir – epidemiology (substance abuse) – PhD student committee Melanie Wall

Ciara Torres – Sulzer Lab – PhD student consulted for lab mice data

Xingyuan Li and Xiao Yu Mo – biostatistics master students advised by Yuanjia Wang working on RAISE study

Guangwei Qiu -- biostatistics master student advised by Yuanjia Wang working on physical activity study

Ruth Eisenberg – biostatistics masters student project analyzing skin conductance data for fear conditioning with Melanie Wall

Tse Choo and Fion Hsueh- biostatistics masters student advised by Melanie Wall on adolescent disordered eating project EAT

### **Guest Lectures:**

Our biostatistics in psychiatry faculty gave over 10 guest lectures to various groups in New York Psychiatric Institute Research Fellow programs. Some topics covered included: sampling methods, regression analysis, clinical trial design, propensity score methods, factor analysis, mediation analyses, and structural equation modeling.

### **Semester Course offering:**

Dr. Wang taught a semester course in Introduction to Biostatistical Methods predominantly to graduate students in biostatistics. Dr. Wall taught a semester course in Latent Variable and Structural Equation Modeling to a combination of graduate students and New York Psychiatric Institute fellows and researchers.

### **Honors and Awards**

Dr. Yuanjia Wang was promoted to Associate professor of biostatistics (in psychiatry) with tenure at Columbia University

Dr. Melanie Wall started a new 3 year term as a member of the Mental Health Service Research (SERV) NIMH Initial Review Group.

Dr. Yuanjia Wang was appointed the Program Chair for the new ASA section on Mental Health Statistics

### **Publications (Selected)**

**Wang Y**, Huang C, Fang Y, Yang Q, and Li R. Flexible semiparametric analysis of longitudinal genetic studies by reduced rank smoothing. *Applied Statistics: Journal of the Royal Statistical Society, Series C.* 61, 1-24. 2012

**Wang Y**, Chen H, Zeng D, Mauro C, Duan N, and Shear K. (2013). Auxiliary marker assisted classification in the absence of class labels. *Journal of the American Statistical Association.* In press 2013.

**Marcus S, Weaver J**, Lim S, **Duan N**, Gibbons RD, Rosenheck R: Assessing the causal effect of Section 8 housing vouchers as the active ingredient for decreasing homelessness in veterans with mental illness. *Health Services and Outcomes Methodology*, 12(4): 273-287. 2012.

Doherenwend B, Yager T, **Wall MM**, Adams BG. The roles of combat exposure, personal vulnerability, and involvement in harm to civilians or prisoners in Vietnam war-related posttraumatic stress disorder. *Clinical Psychological Science.* Online Feb 2013.

**Wall MM**, Larson N, Forsyth A, Van Riper D, Graham D, Story M, Neumark-Sztainer D. Patterns of obesogenic neighborhood features and adolescent weight: A comparison of statistical approaches. *American Journal of Preventive Medicine*, 42(5):e65-e75. 2012

### **Divisional Highlights**

With the appointment of Dr. Melanie Wall as new director there have been six new hires including 2 PhD faculty members, 3 Masters level biostatisticians and a new division administrator.

Dr. **Melanie Wall** collaborated with Dr. Debbie Hasin to obtain a newly funded NIDA R01 (PI: Hasin) to investigate the impact of state level medical marijuana law passage on

adolescent marijuana use. The highly methodological project is extending small area estimation methodology for use on 20 years of national survey data collected in the Monitoring the Future study to develop state level trend estimates of marijuana use pre-post law changes expected to be of great interest in informing passage of future laws.

In a synergy between psychiatric clinical applications and new methods, **Yuanjia Wang** with student Christine Mauro published a new statistical classification method using auxiliary markers from Dr. Kathy Shear's complicated grief study in the Journal of the American Statistical Association.

Dr. **Sue Marcus** in collaboration with Naihua Duan and Jamie Weaver applied a propensity score matching methodology for a project with Lisa Dixon looking at a wait-list control trial for family members of persons with serious mental illness and it was published in Psychiatric Services.

During this year, Biostatistics Division faculty participated in writing 35 new grant proposals (NIH R's, K's, PCORI, NSF, and Foundations) with NYSPi researchers submitted either through RFMH or Columbia. Five were funded with several others scored and being resubmitted.

The division's Seminar Series for Biostatistics in Psychiatry invited 11 speakers this year discussing methods from mediation analysis to real-time prediction in clinical trials. The seminars are open and were well attended by researchers from all divisions of NYPSI.