IOWA | Department of Biostatistics

Iowa Summer Institute in Biostatistics

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Table of Contents

2025 Iowa Summer Institute in Biostatistics Presentations

Zachary Goldstein
Yeshiva University

Lauren Luecke
Kent State University

William Marzen
University of Iowa

Iowa Summer Institute in Biostatistics - University of Iowa
Department of Biostatistics

Evaluating Barriers that Audiologists Perceive to Providing Care Under Medicaid

The goal of our project is to evaluate what barriers audiologists perceive to participating in Medicaid insurance programs. We will use their survey responses to identify the factors that predict whether they partially or fully accept Medicaid and the proportion of their patients that use it. Our independent variables include setting, years in practice, specialty, region, perceived barriers, and social responsibility questions. We will use chi square and fisher exact tests to determine significant variables and then use logistic regression to model the data. Identifying the barriers that may hinder Medicaid acceptance is vital for advocacy to increase Medicaid participation. This information is especially important now since recent Medicaid cuts may further impact access to audiology care.

Jacob Oleson, Professor, Dept. of Biostatistics, University of Iowa
Eva Rasche, Graduate Student Mentor, Dept. of Biostatistics, University of Iowa

Connor Asmus
University of Houston

Ja'Moya Blue
Winston-Salem State University

Brock Olson
Kansas State University

Maia Pietraho
Northwestern University

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Department of Biostatistics

Observing and Evaluating EDA as a Functional Predictor

The human body responds to stress with the activation of the sympathetic nervous system. This causes slight changes in electrical conductivity of the skin, or electrodermal activity (EDA), which can be monitored by measuring the resistance to a small current passed through the skin by a wearable device. This research focuses on validating EDA as a proxy for affective engagement and evaluating its association with students professed intellectual and academic traits. EDA data was collected in a pilot study that included three activities designed to invoke cognitive and emotional arousal. Measurements for each of the participants were compared based on an "arousal ratio" metric, developed in previously published work for analyzing fluctuations depicted on EDA profiles in a maker space. Using functional data analysis, specifically scalar-on-function regression, we further studied the relationship between characteristics of the EDA profiles and several intellectual and academic traits such as professed intellectual humility, mathematical attitude, test anxiety and need for cognition. Graphical analyses showed promising results with respect to test anxiety and mathematical attitude. These findings should be investigated and confirmed in a future larger study.

Dr. Gideon K. D. Zamba, Professor, Department of Biostatistics, University of Iowa

Sia Gbondo-Tugbawa
University of Connecticut

Jacob Gerber
Rose-Hulman Institute of Technology

Owen Gould
Grinnell College

Lauren Walker
Colgate University

Iowa Summer Institute in Biostatistics - University of Iowa
Department of Biostatistics

How Blood Flow Forces Trigger Cancer Cells to Spread

Metastasis is the process by which cancer cells break off from their original cluster and spread to another organ or tissue, and often contributes to the fatality of cancer. Cancer cells subjected to the mechanical forces from blood flow (fluid shear stress) may show changes in gene expression that help ensure the cells metastasize effectively. Our data come from an experiment at the University of Iowa's Holden Comprehensive Cancer Center, in which researchers exposed cancer cells to fluid shear stress and compared it to a static control group. The experimenters then used a technique known as RNA-Sequencing to count the number of times each gene in the cell was expressed at different timestamps. For our analysis, we used the limma package from the Bioconductor project to normalize the distribution of counts and apply linear regression techniques to the data. After determining which genes differed in expression between the static and sheared treatments, we used Gene Ontology (GO) Enrichment analysis to classify them and to investigate the specific role such genes may play in metastasis.

Patrick Breheny, Professor, Dept. of Biostatistics, University of Iowa

Anthony Hobson
Wartburg College
Aiden Orth
University of California, Los Angeles
Carina Scholtens
Baylor University
Ryan Thoreson
Coe College

Iowa Summer Institute in Biostatistics - University of Iowa
Department of Biostatistics

Deep Learning to Predict Enrollment at the University of Iowa

This project extends ongoing research at the University of Iowa focused on predicting incoming undergraduate student enrollment throughout the admissions cycle. This process is complicated due to important predictors of enrollment that change over time, and the outcome of interest is observed much less frequently than the predictor information. Addressing these challenges, this work explores the concept of adversarial debiasing in neural network models to extract generalizable predictions from input data from multiple years; the results are then evaluated against currently used models, such as random forests and gradient boosted trees.

Results indicated that, while there is some promise to the use of neural network methods, challenges remain. Dramatically increased computational burden, in addition to inconsistencies in training performance appear to limit the straightforward application of these techniques.

Improvements to the training process, software optimizations, or alternative architectures could provide avenues for improvement.

Grant Brown, Associate Professor, Dept. of Biostatistics, University of Iowa

Clara Fields
Carleton College
Esmeilyn J. Tejada
Kean University
Serena Shu
Biola University

Iowa Summer Institute in Biostatistics - University of Iowa
Department of Biostatistics

Mediation Analysis for Burnout Among Ukrainian Military Personnel

Burnout is a psychological syndrome that develops due to consistent job stress and may have some overlapping symptoms with PTSD. This study analyzes data collected from Ukrainian soldiers on the frontlines of the Russo-Ukrainian War and sought to identify factors associated with burnout among military personnel. A particular interest lies in exploring the mediation effect of Interpersonal Guilt Rating Scale (IGRS) on the pathway between psychological needs constructs called Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS), and Burnout Assessment Tools (BAT). A full-scale multivariate mediation analysis was performed while adjusting for demographic variables such as Age, Religion, Gender, Experience in combat zone, to name a few. Our exploration suggests potential mediation effects of Survivor Guilt, Omnipotent Responsibility, and Separation Disloyalty while adjusting for demographic variables. It is important to note the joint effect of covariates such as Age, Education and Religion on the pathway between BAT and BPNSFS in the presence of IGRS mediators.

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