Message from our Chair

Shumei S. Sun, PhD
W. Hans Carter Professor and Chair

For the next five years, Yunyun Wu, Brian Bush, Cindy Sabo and I will be working on statistical aspects of studies of alternate nicotine delivery devices under the direction of Dr. Thomas Eisenberg of the VCU Center for the Study of Tobacco Products.

Support for this five-year project derives from the Tobacco Master Settlement Agreement (MSA) between the four largest United States tobacco companies (Philip Morris Inc., R. J. Reynolds, Brown & Williamson and Lorillard) and the attorneys general of 46 states. The states settled their Medicaid lawsuits against the tobacco industry for recovery of tobacco-related health-care costs. In exchange, the companies agreed to curtail or cease certain tobacco marketing practices, as well as to pay, in perpetuity, annual payments to the states to compensate them for the medical costs of caring for persons with smoking-related illnesses.

The companies agreed to pay a minimum of $206 billion over the first twenty-five years of the agreement. The MSA also created the American Legacy Foundation to support research on effective tobacco programs ($250 million over 10 years).

With the passage of the 2009 Family Smoking Prevention and Tobacco Control Act the FDA acquired the authority to regulate the manufacture, marketing, and distribution of tobacco products in order to protect public health. Within the framework of the Tobacco Control Act, the NIH and FDA formed an interagency partnership to foster tobacco regulatory research. The FDA has expertise in tobacco regulatory science and the authority and resources to support research responsive to FDA’s regulatory authority. NIH biomedical, behavioral and social sciences research supported via funding from FDA will provide the scientific evidence needed to better inform FDA’s regulatory authorities.

Soon after we received the good news that Dr. Eisenberg’s grant was to be funded, we held a meeting to plan a five-year study of electronic cigarettes and how they deliver nicotine when used appropriately and inappropriately. I thought you might be interested in my introductory remarks to our new collaborators:

“Our biostatistical team is an integral component of the Center for the Study of Tobacco Products. We also function as an integral part of the multicenter study of febrile seizures, and an integral part of ENVISION, a multicenter computational analysis of the epidemic of childhood obesity.

“The diversity of these three major projects underscores John Tukey’s memorable remark, “Statisticians get to play in everyone’s backyard.” I was fortunate enough to have met this great leader of American statistics who, at the time, was secretly involved in Cold War espionage operations run out of a special computational facility at Princeton University. Professor Tukey also worked to develop early computers at Bell Labs and coined the term software and the term ‘bit,’ a contraction of binary digit.

Professor Tukey was the first to make a clear distinction between exploratory data analysis and confirmatory data analysis, believing that statistical methodologists placed too great an emphasis on confirmatory analysis. Tukey would be gratified by our Center investigators who are focusing intensely on exploratory data analysis to elucidate a major problem of public health. He famously said, “Far better an approximate answer to the right question, than an exact answer to the wrong question.” Fortunately,
the many iterations of our four data-generating protocols have led us to the right questions, and with the application of the right kind of statistical analysis we will be able to arrive at the right answers to the right questions.

“Tukey’s insightful comments reveal the ubiquity and the power of statistics to guide research design, data collection, data storage and data analysis in a wide range of fields, including genomics, proteomics, and metagenomics. Over the past 250 years statisticians have developed an impressive armamentarium of statistical tools for analyzing specific problems, so that now there is a method for just about every problem. We are the fortunate inheritors of that body of knowledge and are at your disposal to provide the best analytical fit for your data.

“You have probably heard of Bayesian statistics or Bayesian approaches to quantifying probability and uncertainty. In fact, Bayesian statistics can be thought of as the science of uncertainty. The other great division of statistics is called frequentism, perfected and promulgated by great statisticians of the past century especially R.A Fisher and Karl Pearson who focused on measures of central tendency, normal and log-normal distributions, sampling strategies, tests of significance, and univariate and multivariate regression. Frequentism values precision and hypothesis testing above all. Until recently its adherents viciously derided Bayesian statistics and its champions as being hopelessly subjective and non-scientific.

“You will be relieved to know that within the past twelve years, the two-century schism between Bayesians and frequentists has been healed. Wise statisticians now embrace both approaches to solving relevant problems, instead of rejecting a major portion of mathematical thought! In the face of sparse, missing, or erroneous data, a Bayesian approach would be preferable. When dealing with large quantities of precise data and clear hypotheses, a frequentist approach would be more appropriate.

“In reviewing the statistical aspects of the four main projects, it seems to me that we could apply a Bayesian approach early on when data are sparse and later on a frequentist approach when the data collection is complete and we are gearing up to accept or reject our null hypotheses.

“For those of you who are interested in learning more about Bayesian theory, I recommend an excellent book by Sharon Bertsch McGrayne entitled *The Theory that Would Not Die*, a riveting account of how Bayes Theorem ignited one of the greatest scientific controversies of all time. The chapter on the work of Pierre Simon Laplace in the 18th and early 19th centuries is stunning. This great mathematician encompassed both Bayesian and frequentist approaches to data analysis. As a frequentist he engaged in amassing the largest collection of data the world had ever seen in order to estimate the population of France, which turned out to be just under 29 million Frenchmen and women. He moved on from this challenge to tabulate large samples of births all over France in 1801 in order to ascertain the sex ratio with as great a precision as possible… which turned out to be 107 boys per 100 girls, a figure that has remained unchallenged to this day. As a Bayesian, he couched Bayes Theorem in more elegant mathematical formulations, which also have remained essentially unchanged today.

“You will be reassured to learn that our Department of Biostatistics is non-doctrinaire and that we have plenty of room under our tent to accommodate all manner of statisticians.”

With that last remark, I concluded my brief overview of the statistical help that we can offer.
FACULTY HIGHLIGHTS

Accessible Methodology and User-Friendly Software for Multivariate Hierarchical Models Given Incomplete Data

Out of 34 proposals competing for funding in the Institute of Education Sciences (IES) Methodology section this year, this project is the only one funded—unusually competitive due to the sequestration. The three-year project aims to develop methodology and user-friendly software for unbiased and efficient estimation of hierarchical models given incomplete data that are broadly accessible to multidisciplinary researchers. The models may be multivariate involving discrete or continuous outcome variables, or both, at any of the levels.

Hierarchical data arise from nested settings such as children nested within schools, adults within neighborhoods, and patients within doctors or hospitals. Longitudinal follow-up of these individuals adds an additional level of nesting. Hierarchical models, AKA multilevel or mixed-effects models, are appropriate to analyze such data. A ubiquitous problem is that nearly all hierarchical data sets have missing values typically at multiple levels.

We develop methods for unbiased estimation of hierarchical models while efficiently handling missing values of the outcomes and covariates at any of the levels. The key element of this project is development of user-friendly software that implements the methods. Supported by our previous IES grant R305D090022, we developed user-friendly software to efficiently estimate univariate two- and three-level hierarchical linear models (HLM) given continuous data missing at random (MAR, Shin and Raudenbush 2007, 2010, 2011, 2013; Shin 2012, 2013). This project extends the missing data methods and software to efficient estimation of multivariate two- and three-level HLM; hierarchical nonlinear models for binary or ordinal categorical outcome variables, or a mixture of the discrete and continuous outcome variables; and two-way hierarchical cross-classified linear models for longitudinal data where children may move across schools.

The user-friendly software will: enable a data analyst to specify her desired hierarchical model; efficiently estimate by maximum likelihood a joint distribution of the variables, including the outcomes, that are subject to missingness given all of the covariates that are completely observed; produce multiple imputation of completed data given the estimated joint distribution; and estimate the user-specified hierarchical model given the multiple imputation (Shin 2013). The key idea is that the user need only specify her desired model. The software automates the rest of the analysis steps, making the incomplete data analysis indistinguishable from the complete data counterpart from the user’s perspective. Consequently, the software will be accessible to a broad range of multidisciplinary researchers. We will hold a series of workshops to train researchers how to intelligently use the developed methods and software.

Published Book for Non-Statisticians

Roy Sabo, Assistant Professor

Congratulations to Roy Sabo who published the book “Statistical Research Methods: A Guide for Non-Statisticians”. The idea for writing this book arose simply from a lack of acceptable alternatives. In BIOS and STAT 543, their has been a struggle for years to find a book that fits our needs. The market is saturated with texts that explain the concepts we cover, yet they invariably speak from a statistical perspective, which is not useful for the students, who are generally enrolled in a graduate program or are academic professionals in non-statistical fields. Thus, Dr. Sabo and Dr. Boone wrote a series of lecture notes that they felt spoke in a language the students could understand, which didn’t over-simplify the material, and at the same time did not make it more challenging than it needed to be. Ed Boone and Roy Sabo worked tirelessly to translate these notes into a publishable form, and are pleased with the final product. Hopefully they can enjoy a year or two away from the process before they start prepping for the second edition.

Click a link below to visit that section of the Biostatistics Department website:

Publications List
Graduate Program
Consulting a Biostatistician

Biostatistician Research Interests
Biostatistics Research Seminar Series

WWW.BIOSTATISTICS.VCU.EDU
Our Newest Alumni

In addition to our May 2013 graduates, we will have 2 more PhD students graduate in December 2013. Not surprisingly, our students continue to be in demand in the professional world, with recent graduates accepting positions at:

- Duke University
- Synta Pharmaceuticals
- Health Diagnostic Laboratory
- National Institute of Environmental Health Sciences
- University of California, San Diego
- Department of Biostatistics, VCU

Welcome new students!

We held our 21st annual New Student Introduction and Reception in August 2013. Faculty, staff and returning students welcomed the following new students:

- Erik Dvergsten
- Kingston Kang
- Hangcheng Liu
- Zach Martin
- Vincent Nardone, MD
- Yongjia Pu
- Anda Wood
- Keith Zirkle

Bhanu Evani

Presented his research “Weighted quartile sum regression assessing the association of environmental chemical mixtures and oral health” at the Daniel T. Watts 2013 Research Poster Presentation in the VCU School of Medicine on October 16, 2013.

Presented his research “Preventive dental services in a home visiting program and the impact on children’s dental utilization” at the 141st Annual Meeting of the American Public Health Association in Boston, MA on November 4, 2013.

Ghalib Bello


Chunfeng Ren

Presented her research “Estimations of small area life expectancy: A comparison of two-method” at the American Public Health’s Association’s meeting on November 2, 2013.

Featured Student

Hanan Hammouri,
PhD Candidate

Hanan lives in Richmond, VA with her family. Her husband Sultan and two young boys Fares and Yosef who keep her very busy. She is originally from Jordan. She received her bachelor degree in applied mathematics and Master degree in mathematics from Jordan University of Science and Technology.

Hanan finished her coursework and she is preparing herself to defend her dissertation “Review and Extension for the O’Brien Fleming Multiple Testing Procedure” with Dr. Roy Sabo. She has a diverse history of research experiences. She has worked as a teaching assistant for three different courses, worked as a consultant for the Dentist Department at VCU and now she is working as a biostatistician at the Virginia Health Quality Center. Her goal is to establish a Biostatistics Department in Jordan University of Science and Technology.

Hanan has many interests when she is not working on her dissertation. She loves to spend quality time with her family and taking care of them. She likes to cook, especially Mediterranean food. Also she loves to travel; after she finishes her degree, she will enjoy traveling with her family to many places.
DEPARTMENT LAUREL

Honors

Lauren Grant, PhD Student was a 2013 Bass Fellow.

Bhanu Evani, PhD Student was the recipient of the 2013 Karl E. Peace Biostatistics Award for Excellence and Scholarship with the Department of Biostatistics.

Kyle Ferber, PhD Student, was inducted into the honor society Phi Kappa Phi.

Newly awarded grants & contracts, June 2013—October 2013

William Anderson, PhD

Co-I on NIH’s award entitled “Efficacy of an Organization Skills Intervention for middle School Students with ADHD” with Dr. Joshua Langberg of Psychology as PI.

Brian Bush, MS and Wen Wan, PhD

Brian will be a Data Manager and Dr. Wan will be a Co-I on AHRQ’s award entitled “Effectiveness of shortened Interval to Postpartum Visit in Improving Attendance” with Dr. Saba Masho of Epidemiology & Community Health as PI.

Yongyun Shin, PhD

PI on IES’s award entitled “Accessible Methodology and User-Friendly Software for Multivariate Hierarchical Models Given Incomplete Data”.

Leroy Thacker, PhD

Co-I on AHA’s award entitled “Intestinal Ischemia as Stimulus for Systemic Inflammatory Response after Cardiac Arrest” with Dr. Mary Peberdy of Internal Medicine as PI.

David Wheeler, PhD

PI on NIH’s award entitled “Models for Cumulative Spatial-temporal Assessment of Non-Hodgkin Lymphoma Risk.”

Shumei Sun, Brian Bush, Cynthia Sabo, & Yunyun Wu

Biostatistics Core on NIH’s award entitled “Center for the Study of Tobacco Products” with Dr. Thomas Eissenberg of Psychology as PI.
Wedding & Baby News

Zirui Gu, Graduate Student
Congratulations to Zirui who married Xue “Snow” Wu on September 20, 2013.

Nitai Mukhopadhyay, PhD
Congratulations to Nitai and his wife who are expecting their 2nd child.

Mary Haynes, Graduate Student
Congratulations to Mary and her husband who are expecting their 1st child.

New Hires

David Fenstermacher, PhD
The department would like to welcome Dr. Fenstermacher. He is currently the Chief Research Information Officer, Director for Research Informatics at VCU, Director of Biomedical Informatics for the Center for Clinical and Translational Research (CCTR) and Professor in the Department of Biostatistics. Previously he was the Founding Chair and Associate Professor of the Department of Biomedical Informatics at the Moffitt Cancer Center and Chief Bioinformatics Officer for M2Gen. Dr. Fenstermacher will be, as of August 26, 2013 the Chief Research Information Officer and Professor of Biostatistics at Virginia Commonwealth University. He received his doctoral degree from the University of North Carolina at Chapel Hill (UNC-CH). Prior to joining the fields of bioinformatics and biomedical informatics, Dr. Fenstermacher spent fourteen years as a molecular biologist/geneticist. During his fourteen years in biomedical informatics at UNC-CH, the University of Pennsylvania (UP) and Moffitt he has designed and directed the implementation of several biomedical informatics distributed computing systems to support basic and clinical research, including multiple institution research projects. Current research focuses on developing informatics resources specifically for comparative effectiveness research and precision medicine. His background as a bench scientist brings a unique perspective to the design of computational tools to support basic and clinical research studies. Dr. Fenstermacher has held several faculty positions at the UNC-CH, the UP and the University of South Florida.

Robert Perera, PhD
Dr. Perera joined our department July 2013. He is an Assistant Professor. A large component of his research expertise fall within the realm of structural equation modeling. This includes exploratory and confirmatory factor analysis, relationships between latent constructs, and latent growth curve modeling (LGCM). Related to LGCM, he also possess expertise in longitudinal data analysis using mixed effects/ heirarchical linear models. He has interest in experimental design using traditional ANOVA methods and mixed effects models. Much of his current research has focused on measurement and test development using classical test theory and item response theory as well as the accuracy and precision of estimates and statistical power.

Adam Sima, PhD
Adam Sima, former graduate student, joined the Biostatistics Department this Fall as an Assistant Professor. His methodological research interests lie in the understanding how, and correcting, the biases that are introduced by the researcher in model selection processes, particularly in linear-mixed effects models. He is also very involved in collaborative research with members of the rehabilitation community, especially in the areas of transition to the workplace for people with disabilities and the study of traumatic brain injuries.
VCUAlumni

Virginia Commonwealth University has created VCU Alumni, a new “umbrella” organization of all alumni entities. For more information, check out the link below: https://www.vcualumni.org/index.html

VCU has also added a new Vice President for Development and Alumni Relations, Marti K. S. Heil, and she recently communicated some updated facts:

There are 11,026 active, dues-paying members of VCU Alumni

VCU has 2,998 alumni donors vs. 1,689 alumni donors this time last year

Here on the MCV Campus, three new chairs and nine new scholarships have been created as a result of endowment gifts in the last quarter.

If you are interested in being featured in the newsletter, visiting, speaking, presenting, or simply want to get back in touch with your alma mater, please contact Russ Boyle (boyle@vcu.edu) or Dr. Chris Gennings (gennings@vcu.edu) for more information.

Biostatistics Alumni

Whether or not you decide to join VCU Alumni, the department needs your help! We are in the process of updating our alumni database. We are periodically asked to prepare reports regarding our graduates for the university as well as the School of Medicine. More importantly, we would like to know where you are, and accurate contact information would benefit our graduate program. So, if you could send us the name of your employer, professional title, professional mailing address and professional email address, we would greatly appreciate the information. Please send to Russ Boyle, boyle@vcu.edu. Thanks in advance for your assistance.

Job Opportunity

Open Rank Tenure-Eligible Faculty Position #F35740

Virginia Commonwealth University (VCU) is shaping the future of healthcare through innovative research and clinical advances in bioinformatics, biomedical informatics and clinical informatics. The School of Medicine is seeking outstanding candidates for a tenure-track assistant professor/associate professor/professor faculty position in bioinformatics. The selected candidates will have extensive experience in bioinformatics and/or systems biology as demonstrated by publications in peer-reviewed journals and through successful collaborative or independent research grants. Expertise in the analysis of high-dimensional data using machine learning/data mining techniques for -omics-based data, including next-generation sequencing data, is preferred. The primary focus is to perform collaborative translational research with basic, clinical and population research scientists as well as pursue independent research opportunities.

Candidates whose research experience includes transcriptomics, biomarker discovery, determination of molecular disease mechanisms, disease stratification and applicants with strong methods/quantitative skills, are particularly encouraged to apply.

Please click on the position hyperlink for more information