

Talk Title: A New Class of Structural Equation Models for Longitudinal Mediation Analysis and a Multivariate Predictive Model for Laparoscopic vs. Open Appendectomy

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Abstract

In this presentation, I will introduce my thesis research along with some of my other collaborative projects, showing the general applicability of the statistical methods to studies on treatment and health care policy. Mediation analysis concerns a cause and effect relationship among three variables where we hypothesize one variable, called the mediator, explains how a predictor affects the outcome. Structural equation models (SEM) are used to model the complex correlated relationship of a mediation process. Through projects and examples, including a test of a clinical model of drinking and suicidal risk, I will provide a basic introduction about SEM in the context of mediation analysis. Since SEM is often applied to longitudinal data to infer causal relationships, biased estimates arise when missing data follows the missing at random (MAR) mechanism and stringent distribution assumptions are not met, very common situations in real world problems. In this talk, I propose a new approach that provides non-biased estimates within this context of longitudinal mediation analysis. I illustrate its application and robustness using real as well as simulated study data. I will also be discussing in depth a study of a large dataset from the National Surgical Quality Improvement Program (NSQIP) of the American College of Surgeons. In this collaborative project we created a multivariate predictive model of factors associated with laparoscopic appendectomy to examine the risk of post-operative surgical infections.