



**THE MEASUREMENT, EVALUATION, STATISTICS, AND ASSESSMENT  
DEPARTMENT**

Invite you to Attend the Final, Public Dissertation Defense for:

**Jordan Lawson**

Titled:

**Strengthening Causal Inferences: Examining Instrument-Free  
Approaches to Addressing Endogeneity Bias in the Evaluation of an  
Integrated Student Support Program**

The defense will be held on

**Tuesday, May 21st at 2 PM**  
in  
**Campion 224**

Dissertation Committee:

Dr. Laura O'Dwyer (Chair), Dr. Eric Dearing (Reader), Dr. Michael Russell (Reader),  
Dr. Mary Walsh (Reader)

Abstract:

Education researchers are frequently interested in examining the causal impact of academic services and interventions; however, it is often not feasible to randomly assign study elements to treatment conditions in the field of education (Adelson, 2013). When assignment to treatment conditions is non-random, the omission of any variables relevant to treatment selection creates a correlation between the treatment variable and the error in regression models. This is

termed endogeneity bias (Ebbes, 2004). In the presence of endogeneity bias, treatment effect estimates from traditionally used regression approaches may be biased.

This dissertation research investigates the utility of two novel and underused statistical approaches for addressing endogeneity bias, namely least squares Gaussian copula regression developed by Park and Gupta (2012), and Latent Instrumental Variable (LIV) regression developed by Peter Ebbes (2004). Using simulation data, the researcher investigated both the performance and boundaries of the two proposed methods compared with that of OLS and Instrumental Variable (IV) regression. In addition, the proposed methods were used with real-world school admissions lottery data to investigate the impact of an integrated student support model, City Connects, on student academic achievement. The use of school admissions lottery data allowed the first-ever comparison of the two proposed methods with IV regression under a large-scale randomized control (RCT) trial.

Simulation study findings suggest that both Gaussian copula and LIV regression are useful approaches for addressing endogeneity bias across a range of research conditions. Furthermore, simulation findings suggest that the two proposed methods have important differences in their set of identifying assumptions, and that some assumptions are more crucial than others.

Results from the application of the Gaussian copula and LIV regression in the school lottery admissions study provided strong empirical validity evidence for the two proposed methods, as the treatment effect estimates from the Gaussian copula and LIV regression approaches matched those from IV regression with a random lottery offer instrument. Moreover, the LIV method was able to reproduce the random lottery offer with a high degree of accuracy. Furthermore, these findings demonstrate that receiving an integrated student support during elementary school has a positive impact on mathematics achievement. Such findings underscore the importance of addressing out-of-school barriers to learning.