Mathematics, Statistics, and Computer Science    **@ UIC**

# Statistics and Data Science Seminar

*Evidence factors from multiple, possibly invalid, instrumental variables*

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**Abstract:** Instrumental variables have been widely used to estimate the causal effect of a treatment on an outcome in the presence of unmeasured confounders. When several instrumental variables are available and the instruments are subject to possible biases that do not completely overlap, a careful analysis based on these several instruments can produce orthogonal pieces of evidence (i.e., evidence factors) that would strengthen causal conclusions when combined. We develop several strategies, including stratification, to construct evidence factors from multiple candidate instrumental variables when invalid instruments may be present. Our proposed methods deliver nearly independent inferential results each from candidate instruments under the more liberally defined exclusion restriction than the previously proposed reinforced design. We apply our stratification method to evaluate the causal effect of malaria on stunting among children in Western Kenya using three nested instruments that are converted from a single ordinal variable. Our proposed stratification method is particularly useful when we have an ordinal instrument of which validity depends on different values of the instrument. This is based on joint work with Anqi Zhao, Dylan Small, and Bikram Karmarkar.

| Wednesday, October 27 at 4:00 PM in Zoom |
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