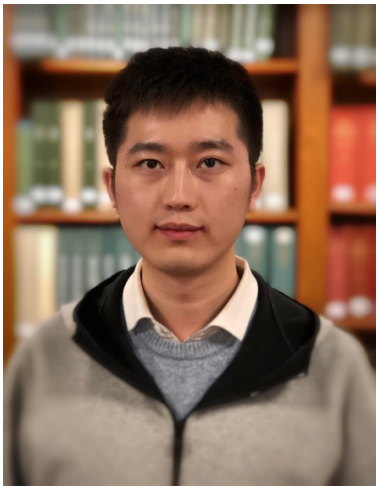
Yale SCHOOL OF PUBLIC HEALTH

Center for Methods in Implementation and Prevention Science (CMIPS), Yale School of Public Health; **Department of Statistics and Data Science**, Yale University; **Yale Research Initiative on Innovation and Scale (Y-RISE)**; **The Institution for Social & Policy Studies (ISPS) with the MacMillan Center - CSAP Quantitative Research Methods Workshop**

"An Evaluation of the Product Method for Estimating Natural Indirect Effect and Mediation Proportion in Epidemiological Studies"



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Tuesday, October 13, 2020
12:00 - 1:00 PM
Via Zoom

https://yale.zoom.us/j/97198016931?pwd=ZUttSXRxWGp0SzFmT00yMU9EazhHdz09&from=msft
Password: 366661

Abstract: We conducted simulation studies to examine the empirical performance of product method for calculating the point and interval estimates of two commonly used mediation measures: the natural indirect effect (NIE) and mediation proportion (MP). The simulation study considered several data types that the mediator and outcome variables can be binary or continuous. Two approaches to obtain the confidence interval were evaluated: the multivariate delta method and percentile bootstrap approach. In the scenarios of binary outcome, we proposed the exact NIE and MP expressions accounting for common outcome prevalence and compared the results between the exact expressions and approximate expressions based on a rare outcome prevalence assumption. Our simulation studies confirm that: (1) A sample size of at least 500 is needed to obtain accurate NIE point and interval estimates; (2) In order to obtain accurate MP point estimates, a sample size of 500 and sample size of 5000 and number of cases at 200 are required for the scenarios of continuous and binary outcome, respectively; (3) The bootstrap approach outperforms the delta method in calculating the confidence interval of MP, but the multivariate delta method also presents satisfactory interval estimates when sample size ≥ 500 for the cases of continuous outcome, and sample size ≥ 20,000 or number of cases ≥ 500 for the cases of binary outcome; (4) The rare outcome assumption in the cases of binary outcome generally performs well when baseline outcome prevalence less than 5%. R-software package was provided for researchers to apply the mediation models considered in this paper.

Chao Cheng is a first-year doctoral student in the Department of Biostatistics at the Yale School of Public Health. His research mainly focuses on measurement error correction, casual inference, statistical genetics, and time series analysis. He is also interested in applying statistical models in public health and epidemiological studies. Currently, he is working with Drs. Fan Li and Donna Spiegelman to conduct research in casual mediation analysis. From 2019 to 2020, he worked as a research assistant under Dr. Spiegelman's supervision. Prior to Yale, he obtained a master's degree in Applied Statistics from Tsinghua University and a bachelor's degree in Finance from Donghua University (Shanghai, China).