

Optimal Design for Mediation Studies in Group-Randomized Trials with Group-Level Mediators

Mediation studies investigating the mechanisms of interventions often lay the groundwork for the critical development and iterative improvement of a specific treatment. Despite growing interest and development in mediation studies, literature guiding the efficient design of mediation studies has been limited to the malleable parameters considered in the literature (e.g., the between treatment equal sampling costs assumption and the balanced design constraint). This study is to develop a more flexible optimal design framework for 2-2-1 mediation studies. Specifically, this project will (a) derive the optimal design parameters to maximize the statistical power under a fixed budget while allowing the costs of sampling vary across both treatment conditions and levels of hierarchy; (b) investigate the robustness of the proposed framework to the misspecification of design parameters (e.g., intraclass correlation coefficient); and (c) implement the optimal design framework for 2-2-1 mediation studies in the R package odr (Shen & Kelcey, 2018a). Preliminary results show that the proposed framework can identify the most efficient designs and/or designs with the greatest statistical power, and that the framework is fairly robust to the misspecification of design parameters. This project has the great potential to shift future 2-2-1 mediation studies to more effective and efficient ones.