“Defining and measuring susceptibility effects under contagion”

The effects of interventions targeting potentially contagious outcomes are often evaluated in clusters of interacting individuals. Contagion induces complex dependence: an individual’s outcome may be influenced by other cluster members’ treatments, outcomes, or both. A widely accepted approach to evaluate the efficacy of such interventions defines the “direct effect” as the contrast between the potential infection outcomes under treatment and no treatment, averaged over the conditional distribution of possible treatment assignments to other individuals. The direct effect is often used as an approximation to the susceptibility effect of an intervention, i.e. the contrast between the potential infection outcomes conditional on the exposure to infection. At the same time, theoretical and empirical studies have shown that the direct effect may change depending on the treatment allocation within clusters. Using an agent-based model of contagion, we explain this discrepancy, and show how some randomization designs ensure that the direct effect cannot be interpreted as a susceptibility effect.