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Title: Modeling intervention compliance behavior: Insights from a cross-sectional survey

Abstract:

Epidemiological modeling provides an understanding of epidemic trajectories and enables intervention design. However, most models represent individual intervention compliance at most in a very simplified way. The effects of this simplification on model results are unclear.

We plan to develop a behavioral module of intervention compliance for agent-based epidemiological models. The goal is to gauge whether such a module can improve the predictive capability of epidemiological models and thereby improve the design and targeting of interventions to manage future epidemics.

Based on a review of literature from the fields of health psychology, social simulation, and social sciences, in general, we synthesized three behavioral models of intervention compliance in epidemics. We will test these models both for their explanatory capability using empirical data and for their predictive, generative capability in agent-based simulations. Here, we present the results of statistical modeling for one of the three models. This model integrates reflective, malleable variables, specifically Attitude, Risk Perception, and Subjective Norm, with more automatic and immutable variables, specifically Intervention Habit and (socioeconomic) Opportunity and Capacity to Comply.

We utilized a scenario describing a novel influenza in which we varied different epidemic characteristics using a 3x3 factorial design. The factors are the government response to the epidemic, the local diseases incidence, and the observed compliance of others; factor levels go from weak or low to strong or high. In a survey, we gathered responses from N=3000 adult German residents. Using this data, we then estimated a partial least squares structural equation model (PLS-SEM).

We find that all variables except Opportunity and Capacity are significantly associated with Compliance and explain more than half of the variance in Compliance. However, caution is required when interpreting these findings. This is partly due to the known weaknesses of using self-report data, and especially self-report data in the context of a hypothetical scenario. While our future work will focus on implementing and comparing all three behavioral models in simulation, other avenues include an experimental test of the model, as well as experimental tests of the hypotheses generated from simulations using this behavioral model.