THE DATA WRANGLER

Imagine you're working on a treatment protocol to help patients overcome addiction. It's vitally important to determine whether or not the treatment is effective, so you conduct a clinical trial. This seems like a straightforward solution, but how useful is your data when the participants, for a variety of reasons, do not always fully adhere to the treatment protocol? How do you know if — or how well — the treatment works?

"I'm by no means the first person to think about this problem, but my impression is that it is often not accounted for, because it is hard to deal with statistically," says UNCG Assistant Professor of Economics Martijn van Hasselt. Through a grant from the National Institute on Alcohol Abuse and Alcoholism, Van Hasselt is developing a set of statistical models and methods to provide researchers with an elegant solution.

As an issue affecting clinical trial data, non-compliance behavior presents a number of methodological and statistical challenges. To help organize all of this unruly data, Van Hasselt has chosen a statistical tool wielded by few economists — Bayesian modeling.

Economists, according to Van Hasselt, usually don't work with Bayesian models, which are commonly used in fields like medicine and biostatistics. Van Hasselt has more experience in those areas than the typical economist — before joining the Bryan School of Business and Economics in 2014, he spent four years as a research economist for RTI International, evaluating government-funded health care projects.

In Van Hasselt's work, a Bayesian model quantifies prior uncertainties about important unknowns — compliance behavior and treatment effectiveness for example — as a range of possible values with probabilities assigned to them, with a mechanism that relates those unknowns to patient outcomes. Outcome data from the clinical trial are then fed into the model. Depending on how the data fit, researchers begin to resolve prior uncertainties, making statistical inferences, for example, about the level of compliance and the effectiveness of treatment.

An advantage of Bayesian modeling is that you can leverage information from multiple sources. Existing evidence taken from earlier studies about the effectiveness of various treatments, such as for alcohol abuse or addiction, can be used together with the data gleaned from a new clinical trial, to better inform an understanding of the impact of the treatments.

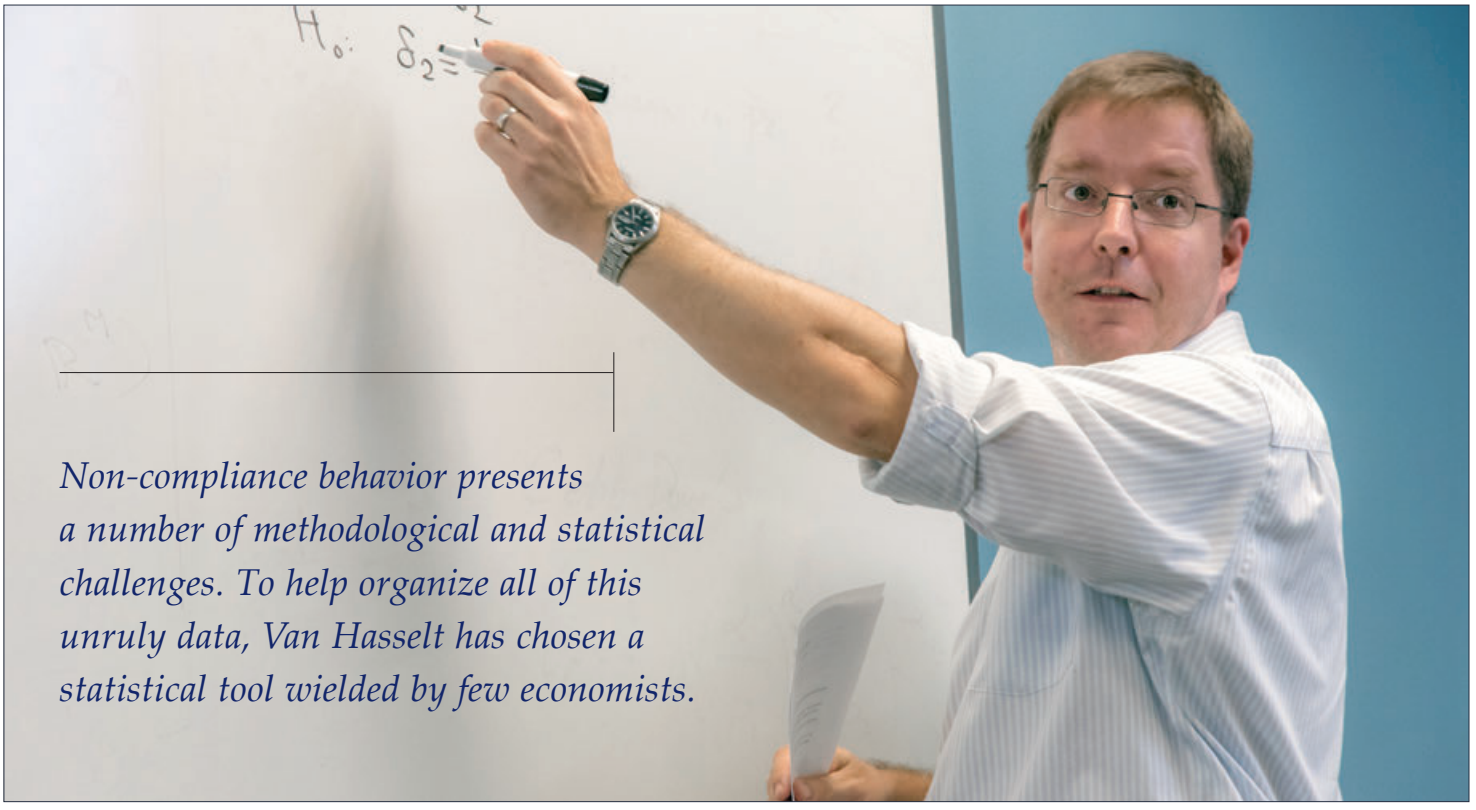
Van Hasselt is applying his model to data produced by a large clinical trial study on alcohol abuse and alcoholism, which was completed some years ago.

"The anticipated impact is that we'll be providing researchers in the field with a set of tools that are intuitive, that can be easily implemented, and that adjust inference about the effectiveness of interventions to account for non-compliance."

But the findings from this study are not limited to treatments for addiction or even to medical protocols. "What I really want to do," states Van Hasselt, "because I am ultimately a social scientist and an economist, is take some of the results from this research and apply them to the evaluation of social programs, or economic programs, or economic incentives."

As a first step to that end, Van Hasselt hopes to make his methodology available via software that will allow people to work with the models and modify them for their own purposes.

By Laura Gonzo • Photography by Martin Kane • Learn more at http://bae.uncg.edu



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