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Associations Between Ridesharing and Motor Vehicle Crashes

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TO THE EDITOR—Rideshare use has increased exponentially over the last decade, and motor vehicle crashes are a leading cause of death or injury globally. Conner et al's[1] examination of associations between Uber trips and motor vehicle crashes in Houston, Texas, is a welcome addition to an important and emerging area of inquiry. In particular, the authors' use of trip-level Uber data—which they accessed directly from the provider—is an exciting development for the field. However, we have several concerns regarding the specification of the statistical models and possible bias of the parameter estimates.

Conner et al[1] conducted ecological time series analyses in which they related Uber trip volume to counts of motor vehicle crashes using zero-inflated Poisson models. Data were aggregated by hour. They also related Uber trip volume to counts of impaired driving convictions using Poisson models, with data aggregated by day. Both analyses used the logarithm of vehicle miles travelled per year in Harris County as an offset term. We believe these analyses could have been affected by using data with mismatching temporal scales and by failing to account statistically for temporal dependencies.

First, the authors correctly note that Uber trip volume is likely to be related to the overall volume of vehicular traffic, and that it was necessary to control for this potential confounder. However, the high temporal precision for the Uber data (hours, days) is not matched by similar temporal precision for vehicular traffic data (years), meaning there is likely to be considerable residual confounding due to vehicular traffic flow.[2] Confounding is a common problem for ecological studies[3] and can bias coefficients in either direction, including reversing the direction of an association.

Second, it is often the case in time series data that values in one temporal unit correlate with values in proximal temporal units, violating assumptions of unit independence. Ignoring temporal dependencies increases the likelihood of erroneously rejecting the null hypothesis.

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There are well-established statistical methods that enable analyses of serially correlated data[4] including for count values[5], which the authors did not employ.

In our opinion, these multiple potential biases give reason to treat with caution the authors' assertion that "introducing rideshare services to the Houston area was associated with a significant decrease in MVC trauma and impaired driving convictions".

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