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Comment on Article by Kim et al.

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I congratulate Kim et al. on a valuable contribution. It's gratifying to see ongoing progress in the statistical modeling of human fecundity, as well as initial results from an important data set, the Oxford Conception Study. I have a few comments regarding the comparability of these results to those from other studies in relation to day-specific probabilities of conception, model fit and inference, the impact of using different biomarkers of ovulation on the duration of the "fertile window" (including the two approaches used in this paper), and the future applications of these models.

1 Characteristics of the Fertile Window

Overall, these results of day-specific probabilities of conception are similar to those of previous studies, including the higher probabilities found in parous women as compared to nulliparous women (Mikolajczyk and Stanford 2006). However, the relative decreases in conception probability on LH day -2 in relation to day -3 and -1, as well as on day 0 in relation to days -1 and +1, do not admit of any plausible physiologic explanation. In a previous study using the Schwartz model, a smooth (monotonically increasing then decreasing) fertile window was found for the overall study with 434 conceptions out of 3175 cycles around basal body temperature, but many local "dips" similar to those found by Kim et al. were found within most of the analyses of various subgroups of roughly one third to one sixth of the overall sample, including subgroupings by geographic center, age, and cycle characteristics (Colombo and Masarotto 2000). Perhaps future methods work including simulations can elucidate whether such patterns are in fact artifacts related to sample size, or whether they reflect a stark heterogeneity of the pattern of the fertile window in the underlying populations (which seems less likely). Another option to address this issue when sample size limits statistical precision is to constrain the model to a unimodal shape (Dunson and Colombo 2001). The full data of the Oxford Conception Study, when available, should have roughly four times the sample size of this analysis and will likely to be able to address the impact of sample size on the shape of the trajectory of the day specific probabilities (Pyper et al. 2006).

2 Model Fit and Inference

The greater flexibility of the generalized t-link model in relation to exponential link functions does seem to result in a better model fit, as assessed by link functions via the Deviance Information Criterion (DIC) and the pseudo marginal likelihood (LPML). It would also be helpful to see comparison simulation results for the exponential link models.

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