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Characterization of chaotic dynamics in the human menstrual cycle GREGORY DERRY, Loyola University Maryland, PAULA DERRY, Paula Derry Enterprises in Health Psychology — The human menstrual cycle exhibits much unexplained variability, which is typically dismissed as random variation. Given the many delayed nonlinear feedbacks in the reproductive endocrine system, however, the menstrual cycle might well be a nonlinear dynamical system in a chaotic trajectory, and that this instead accounts for the observed variability. Here, we test this hypothesis by performing a time series analysis on data for 7438 menstrual cycles from 38 women in the 20-40 year age range, using the database maintained by the Tremin Research Program on Women's Health. Using phase space reconstruction techniques with a maximum embedding dimension of 6, we find appropriate scaling behavior in the correlation sums for this data, indicating low dimensional deterministic dynamics. A correlation dimension of $\cong$2.6 is measured in this scaling regime, and this result is confirmed by recalculation using the Takens estimator. These results may be interpreted as offering an approximation to the fractal dimension of a strange attractor governing the chaotic dynamics of the menstrual cycle.

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