**Workshop**

**Nonlinear Longitudinal Trajectory Analysis with P-Splines in R**

Wednesday 19th October 2022 – OS6, Oakfield House. Bristol

Registration: [eventbrite](https://www.eventbrite.co.uk/e/nonlinear-longitudinal-trajectory-analysis-with-p-splines-in-r-tickets-389478319137?utm-campaign=social&utm-content=attendeeshare&utm-medium=discovery&utm-term=listing&utm-source=cp&aff=escb)

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| **Time** | **Event** | **Speaker** |
| **08:45 – 09:00** | Arrival and registration |  |
| **09:00 – 09:30** | Introduction to workshop and recap of repeated-measures analysis for modelling linear change | Ahmed Elhakeem |
| **09:30 – 11:00** | Moving beyond a linear trajectory: limitations of simple polynomials, and introduction to splines | Zheyuan Li |
| **11:00 – 11:20** | Refreshment break |  |
| **11:20 – 12:30** | Estimation of nonlinear longitudinal trajectories (and features) using P-splines, with examples in mgcv | Zheyuan Li |
| **12:30 – 13:00** | Lunch |  |
| **13:00 – 14:15** | mgcv P-spline practical: estimating early life BMI trajectories and features (adiposity peak, rebound, and area under the BMI trajectory curve)\* | Ahmed Elhakeem;  Zheyuan Li |
| **14:15 – 14:45** | General P-splines, with examples in gps, and Bayesian P-splines, with examples in brms | Zheyuan Li |
| **14:45 – 15:00** | Discussion & wrap-up | Ahmed Elhakeem;  Zheyuan Li |

\* For the practical we will use a small synthetic replica dataset from the [ABCD study](https://academic.oup.com/ije/article/40/5/1176/656509). The practical dataset, questions and solutions will be made available before the workshop.

References

* [A review of spline function procedures in R](https://doi.org/10.1186/s12874-019-0666-3)
* [Using linear and natural cubic splines, SITAR, and latent trajectory models to characterise nonlinear longitudinal growth trajectories in cohort studies](https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/s12874-022-01542-8)
* [Generalized additive models: an introduction with R](https://doi.org/10.1201/9781315370279)
* [Hierarchical generalized additive models in ecology: an introduction with mgcv](https://doi.org/10.7717/peerj.6876)
* [Practical smoothing: the joys of P-splines](https://www.cambridge.org/core/books/practical-smoothing/D6A3B6662CCE8D6F570A6030CB5B0F7C)
* [General P-splines for non-uniform B-splines](https://arxiv.org/pdf/2201.06808.pdf)
* [Advanced Bayesian multilevel modeling with the R package brms](https://cran.r-project.org/web/packages/brms/vignettes/brms_multilevel.pdf)