OP59 MODELLING ACCELEROMETER DATA FROM 7-YEAR OLD BRITISH CHILDREN USING FUNCTIONAL ANALYSIS OF VARIANCE

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Background There is increasing evidence of the impact of physical activity (PA) in childhood on future health and well-being. The use of accelerometers in population-based studies provides objectively measured activity levels, although there are very few studies using this technology to collect data from young children. The resulting data are highly irregular trajectories and contains periods of activity reflecting multiple seasonal patterns, for example, daily, weekly and yearly. Functional Data Analysis (FDA) methods model temporal trajectories and extract detailed information from such complex datasets. In particular, FDA can identify the times of day when children are most active, and detects covariate effects varying throughout these temporal patterns.

Objectives To evaluate the feasibility and usefulness of using FDA to study accelerometer data within a large population-based study. We analyse data from the Millennium Cohort Study (MCS) to model trajectories of PA measurements.

Methods The MCS is a longitudinal study of socioeconomic and health-related characteristics of UK-born children. Between May 2008 and August 2009 children aged 7 enrolled in the MCS were asked to wear Actigraph GT1M accelerometers for seven consecutive days during waking hours. To date, data from 10,682 children have been received. We analysed a random sample of 501 children contributing to 1815 valid daily minute-by-minute PA profiles (median 4 days, range 1-9 days). Valid days had at least 10 h of non-zero PA daily measurements between 09:00 and 19:59. We used the R package fda to fit Functional Analysis of Variance (fANOVA) models based on smoothed penalised splines in order to analyse the effects of day of the week, weekend and season on the variation of the functional response consisting of accelerometer trajectories.

Results fANOVA established significant effects of day of the week and season. Workdays had peaks of PA around 10:30, 13:00, 14:30 and 15:30. No differences by weekdays were observed after 15:30. Weekend trajectories were more homogeneous and had higher PA levels, especially before 15:00 and on Saturdays, than workday trajectories. The highest recorded accelerometer measures excluding school playtime were observed during spring; summer had significantly higher PA levels after 18:00 than any season, and the lowest levels of PA took place in winter, especially after 13:00.

Conclusion We showed the potential of functional models have for analysing a large database of PA trajectories. This approach can also be used to evaluate the temporal effects of environmental and socioeconomic factors on PA in children.