RF32   IDENTIFYING AN INTERVENTION DIFFERENTIAL EFFECT WITHIN HETEROSCEDASTIC LONGITUDINAL DATA – AN EXAMPLE USING CHILDHOOD GROWTH

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Background Because responses to interventions can be heterogeneous, interest may lie in the extent to which any given individual's response to an intervention relates to their baseline status (an intervention differential effect; IDE). In interventions designed to prevent excess childhood weight gain, researchers may want to investigate whether children with higher or lower body weights at baseline respond differently to the intervention. However, when investigating the potential of an IDE, it is necessary to avoid the issue of mathematical coupling (MC), where change in weight is analysed with respect to initial weight using correlation or regression. The problem of MC, and methods used to overcome it (Oldham's method and multilevel modelling) have been described previously for outcomes that are homoscedastic. However, the literature does not explore how these methods perform in identifying IDEs in outcomes that are inherently heteroscedastic (such as growth in childhood body weight). We hypothesised that methods for detecting IDEs in heteroscedastic outcomes are only robust when analyses in the intervention group are compared with analyses in control group data.

Methods We explored the performance of Oldham's method and multilevel modelling in overcoming MC within heteroscedastic data. We simulated longitudinal data derived from child weight growth statistics, designed to be heterogeneous to reflect real-world growth data. To emulate weight-management programmes, an intervention group was simulated with an IDE, and a control group was simulated without. Methods for detecting IDEs were evaluated: first in the intervention group only, then with analyses of the intervention group contrasted with the control group. Simulations were performed in R and MLwiN.

Results We demonstrated that Oldham's method and multilevel modelling were biased when used to estimate an IDE within inherently heteroscedastic data. However, we showed that introducing a control group comparison enabled both methods to robustly detect an IDE in heteroscedastic data, providing that parametric assumptions of growth were justified and modelled explicitly (e.g. as linear, quadratic, etc.).

Conclusion Oldham's method and multilevel models can robustly detect an IDE in growth data that are inherently heteroscedastic if analyses include a control group and underlying growth patterns can be parameterised appropriately. For study designs that do not collect control group data (as with most weight management programmes amongst children), identification of an IDE currently remains intractable.

RF33   ARE ACTIVE BOYS AND GIRLS AT INCREASED RISK OF HOSPITAL ATTENDANCE OR ADMISSION FOR INJURY? A LONGITUDINAL STUDY IN WALES AND SCOTLAND USING LINKED COHORT AND ELECTRONIC HEALTH RECORDS

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Background Children and young people are being encouraged to increase the amount of time they spend being physically active, especially in activities of moderate and vigorous intensity. However, there is limited evidence on the prospective association of activity levels with injuries requiring health service utilisation. We examined the relationship between objectively-measured physical activity (PA) in childhood and subsequent hospital attendances or admissions for injuries, using linked electronic health records (EHR) from a nationally representative prospective cohort of children in Wales and Scotland. We hypothesised that children engaging in higher intensity PA at age seven experience higher rates of injury-related health service utilisation in later childhood and early adolescence.

Methods We analysed accelerometer-based estimates of moderate and vigorous (MVPA) and vigorous PA (VPA) from 1585 (777 [weighted %: 46%] boys) seven-year-old Millennium Cohort Study members, living in Wales or Scotland, whose parents consented to linkage of cohort to EHRs up until their 14th birthday. Negative binomial regression models adjusted by potential individual (sex, longstanding illness and weight status of child), household (poverty indicator, maternal age at birth of cohort child) and area-level (urban/rural) confounders, allowed us to estimate associations between average daily minutes of MVPA, and VPA, and number of hospital in-patient admissions and emergency department attendances for injuries from age nine to 14 years.

Results Children spent a median of 59.5 (IQR 46.4, 75.2) and 18.1 (12.5, 25.3) minutes in MVPA and VPA/day respectively, with boys significantly more active than girls; 47.3% of children experienced at least one injury-related admission/attendance. Associations of each 10 min increment in MVPA and VPA with number of admissions/attendances were strong and significant in boys: adjusted rate ratio [RR] (95% CI): 1.09 (1.01, 1.17) and 1.16 (1.00, 1.34), respectively, but not in girls: 0.94 (0.86, 1.03) and 0.85 (0.69, 1.04), respectively.

Discussion This is to our knowledge the first nationally representative prospective analysis examining associations between objectively measured PA in childhood and health service utilisation for injuries in childhood. We found that seven-year-old boys who engaged in more intense PA had higher injury-related admission or attendance rates from