Impact of wear time criteria upon physical activity estimates in children

Purpose: Lack of compliance with accelerometer wear time requirements can potentially lead to selection bias within a study. In an attempt to maximize participant numbers researchers may be tempted to employ more lenient wear time criteria. However, this may lead to misclassification of physical activity (PA) and sedentary time (ST), both through reducing the monitoring period and through failure to capture distinct periods of the day, resulting in inaccurate estimates of PA and ST and masking of true relationships between PA, ST and health. The present study aimed to explore the misclassification that may occur using three distinct 10 hour periods across the day in comparison to 24 hour continuous wear in children.

Methods: 149 children were asked to wear a GENEActiv accelerometer on their left wrist for 24 hours a day, for a period of 7 days. Including only children who complied with the full wear time protocol (n = 78), weekly average estimates of ST and time spent in light, moderate and vigorous PA were created for the full 24 hour criteria and for three 10 hour periods (8am – 6pm, 10am – 8pm, 12pm – 10pm) . Repeated Measures ANOVA were used to assess for significant differences across monitoring periods.

Results: In comparison to complete observation (24hours), the 10 hour periods across the day resulted in an underestimation of time spend sedentary and in each activity intensity (ps < 0.05). ST was underestimated by an average of 269 minutes, whilst Moderate to Vigorous PA (MVPA) was underestimated by 30 minutes. Between the 10 hour periods, higher rates of ST were accumulated in the latest period (12pm – 10pm), whilst higher estimates of MVPA were apparent between 8am and 6pm.

Conclusions: Time in PA and ST was underestimated with the use of shorter wear periods and researchers may be unknowingly misclassifying PA and ST by not accounting for which period of the day was measured. Future studies should use longer monitoring periods to gain accurate assessment of PA and to establish relationships with health variables.