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An investigation of the association between foods consumed and time-of-day in UK adolescents using the NDNS Rolling Programme (2008–2012)

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Adolescence is a period of profound hormonal and behavioural changes, which also coincides with disruption of circadian rhythms, sleep deprivation and irregular eating patterns⁽¹⁾. Together such factors may increase susceptibility towards weight gain and the development of obesity. Multiple epidemiological and animal studies have demonstrated a relationship between timing of energy and macronutrient intake and obesity, yet few have assessed trends in food group consumption over the day.

The present study makes use of four-day food records data from 884 adolescents aged 11–18 years participating in the 2008–2012 UK National Dietary and Nutrition Survey Rolling Programme (NDNS RP). The aim of the study was to investigate the relationship between time slots and food group consumption. Analysis focussed on the 25 major food groups which contribute to the top 80 % of adolescents' energy intake. Food records permitted classification of eating periods into seven time slots corresponding to early morning, mid/late morning, early afternoon, mid/late afternoon, early evening, late evening and night. Correspondence Analysis (CA) biplots were first used to describe food-time slots combinations that manifested some association in the randomly selected 20,567 food records used as the hypothesis generating sample.

Focusing on the set of foods classified as less healthy⁽²⁾, CA highlighted an association of sugary jams with breakfast, low-fat spreads with morning, chocolate/sweets and cake/pastries with afternoon, sausage and meat pies with both early and late evening and biscuits with night. Novel hypotheses generated by the initial CA analysis were then tested using logistic regression with survey weights via Generalised Estimating Equations in the remaining 20,455 food diary records⁽³⁾. Adjusted odds-ratios (ORs) were estimated for the population average effect of time slots on consumption of food groups. We report statistically significant results on selected high fat energy dense foods that emerged as linked to late times of the day in CA. In particular, we estimated that the odds of consuming biscuits at night was 67 % higher compared with the rest of the day (OR = 1.67, 95 % CI = 1.14:2.44, $p = 0.008$), the odds of consuming meat pies in the evening was 97 % higher than AM (breakfast and morning combined) (OR = 1.97, 95 % CI = 1.06:3.60; $p = 0.03$). Odds ratios were estimated with adjustment for the effect of sex, age and weekend/weekday. We also found that the odds of having biscuits compared to other foods significantly decreased with age and at weekends.

In conclusion, adolescents are more likely to consume less-healthy foods such as meat pies and biscuits later in the day. Such choice of high-fat foods may carry important public health implications related to the prevention of weight gain and obesity. Our data therefore provide novel insights to inform effective dietary strategies to promote behavioural change in this population subgroup.

1. Dashti HS, Scheer FA, Jacques PF *et al.* (2015) *Advances in Nutrition* 6, 648–59.
2. Pechey R, Jebb SA, Kelly MP *et al.* (2013) *Soc Sci Med* 92, 22–6.
3. Chapman A, Beh E, Palla L (2017) *Stud Health Technol Inform* 235, 166–170