families. As part of BiB, children completed three tasks of WM when they were aged 7–10 years. Ethnicity data were collected through classroom records ($n=14,076$), and socioeconomic data were linked from BiB baseline (at birth) ($n=4916$). Linear regression was used for all analyses. WM was analysed by age to provide an interpretation of the magnitude of the effect between socioeconomic and ethnic groups. We next analysed WM by (1) a latent-class measure of socioeconomic position at birth (with least deprived as baseline) and (2) nine different ethnic groups (White British – ethnic majority – as baseline). Finally, WM scores were presented by ethnic-specific groups of socioeconomic position for the ethnic majority and largest ethnic minority group (White British and Pakistani).

Results The difference between the least and most deprived socioeconomic groups was equivalent to at least a 1-year age difference ($B=-6.02$ [95% CI -7.51 to -4.54]). In comparison to White British children, Gypsy/Irish Traveller children had the lowest WM scores ($B=-9.58$ [-11.93 to -7.23]) (equivalent to a two-year age difference). Most other ethnic minority children scored higher than White British children for ≥ 1 task(s), for example, Pakistani children had higher scores on the forwards digit recall task ($B= 3.12$ [2.53 to 3.71]) (equivalent to a 9-month age difference). Finally, there was a social gradient in WM for White British children, but not for Pakistani children.

Conclusion Given the strong associations between WM and learning ability and the potential consequences for lifelong trajectories of health and wellbeing, these large socioeconomic and ethnic group differences in children's WM are concerning. This study also found socioeconomic disadvantage was more detrimental for WM among ethnic majority children than for ethnic minority children; this may suggest that the negative effects of disadvantage are buffered by other factors for ethnic minorities, such as social support and own ethnic density.

OP78 COMMUNITY SEVERANCE AND HEALTH – A NOVEL APPROACH TO MEASURING COMMUNITY SEVERANCE AND EXAMINING ITS IMPACT ON THE HEALTH OF ADULTS IN GREAT BRITAIN

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Background Aspects of community severance (the separation of people from goods, services, and each other by busy roads or other transport infrastructure) have been linked to poor health and wellbeing, but few studies have examined the overall relationship between community severance and health. We created a novel index for community severance and estimated its association with the self-rated health of adults in Great Britain.

Methods Data were collected from a nationally-representative online panel survey of 4,111 participants, February–July 2016. To construct an index, polychoric factor analysis (suitable for ordinal variables), was conducted on four survey items related to the perceived impact of roads on ability to walk locally: 1) traffic volume, 2) traffic speed, 3) availability of crossing points, and 4) adequate crossing time. Community severance index scores were negatively skewed, and were thus

categorised into four groups (lowest 40%, second, third and highest). Logistic regression was used to examine the association of community severance with self-rated health ('good' (very good/good) vs. 'poor' (fair/bad/very bad)), adjusting for potential confounders (age, income, employment status). We also examined effect modification of the severance and self-rated health association by environment type (urban/not urban) and the presence of a car in the household.

Results Polychoric factor analysis confirmed that it was appropriate to combine the four survey items into a single index (Cronbach's Alpha=0.86; Keiser-Meyer-Olkin measure of sampling adequacy= 0.76, all factor loadings >0.74). After controlling for confounding factors, being in the highest community severance index group was associated with higher odds of reporting poor self-rated health (Odds Ratio: 1.79, 95% Confidence Interval: 1.48–2.17) compared with the lowest scoring group. There was a dose-response gradient, with those in the second and third highest groups having increased odds of reporting poor self-rated health, though of lower magnitude ((OR 1.21, 1.01–1.45) and (OR 1.41, 1.16–1.71) respectively).

Conclusion We found an inverse association between community severance index and self-rated health. This suggests that to improve health, local governments and road authorities should take steps to reduce community severance through traffic reduction and calming, pedestrian prioritisation, and the installation of well-designed crossing points.

Friday 17 September

Nutritional EPI & Data, 13.00 – 15.30

OP79 ENERGY AND NUTRIENT TRENDS OF MENU ITEMS SERVED BY LARGE UK CHAIN RESTAURANTS, 2018–2020

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Background Increased consumption of out-of-home food is one important contributor to rising obesity rates. Currently, little is known about trends in the nutritional content of restaurant foods in the UK. The objective of this study was to evaluate longitudinal trends in energy and nutrient (i.e., saturated fat, sugar, and salt) content of menu items served by large UK chain restaurants.

Methods Data on energy and nutrient content of menu items served by large UK restaurant chains– defined by either number of outlets or turnover – that provided nutritional information on their websites were collected annually (2018–2020). A total of 23,911 items from 29 large UK chain restaurants were included in the analysis. We used linear mixed models to estimate per-item energy and nutrient changes, in all items and common items (i.e., items that were available in all three years, $N=2,433$) over time. We also explored if the trends varied across different types of restaurants (e.g. cafés, full-service restaurants) and food categories (e.g. beverages, pizza).

Results The sugar content of menu items served by large UK chain restaurants declined (0.43g/year, 95% CI= -0.66, -0.21, $p<0.001$) from 2018 to 2020. This reduction was

particularly driven by changes in beverages and desserts, and the trends were similar in all restaurant types. The average reduction in sugar was smaller in common items compared to all items (0.30 g/year vs. 0.43 g/year). Changes for energy and other nutrients were sporadic and inconsistent across different restaurant types and food categories.

Conclusion From 2018 to 2020, sugar per serving declined in restaurant menu items, which could help to reduce sugar intake in the UK population. This may reflect a response to Public Health England's Sugar Reduction Strategy. In contrast, there was little change in other nutrients. Future policies addressing the overall nutritional quality of restaurant foods, rather than single nutrients, may help the restaurant sector to move towards offering healthier foods.

OP80

SOCIODEMOGRAPHIC DIFFERENCES IN SELF-REPORTED EXPOSURE TO HIGH FAT, SALT AND SUGAR FOOD AND DRINK ADVERTISING: A CROSS-SECTIONAL ANALYSIS OF 2019 UK PANEL DATA

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Background Obesity disproportionately affects socially disadvantaged groups. Differential exposure to advertising of high fat, salt and sugar (HFSS) foods and drinks has been proposed as one factor which may explain these social inequalities. This study explores sociodemographic differences in exposure to HFSS advertising and whether exposure is associated with body mass index.

Methods Adults recruited to the Kantar Fast Moving Consumer Goods panel for London and the North of England completed an online survey on their exposure to HFSS advertising in February 2019 (n=1552). We used logistic regression models to assess the association between self-reported exposure to HFSS advertising and sociodemographic characteristics: sex (male or female), age group (18–34 years, 35–44 years, 45–54 years, 55–64 years or ≥65 years), socioeconomic position (high, middle or low), children in the household (yes or no) and working status (full-time employee, part-time employee, self-employed, retired or not looking for work/unable to work). We further assessed associations stratified by product advertised (processed HFSS foods, sugary drinks, sugary cereals, sweet snacks, fast food or digital food delivery services) and advertising setting (traditional, digital, recreational, functional or transport). Lastly, we examined the association between self-reported advertising exposure and weight status.

Results Overall, 84.7% of participants reported exposure to HFSS advertising in the past 7 days. Participants in the middle

(vs high) socioeconomic group had higher odds of overall self-reported exposure (OR 1.48; 95% CI 1.06–2.07). Participants in the low (vs high) socioeconomic group had higher odds of reporting exposure to advertising for four of six product categories (ORs ranging from 1.36 to 1.67), traditional advertising (OR 1.44; 95% CI 1.00–2.08) and digital advertising (OR 1.50; 95% CI 1.06–2.14). Younger adults (18–34 years vs ≥65 years) had higher odds of reporting exposure to digital food delivery service advertising (OR 2.08; 95% CI 1.20–3.59), digital advertising (OR 3.93; 95% CI 2.18–7.08) and advertising across transport networks (OR 1.96, 95% CI 1.11–3.48). Advertising exposure was associated with increased odds of obesity for digital food delivery services (OR 1.40; 95% CI 1.05–1.88), digital advertising (OR 1.80; 95% CI 1.33–2.44) and advertising in recreational environments (OR 1.46; 95% CI 1.02–2.09).

Conclusion Exposure to HFSS advertising was prevalent, with adults in lower socioeconomic groups and younger adults more likely to report exposure. Several types of HFSS advertising were associated with increased odds of obesity. Restricting HFSS food and drink advertising may help to reduce sociodemographic differences in obesity.

OP81

ADJUSTMENT FOR ENERGY INTAKE IN NUTRITIONAL RESEARCH: A CAUSAL INFERENCE PERSPECTIVE

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Background Four modelling approaches are commonly used to adjust for overall energy intake when seeking to estimate the causal effect of an individual dietary component on an outcome; (1) the 'standard model' adjusts for total energy intake, (2) the 'energy partition model' adjusts for remaining energy intake, (3) the 'nutrient density model' examines the exposure as a proportion of total energy, and (4) the 'residual model' indirectly adjusts for total energy by using the residual from regressing the exposure nutrient on total energy intake. Unfortunately, it remains underappreciated that each approach evaluates a different causal effect estimand and only partially accounts for confounding by common causes of dietary intake and composition.

Methods Semi-parametric directed acyclic graphs and Monte Carlo simulations were used to identify the estimand implied by each approach and the correct interpretation of the model results. The performance of each model for estimating the corresponding target estimand was explored both in the absence and presence of confounding that acts through diet. An alternative approach based on the energy partition model that simultaneously adjusts for all competing dietary components, termed the 'all-components model', was also explored and compared with the four traditional approaches. This model involves using the weighted coefficients of different dietary components to estimate any desired causal effect estimand.

Results The 'standard model' and the mathematically identical 'residual model' both estimate *the average relative causal effect* (i.e. a 'substitution' effect) but provide biased estimates even in the absence of any confounding. The 'energy partition model', that adjusts for remaining energy intake, estimates *the*