inductively. This study is registered as PROSPERO 2015: CRD42015026464.

Results 78 451 unique references were identified, of which 35 (13 studies) evaluated outcomes. Quality of evidence was highly variable, and often related to whether meta-analysis was possible. The strongest evidence for the effectiveness of interventions integrating academic and health education was found in the reduction of substance use in KS2 and KS3, and a meta-analysis for the effectiveness of these interventions in reducing violence victimisation in KS2 did not find an effect. We described intervention components in terms of a) the number of domains (school, classroom, family) targeted, b) the planned duration of the intervention, c) how integration was specified (using literature, teaching study skills, supporting teachers to integrate in their own classrooms).

Discussion There is under-theorisation and understanding of characteristics affecting implementation of integrated academic and health curricula as well as appreciation of how academic attainment and reduced risk-taking may be linked. However, available data suggest that multi-level interventions that aim to erode boundaries—or rather, strengthen pro-social relationships—between academic and health curricula, teachers and students, classrooms and schools and schools and families are likely to have the greatest impact on reducing risk-taking and improving academic outcomes. These programmes may be effective in reducing substance use but do not appear to reduce outcomes related to violence.

Diet and nutrition

OP38

DIETARY PATTERN ASSOCIATIONS WITH AGE AT NATURAL MENOPAUSE IN THE UK WOMEN'S COHORT STUDY

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Background British women spend around one third of their life post-menopausally. The timing of menopause has been linked to several chronic diseases. Evidence shows an association between a later menopause and reduced risk of cardiovascular diseases and osteoporosis, and a higher risk for endometrial, ovarian and breast cancer. It is hypothesized that diet can influence the timing of natural menopause. However, studies reporting this association are limited and contradictory. This study aimed to investigate the prospective association between dietary patterns derived from two different methods and age at natural menopause.

Methods Menopausal status was reported at two time points 4 years apart in the UK Women's Cohort Study. Natural menopause was defined as the permanent cessation of menstrual periods for at least 12 consecutive months. A 217-item food frequency questionnaire was used to measure diet of participants at baseline. Principal component analysis (PCA) and reduced ranked regression (RRR) were used to identify dietary patterns for 13 916 women. Cox proportional hazards regressions were used to estimate hazard ratios (HR) and 95% confidence intervals (CIs) for each pattern in relation to age at natural menopause, adjusting for potential confounders (smoking status, ethanol intake, education level, social class, physical

activity level and age at baseline). All analyses were conducted using Stata 14.

Results Five patterns were identified from the PCA which accounted for 16% of variance in dietary intake. These were labelled: 'vegetables and legumes', 'animal proteins', 'fruits', 'fats and sweets' and 'low-fat products'. Three patterns were derived from RRR (29% of the total variance): 'sweets, pastries and puddings', 'low-fat dairy and meat', and 'red meat and processed meat'. Women who scored higher on the 'animal proteins' pattern were 6% less likely to have gone through a natural menopause (HR: 0.94, 95% CI 0.90 to 0.97) compared to those who scored lower. The 'red meat and processed meat' pattern predicted a 7% higher risk for a later natural menopause (HR: 0.93, 95% CI 0.87 to 1.00). No evidence of an association was observed between the other dietary patterns and incidence of being naturally menopausal.

Conclusion This is the first study demonstrating a link between dietary patterns and age at natural menopause. Both PCA and RRR are useful in deriving dietary patterns which can influence the onset of natural menopause. RRR provided a more useful insight for the association between dietary patterns and the timing of menopause in comparison to PCA. These findings will contribute to an improved understanding of the timing of natural menopause in relation to diet, which may also have implications associated with longer term health outcomes in post-menopausal women.

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OP39

THE ASSOCIATION BETWEEN AN UNHEALTHY CHILDHOOD DIET AND BODY COMPOSITION DEPENDS ON PRENATAL EXPERIENCE: DATA FROM THE SOUTHAMPTON WOMEN'S SURVEY

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Background The developmental mismatch hypothesis proposes that risk of diseases such as obesity is increased when impaired prenatal nutrition and growth, is followed by an unhealthy childhood diet. We used data from the Southampton Women's Survey (SWS) to investigate whether there was an interaction between conditional growth in fetal abdominal circumference (AC) in late pregnancy and diet at age 6 years on body composition at age 9 years.

Methods 3158 SWS women had live singleton births. AC was measured at 11, 19 and 34 weeks' gestation, birth, and ages 6 months and 1, 2, 3 and 6 years. At age 9 years a subset had dual-energy X-ray absorptiometry (DXA) scans. Among mothers with a reliable menstrual history, enabling precise gestation determination, 582 children had DXA measurements. Fat, lean and bone mass at age 9 years were transformed to z-scores.

AC z-scores for age were created and conditional AC growth between each pair of consecutive time points calculated. At age 6 years a 'prudent' dietary pattern was identified using principal component analysis, characterized by frequent consumption of fruit, vegetables and fish. Linear regression models were fitted to assess effects of AC growth on 9-year

body composition; a multiplicative interaction term for AC growth from 34 weeks to birth and 6 year prudent diet score was added. Confounding variables (determined by a Directed Acyclic Graph) were 9-year height, age at DXA, sex, breast-feeding duration, maternal BMI, education, smoking in pregnancy, late pregnancy vitamin D and pregnancy weight gain.

Results Greater AC growth z-scores from birth to 6 months, 2–3 years and 3–6 years were associated with higher fat mass and percentage fat at 9 years. The interaction between AC growth from 34 weeks to birth and 6 year prudent diet score was statistically significant for total fat ($p=0.006$) and percentage fat ($p=0.005$), but not for total lean or bone mass. Amongst children with low late gestation AC growth, lower prudent diet scores were associated with greater 9-year total and percentage fat, whereas amongst children with high AC growth in late gestation there was little effect of prudent diet score on total and percentage fat.

Conclusion Individuals showing late gestation faltering of fetal growth who then had an unhealthy imprudent childhood diet had greater adiposity, while childhood diet was less influential on adiposity in individuals whose fetal growth had not faltered, providing evidence in support of the mismatch hypothesis.

OP40

#ASSOCIATION BETWEEN SUPERMARKET CHECKOUT FOOD POLICIES AND PURCHASES OF COMMON LESS HEALTHY CHECKOUT FOODS: INTERRUPTED TIME SERIES ANALYSES AND META-ANALYSIS OF NATURAL EXPERIMENTS

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Background Supermarkets' in-store marketing influences food purchasing and consumption. This marketing includes positioning food at checkouts. Checkouts provide a unique location, through which all customers must pass and where some may linger. The majority of supermarket checkout food is less healthy.

Supermarket activities with potential to improve population health are increasing. One example is voluntary, supermarket-led policies on checkout foods.

We studied the immediate and sustained impacts of the introduction of voluntary, supermarket-led checkout food policies on purchases of commonly displayed checkout foods.

Methods Eight national supermarket groups were included. Intervention groups were those that changed their checkout food policy between January 2014 and February 2016 ($n=6$).

Supermarket group-specific data on purchases of common checkout foods was obtained from Kantar Worldpanel's 'Take Home' panel: a representative panel of UK households ($n\approx 30,000$) who record all food and beverage purchases brought into the home. We obtained data at the four-weekly level, multiplied up and weighted by Kantar to represent the total UK market. Kantar also provided supermarket group market share data.

Common checkout foods, selected based on a previous survey, were: single-unit packages of sugary confectionery (≤ 225 g), chocolate (≤ 125 g), and crisps (≤ 50 g).

Controlled interrupted time-series analyses were conducted of changes in purchases of common supermarket checkout foods in the 14 four-weekly periods before, and the 13 four-weekly periods after, implementation of checkout food policies – in units purchased per percentage market share. As different supermarket groups implemented policies at different times, separate analyses were conducted for each group. Supermarket groups that did not change their policies during the study period were used as comparators ($n=2$). Results were synthesised using random-effects meta-analyses.

Data analyses were conducted in Stata/SE v14.2 and R v3.3.1.

Results In meta-analyses, implementation of supermarket checkout food policies was associated with a statistically significant decrease in purchases of common checkout foods of 1 37 160 units per percentage market share in the four weeks following policy implementation (95% confidence intervals (CI): $-252,690$ to $-21,630$). By 12 months this effect had diminished ($-57,080$; 95% CI $-167,760$ to $53,590$).

Conclusion Implementation of supermarket checkout food policies was associated with an immediate reduction in purchases of sugary confectionery, chocolate and crisps that was not sustained at one year. Voluntary supermarket-led activities have the potential to decrease purchases of less healthy foods. Initial effects may be undermined over time by changes in behaviour of supermarkets, consumers, or both. The data are observational and exclude purchases not brought home.

OP41

NUTRITIONAL CONTENT OF HOUSEHOLD FOOD PURCHASES: STUDY OF TRENDS AND SOCIO-ECONOMIC INEQUALITIES IN BRITAIN 2012–2017

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Background Tackling the rise of non-communicable diseases has become a significant challenge for public health across the globe. Understanding diets and dietary behaviours is important due to significant links between poor diet and obesity, diabetes, cardio-vascular diseases and many cancers. This study aims to describe the patterns of expenditures on food and beverages purchased for at-home consumption in Great Britain and to examine socio-economic inequalities in the nutritional content of purchases.

Methods We use home-scan (Kantar Worldpanel) data covering daily purchases of all foods and beverages for at-home consumption in the period 2012–17 by $\sim 32,000$ British households. The sample is nationally representative with respect to age and sex of the main shopper in the household, geographical region and socio-economic status. We estimate daily per capita purchases of energy, all sugars and saturated fats from 26 healthier and less healthy food groups defined using a nutrient profile model (UK Department of Health). Results are further stratified by social grade (A/B, C1/C2 and D/E).

Results Preliminary results show that daily per capita purchases of energy and sugar decreased between 2012 and 2017 from 2099 kcal (95% CI 2,091 to 2106 kcal) to 2002 kcal (95% CI 1,995 to 2009 kcal) and 116 g (95% CI 116 to 117 g) to 108 g (95% CI 108 to 109 g) respectively. Expenditure on saturated fat remained constant at 31 g (95% CI 31