Daily eating windows amongst UK adults and their relationship with metabolic health

Insights from the National Diet and Nutrition Survey

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Background

Time-Restricted Eating (TRE)

• *When* we eat is important.

• TRE: Limit food intake to ≤12 hours a day.

  ![Diagram showing Normal diet and TRE]

  - Normal diet: 6am - 6pm
  - TRE: 6am - 6pm

  • Animal studies: Strong evidence of metabolic benefits.
Background

Daily Eating Windows

- DEW = time between first eating/drinking in morning and finishing eating/drinking in evening.
- Most people eat for period >12 hours a day.
- But small number of studies & little research on metabolic health.
- True potential of TRE to improve metabolic health of UK adults unclear.
Aims

Overall:

• Evaluate the potential use of time-restricted eating as a dietary intervention to improve the metabolic health of UK adults.

More specifically:

• Use a large representative sample of UK adults to:
  1. Identify length of DEW people eat within.
  2. Identify the sociodemographics and health behaviours of those with a longer DEW.
  3. Explore whether there is a relationship between metabolic health and length of DEW.
  4. Formulate recommendations as to whether TRE could be used to improve the health of UK adults and, if so, what DEW could be feasible.
Method

UK National Diet and Nutrition Survey Rolling Program (NDNS RP)

- Continuous cross-sectional survey of representative sample of UK population.

- Data collection:

<table>
<thead>
<tr>
<th>Stage 1: Interviewer Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Face-to-face computer assisted personal interview (CAPI)</td>
</tr>
<tr>
<td>- Height &amp; weight measured</td>
</tr>
<tr>
<td>- Self-completion physical activity questionnaire</td>
</tr>
<tr>
<td>- Four-day food diary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 2: Nurse Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fasting blood sample</td>
</tr>
<tr>
<td>- Waist/hip measured</td>
</tr>
<tr>
<td>- Blood pressure</td>
</tr>
</tbody>
</table>
# Method

Sample food diary

<table>
<thead>
<tr>
<th>Time</th>
<th>Where?</th>
<th>With Whom?</th>
<th>TV on?</th>
<th>At table?</th>
<th>Food/Drink description &amp; preparation</th>
<th>Brand Name</th>
<th>Portion size or quantity eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.30 am</td>
<td>Kitchen</td>
<td>Alone</td>
<td>No TV</td>
<td>Not at table</td>
<td>Filter coffee, decaffeinated milk (fresh, semi-skimmed)</td>
<td>Douwe Egberts</td>
<td>Mug 1 level tsp</td>
</tr>
<tr>
<td>7.30 am</td>
<td>Kitchen</td>
<td>Partner</td>
<td>TV on</td>
<td>At table</td>
<td>Filter coffee with milk and sugar Cornflakes Milk (fresh, semi-skimmed) Toast, granary medium sliced Light spread Marmalade</td>
<td>As above Tesco's own Hovis Flora Hartleys</td>
<td>As above 1b drowned 1 slice med spread 1 heaped tsp</td>
</tr>
<tr>
<td>9am to 12 noon</td>
<td>Office desk</td>
<td>Alone</td>
<td>No TV</td>
<td>Not at table</td>
<td>Instant coffee, not decaffeinated Milk (fresh, whole) Sugar brown</td>
<td>Unknown brand</td>
<td>Mug 1 level tsp</td>
</tr>
<tr>
<td>10.15 am</td>
<td>Office desk</td>
<td>Alone</td>
<td>No TV</td>
<td>Not at table</td>
<td>Digestive biscuit – chocolate coated on one side</td>
<td>McVities</td>
<td>2</td>
</tr>
</tbody>
</table>
Method

Study inclusion criteria:

- Participants in any year of NDNS RP Years 1-9 (2008/09–16/17).

- Aged ≥19, with 3 or 4 food diary days.
Method

Variables of interest:

Exposures:
• BMI • Waist-hip ratio
• Systolic/diastolic blood pressure
• Cholesterol • Triglycerides
• C-Reactive Protein • HbA1c
• Glucose

Outcome:
Mean length of DEW

Exposures/Confounders: Sociodemographic & health behaviour variables.
Method

Data handling

• NDNS data are fully anonymized & weighted for selection/non-response bias.

Statistical analysis

• Simple linear regression: Sociodemographics and health behaviours → Length of DEW.
• Multiple linear regression: metabolic health (adjusting for confounders) → Length of DEW.
Results

• Mean DEW: 13 hours and 33 minutes.
• 78% had a DEW >12 hours.
• Associated with a longer DEW:
Results

Multiple Linear Regression

After adjusting for confounders:

- BMI, waist-hip ratio and LDL cholesterol negatively associated with length of DEW.
- HDL cholesterol and CRP positively associated with length of DEW.

<table>
<thead>
<tr>
<th>Metabolic health marker</th>
<th>Unstandardized Association</th>
<th>Standardized B</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>One kg/m$^2$ higher associated with a 1-minute shorter DEW</td>
<td>-0.04</td>
<td>-1.84, -0.01</td>
<td>0.047</td>
</tr>
<tr>
<td>Waist/hip ratio</td>
<td>One unit higher associated with a 93-minute shorter DEW</td>
<td>-0.06</td>
<td>-179.32, -6.35</td>
<td>0.035</td>
</tr>
<tr>
<td>LDL cholesterol</td>
<td>One mmol/L higher associated with a 6-minute shorter DEW</td>
<td>-0.05</td>
<td>-12.03, -0.91</td>
<td>0.023</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>One mmol/L higher associated with a 17-minute longer DEW</td>
<td>0.06</td>
<td>4.24, 29.18</td>
<td>0.009</td>
</tr>
<tr>
<td>C-reactive protein (CRP)</td>
<td>One mg/L higher associated with a 2-minute longer DEW</td>
<td>0.06</td>
<td>0.58, 2.81</td>
<td>0.003</td>
</tr>
</tbody>
</table>
Strengths & Limitations

Strengths

• Large, nationally representative sample.
• Wide variety of variables available in NDNS.

Limitations

• Under-reporting in food diaries.
• Only one time point recorded for each eating occasion.
• Cross-sectional design.
• Having DEW as outcome made it difficult to interpret whether results clinically meaningful.
Implications

- TRE could be a feasible intervention for UK adults.
- Distinct sociodemographics & health behaviours associated with longer DEW.
- But inconsistent associations between metabolic health and DEW length, and effect sizes were too small to be meaningful.
- Not possible to recommend TRE to improve metabolic health of UK adults.

Future research:
- Longitudinal data
- Timing of DEW (early vs late)
- Objectives measures of food timing.
Thank you for listening!