Food Choice and Behaviour, nutrition interventions and implications for Waste

Louise Dye
Professor of Nutrition & Behaviour
Human Appetite Research Unit
Institute of Psychological Sciences
University of Leeds
“Things I have learned so far” (not quite Jacob Cohen)

• Household waste = 50% UK waste (A. Parry, Seminar 1)
• Unintended consequence of a move to healthy diet
• Most waste is unavoidable

People throw food away because: (Tom Quested Seminar 2)
• ½ not used in time
• accidents – food burned, dropped
• mechanical failure (fridge breaks)
• ⅓ cooked, prepared or served too much

• Size of jar/pack & recipes to use ingredients
“Things I have learned so far...2

Individual behaviours which drive waste and patterns in waste generation (Matteo Vittori, Seminar 2; Sian Lewis Seminar 1)

• Excess purchases
• Excess portions
• Misunderstanding labels
• Errors in food storage
• Attitudes
• Cultural norms

• Single person households
• Lower income/SES (some food categories only)
• BOGOF – low income appeal
• Older adults – less waste
• Knowledge of healthy diet - less waste
Overview and Aims

Examine the potential for dietary interventions to improve health and wellbeing

Who is most likely to comply & how do we increase this

Consider what strategies are useful in achieving compliance with interventions

examples – increasing dietary fibre

- getting kids to eat breakfast

Discuss the implications of nutritional recommendations for waste
12-week randomised controlled dietary intervention study

- 72 Low fibre consuming overweight women randomised to
  - Diet A - healthy eating or
  - Diet B - healthy eating with increased fibre (HF) - up to 25g/day

- Products
- Recipes
- Advice
Strategies to increase fibre intake to recommendation

Dietary fibre intake recommendation - 25g/day
Average UK intake 10-15g/day

Information - fibre points = 1g to allow easy count of intake

Advice – swap/substitute low fibre for high fibre alternatives
Identify opportune moments e.g. Breakfast

Stealth – adding fibre to recipes e.g. sauces (hiding fibre in food)
Changes in fibre intake from baseline to week 12 (N=71)

- **DINE**
  - Fibre intake (points/d) (N=35)
  - Fibre points/day (WDB)

- **LWW-DINE**
  - Fibre intake g/day

- **Fibre & Healthy**
  - Healthy

Study phase
- screening
- week 12

Intervention phase
- week 4
- week 8

Louise Dye, HARU, Leeds
Barriers to increasing fibre intake

• Time – to plan meals, shop and prepare
• Need for flexibility – plan B if food not available/time is short
• Requires level of skill/competence,
  • hampered by lack of confidence/training/experience of cooking
• Experimentation – waste if disliked
• Cant add fibre if cooking for family – waste
• Need to eat (and cook) separately
  • often families do not eat together
Body weight change from week -1 to week 12 (ADP)

- Weight change (pre-post intervention)

• +ve: weight loss
Compliance

• Under/over/desirable reporting
• Liking - have to like the food to comply
• Breaking diet plan – relapse in restraint – “What the hell”
• Portion size - overestimate – over consume, reluctance to throw away
• Motivation:
  • Weight
  • Health
  • money

Characteristics associated with compliance

• Women
  • <65
  • white
• Married/cohabitating
During a 12 week healthy diet (Diet A) or a healthy diet and high fibre (HF) (Diet B) intervention

Fibre intake increased around day 23
1. Internet Survey: Methodology

- Bespoke Internet survey
- 1000 women representative of the UK population – age, SES, geographical location

Sample characteristics:

- Age: 18-50, premenopausal
- Not pregnant
- No GI surgery (e.g. colostomy)

Record contraceptive use & whether they might have IBS (115 excluded)
# Using the Bristol Stool Form Scale

<table>
<thead>
<tr>
<th>Bristol Stool Form Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hard to pass</strong></td>
</tr>
<tr>
<td>Type 1</td>
</tr>
<tr>
<td>Type 2</td>
</tr>
<tr>
<td><strong>Ideal consistency</strong></td>
</tr>
<tr>
<td>Type 3</td>
</tr>
<tr>
<td>Type 4</td>
</tr>
<tr>
<td><strong>Difficult to control</strong></td>
</tr>
<tr>
<td>Type 5</td>
</tr>
<tr>
<td>Type 6</td>
</tr>
<tr>
<td>Type 7</td>
</tr>
</tbody>
</table>

Louise Dye, HARU, Leeds
RATING OF STOOL FORM DURING THE CYCLE (BRISTOL STOOL FORM SCALE) FOR EACH INDIVIDUAL

- Persistent diarrhea

- Persistent constipation

- Consistently normal (4)
14. If you suffer from mild digestive problems where do you go for advice, tick all that apply:

<table>
<thead>
<tr>
<th>Source of advice</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your doctor / GP</td>
<td>330</td>
</tr>
<tr>
<td>I wouldn't go to the doctor with a minor problem</td>
<td>296</td>
</tr>
<tr>
<td>Your friends</td>
<td>89</td>
</tr>
<tr>
<td>Family</td>
<td>204</td>
</tr>
<tr>
<td>The chemist / pharmacist</td>
<td>215</td>
</tr>
<tr>
<td>I would do research on the internet</td>
<td>306</td>
</tr>
<tr>
<td>I would look in a medical text book at home</td>
<td>33</td>
</tr>
<tr>
<td>Other - please specify -</td>
<td>3</td>
</tr>
<tr>
<td>No one, I wouldn't seek help</td>
<td>69</td>
</tr>
<tr>
<td>I never or rarely suffer from digestive problems</td>
<td>145</td>
</tr>
</tbody>
</table>
Economic analysis - medical cost saving based on

- Prevalence of functional constipation (men, women)
- Proportion of population not meeting recommended dietary fibre recommendations

Assumes that 25% of adults make no change in fibre intake, 25% increase intake by 3g/day, 15% increase intake by 4g/day, 25% increase intake by 5g/day, 10% increase intake by 11g/day.

Annual cost savings £127m in the United Kingdom
Implications for behaviour change messages

What types of foods would individuals consume to obtain additional dietary fibre in their diets?

Little additional cost to increased fibre consumption - Many foods are available in conventional and fibre enriched versions for comparable price.

No data showing that fibre-rich foods are more expensive than lower-fibre foods.

Simple, small-step substitutions possible without affecting caloric intake - intakes of total energy & saturated fat may decrease, & other dietary components found in fibre-rich foods may increase.

Unintended health & economic consequences of modifying fibre intake.
School breakfast programs

Breakfast consumption
• helps to ensure nutritional adequacy in school-aged children
• associated with better nutritional profiles cf children who habitually skip breakfast

Breakfast skipping is associated with:
• Increased levels of snack food consumption
• increased likelihood of being overweight or obese

School Breakfast Programs

Children’s Society 2012 – 45% teachers – hungry children

Magic Breakfast – Lord Mayor’s Fund for London £650k (2013)
8,000 children daily in 242 UK primary schools – Bagel Nash/Quaker/Tropicana

The Greggs Foundation - 200 clubs - 10,000 primary school children/day
ContinYou – 1m BF/year to primary schools (Kellogg’s)

Kellogg’s Breakfast Club Trust - grants to start BF clubs
Blackpool – free BF for 12,000 primary school children £700k (£1.2m)

Wales – free BF to primary pupils – ¾ of welsh schools (£12.7m)
A systematic review of the effect of breakfast on the cognitive performance of children and adolescents

Alexa Hoyland, Louise Dye* and Clare L. Lawton

Human Appetite Research Unit, Institute of Psychological Sciences, University of Leeds, Leeds LS2 9JT, UK

Breakfast is recommended as part of a healthy diet because it is associated with healthier macronutrient intakes, BMI and lifestyle. Breakfast is also widely promoted to improve cognitive function and academic performance, leading to the provision of breakfast initiatives by public health bodies. Despite this positive and intuitive perception of cognitive benefits, there has been no systematic review of the evidence. Systematic review methodology was employed to evaluate the effects of breakfast on cognitive performance in well-nourished children and nutritionally at-risk or stunted children. Acute experimental studies, school feeding programmes and studies of habitual breakfast intake are reviewed. Comparisons of breakfast vs. no breakfast and breakfasts differing in energy and macronutrient composition are discussed. Included are forty-five studies described in forty-one papers published between 1950 and 2008. The evidence indicates that breakfast consumption is more beneficial than skipping breakfast, but this effect is more apparent in children whose nutritional status is compromised. There is a lack of research comparing breakfast type, precluding recommendations for the size and composition of an optimal breakfast for children’s cognitive function. Few studies examined adolescents. Studies of school breakfast programmes suggest that such interventions can have positive effects on academic performance, but this may be in part explained by the increased school attendance that programmes encourage. The present systematic review considers methodological issues in this field and makes recommendations for future research design and policy priorities.

Breakfast: Cognition: Children: Adolescents: Learning
**Breakfast and cognition in children**

**Systematic review**

**Two aims:**
- Does breakfast per se confer benefits?
- Is breakfast type important?

45 studies

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute effects in well-nourished children</td>
<td>21</td>
</tr>
<tr>
<td>Acute effects in children of differing nutritional status</td>
<td>7</td>
</tr>
<tr>
<td>Long-term effects of school breakfast programs and breakfast clubs</td>
<td>13</td>
</tr>
<tr>
<td>Effects of habitual breakfast intake</td>
<td>4</td>
</tr>
</tbody>
</table>

• Hoyland & Lawton (Nutr. Res. Reviews in press)
Review findings

- Few studies
- Generally +ve effects of breakfast
- Small effects
- Difficult to determine optimal breakfast

Most convincing effects for school breakfast programs
  - but these increased school attendance
More demonstrable in nutritionally compromised children

Predominance of younger samples or large age range
Poor range of cognitive tests
  - memory and attention

Breakfast & Behaviour / Academic performance

- Related to cognition
- Effects of BF on behaviour & academic performance.
- Ecologically valid measures
- Relevance to policy makers, teacher, parents

Two aims:

Does breakfast benefit:

1. Behaviour in class or at school
2. Academic performance

36 studies (14 behaviour, 17 academic, 5 both)

- Adolphus et al. (2013)
- http://www.frontiersin.org/Human_Neuroscience/10.3389/fnhum.2013.00425/full#h1
Results: Behaviour

19 studies

Measures: Classroom observations or teacher rating scale
Design: Mostly acute or SBP, few habitual.

Findings:

• Mixed with +tive effects for on-task classroom behaviour
• Less consistent – distractible, hyperactive & disruptive behaviour
• Effects in:
  Well & undernourished
  Low SES & more affluent
  Young children <13 years

<table>
<thead>
<tr>
<th>Measure*</th>
<th>Studies</th>
<th>Sig effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom observations: Live or filmed</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Teacher rating scales and questionnaire</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>

Results: Academic performance

22 studies
Measures: Average school grades and standardised achievement tests
Design: Mostly cross-sectional (habitual) and SBP - longer term effects
Findings:
• Consistent - habitual breakfast (frequency and quality) & SBPs
  +tive effects on academic performance
• Maths and arithmetic
• Effects:
  Clearest in undernourished
  Low SES and more affluent
  Children and adolescents

<table>
<thead>
<tr>
<th>Measure</th>
<th>Studies</th>
<th>Sig effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>School grades</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Standardised achievement tests</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

Louise Dye, HARU, Leeds
Are we reaching the right people?

Breakfast studies of children:
- younger (<13 years)
- middle class
- normal weight
- higher IQ than average

School based studies
- SES related
- opt out not in
- parental disengagement
Effect of BF vs No BF on Corsi Block tapping task

• Relationship between IQ & proportion correct

• N = 29
• 11-12yrs

• Hoyland, Dye & Lawton (in prep)

Louise Dye, HARU, Leeds
Devore et al (2012) Nurses Health Study

16010 women aged 70+

Follow up – 2yr intervals

Greater intake of &

Slower rate of cognitive decline (6 cognitive tests)

Health promotion initiatives tend to be more readily adopted by people with higher SES

• prevention of cognitive aging

• infant

• child

• adult

• elderly
Nutritional strategies

- Increase understanding
- Substitution
- Improve palatability
- Increase availability
- & exposure esp children
- Form good habits early

implications for waste?
Behaviours that influence food choice and waste

- planning,
- buying,
- storing,
- preparing,
- exposure to foods (try out)
- skills

Features of the Message

- Understandable
- Easy to implement
- Complementary not contradictory
- Informative - build knowledge & skills
- No unintended consequences
<table>
<thead>
<tr>
<th>Technique</th>
<th>No of interventions using technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prompt intention/ goal formation</td>
<td>27 (67.5%)</td>
</tr>
<tr>
<td>Provide feedback on performance</td>
<td>26 (67.5%)</td>
</tr>
<tr>
<td>Provide instruction</td>
<td>26 (67.5%)</td>
</tr>
<tr>
<td>Provide information on consequences</td>
<td>16 (40%)</td>
</tr>
<tr>
<td>Provide information on health-behaviour link</td>
<td>14 (35%)</td>
</tr>
<tr>
<td>Prompt self-monitoring of behaviour</td>
<td>13 (32.5%)</td>
</tr>
<tr>
<td>Set graded tasks</td>
<td>11 (27.5%)</td>
</tr>
<tr>
<td>Provide general encouragement</td>
<td>11 (27.5%)</td>
</tr>
<tr>
<td>Prompt barrier identification</td>
<td>10 (25%)</td>
</tr>
<tr>
<td>Teach to use prompts and cues</td>
<td>10 (25%)</td>
</tr>
</tbody>
</table>
The Yellow Label Diet
My food waste disposal unit
Thank you

l.dye@leeds.ac.uk

Disclosures

The internet survey was supported by a grant from Kellogg’s Sales and Marketing UK to L Dye.

Schnell performed statistical analysis and acted as consultant.

Leeds Women’s Wellbeing Study was supported by a grant from Kellogg’s Sales and Marketing UK to L Dye & C Lawton.
## Strategies to Manage Digestive Problems

### Pharmaceutical Strategies:

<table>
<thead>
<tr>
<th></th>
<th>Daily</th>
<th>Weekly</th>
<th>Monthly</th>
<th>Yearly</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laxatives</td>
<td>18</td>
<td>23</td>
<td>40</td>
<td>69</td>
<td>815</td>
</tr>
<tr>
<td>Fibre Gel</td>
<td>9</td>
<td>12</td>
<td>20</td>
<td>29</td>
<td>919</td>
</tr>
<tr>
<td>Stool Softeners</td>
<td>9</td>
<td>7</td>
<td>22</td>
<td>24</td>
<td>923</td>
</tr>
<tr>
<td>Anti Diarrhoea</td>
<td>6</td>
<td>16</td>
<td>30</td>
<td>100</td>
<td>798</td>
</tr>
<tr>
<td>Milk of Magnesia</td>
<td>4</td>
<td>7</td>
<td>24</td>
<td>24</td>
<td>929</td>
</tr>
<tr>
<td>Pain Killers</td>
<td>18</td>
<td>32</td>
<td>88</td>
<td>37</td>
<td>802</td>
</tr>
<tr>
<td>Fibre Supplements</td>
<td>32</td>
<td>68</td>
<td>44</td>
<td>22</td>
<td>810</td>
</tr>
</tbody>
</table>

### Dietary Strategies:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High Fibre Breakfast Cereal</td>
<td>168</td>
<td>162</td>
<td>95</td>
<td>21</td>
<td>532</td>
</tr>
<tr>
<td>Probiotics</td>
<td>78</td>
<td>81</td>
<td>65</td>
<td>28</td>
<td>710</td>
</tr>
<tr>
<td>Peppermint Tea</td>
<td>30</td>
<td>61</td>
<td>54</td>
<td>23</td>
<td>809</td>
</tr>
<tr>
<td>Aloe Vera</td>
<td>11</td>
<td>12</td>
<td>27</td>
<td>26</td>
<td>914</td>
</tr>
<tr>
<td>High Fibre Fruit/Juice</td>
<td>39</td>
<td>70</td>
<td>55</td>
<td>55</td>
<td>766</td>
</tr>
</tbody>
</table>
• Why do we need legislation?

Supplements that can sharpen your growing child's brain power

Q: Good nutrition can support healthy growth in children and increase energy levels and learning ability. But what better time than before the strain of a new school year begins to boost up their immune system?

Research into children's mental ability shows that they perform better at school if they are given a good balanced diet and mineral supplement. Important nutrients for the growing years include calcium, magnesium, rich in vitamin C and D and B.

Quality counts – choose reputable manufacturers with sound product ingredients backed by scientific research.