NUTRITIONAL LABELLING FOR PROMOTING HEALTHIER FOOD PURCHASING AND CONSUMPTION: A SYSTEMATIC REVIEW AND META-ANALYSIS.

Rachel Crockett PhD, University of Greenwich.
Does nutritional labelling promote healthier food purchasing and consumption behaviours?

- Nutritional labelling being implemented internationally as a means to enable people to make healthier choices about what they buy and how they eat it.
- But is it effective?
Do we know if nutritional labelling is an effective intervention?

- Research into the effect of nutritional labelling on behaviour has limitations:
  - Wide range of labelling schemes tested.
  - Use of student samples.
  - Measurement of non behavioural outcomes such as knowledge.
  - Use of measures of intended/self report behaviour rather than actual behaviour.

- A systematic review would allow us to identify and draw together research to inform an evaluation of the effectiveness of nutritional labelling on behaviour.
The systematic literature review

- Registered with the Cochrane Collaboration.
- Protocol published in 2011 and the review itself is currently in revision.
- Objectives:
  - To assess whether nutritional labelling of foods in comparison to the same foods presented without a label promotes:
    - Healthier food purchasing behaviour from a) food shops, b) vending machines, c) restaurants.
    - Healthier food consumption behaviour.
Inclusion Criteria

- **Design:** RCTs, non randomised controlled studies, non randomised uncontrolled studies.
- **Participants:** Adults and children either buying food for themselves or a group of which they are a part or eating.
- **Intervention:** A nutritional label visible at point at which choices are made, giving information about the content of at least one nutrient, or energy, compared to the same food presented without a label.
- **Outcome:** an objective measure of behaviour:
  - Food purchasing: till receipts, electronic sales data or field observation.
  - Food consumption: measurement of food consumed using before-and-after consumption weighing of food.
Searches

- Search strategy used to search 17 electronic databases covering health, food, psychology, social science, business and marketing.
- Cited reference and reference list searches on included studies.
- Contact with authors of included studies for information about unpublished work.
- Searches conducted up to end of 2012 and currently being updated.
Data selection and management

- Data and relevant information extracted from included studies.
- Review Manager software used to manage and analyse data.

- Titles and abstracts of 31,608 papers assessed against inclusion criteria.
- Full text assessment of 154 studies independently by two researchers.
- 31 discrete studies assessed as meeting inclusion criteria.
Data synthesis

- Data from non-randomised trials were synthesised in a narrative summary.
  - Characteristics of the studies and their results were recorded in tables allowing comparison between studies.

- Data from randomised controlled trials were combined statistically.
  - Data summarised using a standardised difference because the same outcome was measured in different ways (e.g. energy consumed over one day vs. at one meal, etc.).
  - Random effects model used.
Summary of included studies

- Thirty-one studies included.
- Eighteen studies (2 RCTs) evaluated effects of labelling on food purchasing:
  - Twelve concerned purchasing for immediate consumption (i.e. in a restaurant or vending machine).
  - Six concerned purchasing for later consumption (i.e. from a store).
- Thirteen (9 RCTs and 4 Q-RCTs) assessed the impact of labelling on consumption.
- Quality of the included studies was assessed using the Effective Public Health Practice Project ratings:
  - Overall all quality was low or moderate with only 5 studies (all RCTs) being assessed as high quality.
Preliminary Results - food purchasing for immediate consumption

- Two RCTs:
  - In one there was no significant effect of labelling on food as either a more or a less healthy choice on purchasing.
  - In the other a reliable effect size could not be calculated.

- Three non-randomised studies with a control group,
  - Two reported no significant effects.
  - One reported greater purchasing of healthier food.

- Seven non-randomised, uncontrolled studies,
  - Four reported significantly greater purchasing of healthier foods.
  - Three found no effects.
Preliminary Results: Food purchasing for later consumption

- Two non-randomised studies with a control group.
  - One study reported significantly greater purchasing of healthier foods, and one reported significantly less purchasing of healthier foods.

- Four nonrandomised uncontrolled studies
  - None were possible to interpret, involving multiple endpoints generating varied effects.

- In summary it was not possible to identify a consistent effect of nutritional labeling on food purchasing for either immediate or later consumption.
Eight RCTs and one Q-RCT each assessed the effectiveness of labelling on energy intake. Meta-analysis revealed no impact of nutritional labelling on this outcome (Pooled SMD = -0.08, 95% CI: -0.21 to +0.05, \( p=0.23 \)).

Two studies assessing non-energy based outcomes (volume of soft drinks, and grams of breakfast cereal) reported no significant effects.

In the remaining two Q-RCT studies, nutritional labelling increased the consumption of less healthy foods.
Impact of nutritional labelling on food consumption.

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental Mean</th>
<th>SD</th>
<th>Total</th>
<th>Control Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1.1 Impact of energy (calorie) labelling, nutrition fact or 'low fat' labelling on energy consumption</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Crockett In submission</td>
<td>402.44</td>
<td>288.68</td>
<td>103</td>
<td>468.07</td>
<td>361.93</td>
<td>88</td>
<td>16.2%</td>
<td>-0.20 [-0.49, 0.08]</td>
</tr>
<tr>
<td>Girz 2011a</td>
<td>401.88</td>
<td>197.87</td>
<td>98</td>
<td>419.95</td>
<td>238.52</td>
<td>49</td>
<td>12.0%</td>
<td>-0.08 [-0.43, 0.26]</td>
</tr>
<tr>
<td>Girz 2011b</td>
<td>631.19</td>
<td>329.19</td>
<td>66</td>
<td>642.92</td>
<td>342.89</td>
<td>128</td>
<td>15.2%</td>
<td>-0.03 [-0.33, 0.26]</td>
</tr>
<tr>
<td>Girz unpub</td>
<td>433.14</td>
<td>260.16</td>
<td>24</td>
<td>426.54</td>
<td>237.39</td>
<td>25</td>
<td>5.0%</td>
<td>0.03 [-0.53, 0.59]</td>
</tr>
<tr>
<td>Harnack 2008a</td>
<td>804.7</td>
<td>423.9</td>
<td>151</td>
<td>739</td>
<td>358.2</td>
<td>150</td>
<td>22.7%</td>
<td>0.17 [-0.06, 0.39]</td>
</tr>
<tr>
<td>Kral 2002</td>
<td>1,534</td>
<td>335.4</td>
<td>20</td>
<td>1,569</td>
<td>451.7</td>
<td>20</td>
<td>4.2%</td>
<td>-0.09 [-0.71, 0.53]</td>
</tr>
<tr>
<td>Platkin 2010</td>
<td>898.82</td>
<td>392.01</td>
<td>20</td>
<td>995.4</td>
<td>429.36</td>
<td>22</td>
<td>4.3%</td>
<td>-0.23 [-0.84, 0.38]</td>
</tr>
<tr>
<td>Roberto 2010</td>
<td>1,333</td>
<td>620.65</td>
<td>92</td>
<td>1,459</td>
<td>724.62</td>
<td>92</td>
<td>15.8%</td>
<td>-0.19 [-0.48, 0.10]</td>
</tr>
<tr>
<td>Temple 2010</td>
<td>620.4</td>
<td>203.6</td>
<td>24</td>
<td>822.8</td>
<td>408.7</td>
<td>23</td>
<td>4.6%</td>
<td>-0.62 [-1.21, -0.03]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>598</td>
<td></td>
<td></td>
<td>597</td>
<td>100.0%</td>
<td></td>
<td>-0.08 [-0.21, 0.05]</td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Tau² = 0.01; Chi² = 9.47, df = 8 (P = 0.30); I² = 15%
Test for overall effect: Z = 1.21 (P = 0.23)

**1.1.2 Impact of energy (calorie) labelling on soft drink consumption**

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental Mean</th>
<th>SD</th>
<th>Total</th>
<th>Control Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vermeer 2011</td>
<td>376.3</td>
<td>125.4</td>
<td>48</td>
<td>382.14</td>
<td>147.6</td>
<td>41</td>
<td>100.0%</td>
<td>-0.04 [-0.46, 0.37]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>48</td>
<td>41</td>
<td>100.0%</td>
<td>-0.04 [-0.46, 0.37]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Not applicable
Test for overall effect: Z = 0.20 (P = 0.84)

**1.1.3 Impact of ‘healthy choice’ labelling on quantity of food consumed (grams)**

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental Mean</th>
<th>SD</th>
<th>Total</th>
<th>Control Mean</th>
<th>SD</th>
<th>Total</th>
<th>Weight</th>
<th>Std. Mean Difference IV, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roberto 2012</td>
<td>219.21</td>
<td>133.44</td>
<td>76</td>
<td>219.86</td>
<td>127.08</td>
<td>69</td>
<td>100.0%</td>
<td>-0.00 [-0.33, 0.32]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>76</td>
<td>69</td>
<td>100.0%</td>
<td>-0.00 [-0.33, 0.32]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: Not applicable
Test for overall effect: Z = 0.03 (P = 0.98)

Test for subgroup differences: Chi² = 0.19, df = 2 (P = 0.91), I² = 0%
Summary of the effects of nutritional labelling on consumption.

- There were no significant effects of nutritional labelling on behaviour.
- Little evidence that nutritional labelling promotes healthier food purchasing and consumption.
- But research often poor quality, with a variety of interventions and outcomes assessed.
The National Institute of Health Research for funding for this research as part of a Postdoctoral fellowship (PDF-2009-02-14).

My collaborators:
- Professor Theresa Marteau & Dr Gareth Hollands (Health and Behaviour Research Unit, University of Cambridge)
- Professor Susan Jebb (Department of Primary Care Health Sciences, Oxford)
- Professor Toby Prevost (King’s College London)
- Dr Sarah King (RAND UK)