Development and testing of a mobile phone application for weight loss

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Background

- Health Survey for England, almost one in four adults and one in three 10-11 year olds are currently classified as obese
- In UK, 89% of population has a mobile phone
- 30-50% owning a smartphone (2010) – growing
- Weight management patients want alternatives to face-to-face treatment
- A role for smartphones?

“a mobile phone that is able to perform many of the functions of a computer, typically having a relatively large screen and an operating system capable of running general-purpose applications” (Oxford dictionary definition)
Project aim: To develop, validate and investigate the feasibility and acceptability of a smartphone app to support weight loss

To develop a smartphone application to support weight loss using qualitative research to inform the development process

To compare dietary data captured on the smartphone with a reference measure of diet

To implement an exploratory 6 month pilot trial using the smartphone with an overweight sample of adults
Qualitative research – focus group

• Objective:
  • to explore views and preferences of potential users to inform development of the smartphone application
  • 7 women + 2 men participated: 36y (SD 11)

• Positive response re: weight loss – convenient, motivating

• Searchable branded food database – quick and easy to use

• Feedback
  • desirable, not too frequent or negative
  • tailored
Features of “My Meal Mate”

Set own weight loss goal and energy target

Weight Loss Goals

Starting weight: 91 st 0 lbs
Height: 5 ft 1.99 in
BMI: 23.0

Weight loss goal

Choose target weight: 8 st 8 lbs (5% loss)
Select weekly target: 1lb/0.5kg per week

You will need 1959 calories to maintain your current weight.
To lose weight you should eat 1409 calories. If you stick to this then it will take you 5 weeks to reach your goal.

Exercise settings (PAL)

How physically active are you during your work/day time? (even work at home, sick leave or studying for instance at University)

- Mostly sitting
- Seated work but some requirement to move around (office work with light activities)
- Standing/walking most of the time (shop assistant, delivering mail, cleaning work)
- Heavy work

Describe your physical activity in your leisure time

- Very light (mostly sitting)
- Light (light walking for 30 minutes or less most days)
- Moderate (regular activities most days such as vigorous walking, cycling or sport for 30 minutes or longer)
- Very active (more than an hour of daily strenuous activities such as sport)
Features of “My Meal Mate”

Self monitoring – diet and activity

Electronic food diary
Features of “My Meal Mate”

Large searchable database
Features of “My Meal Mate”

- Photo reminders
- Add favourites
- Recent items
- Progress tracking
- Back end website
Features of “My Meal Mate”

MyMealMate: Don’t forget to do some diary entries, even if you’ve lost weight it can help keep track of your choices and maintain your weight loss.

11:22

Tap to compose
Comparison with 24 hr recalls

Sample = 50 (staff and students at University)

• use MMM x 7 days

• diet reference measure – 2 x 24 hour telephone recalls
## Comparison of intakes – same day recall vs. MMM

<table>
<thead>
<tr>
<th></th>
<th>MMM Mean (SD)</th>
<th>Recall Mean (SD)</th>
<th>MMM-recall Mean</th>
<th>95% CI</th>
<th>P</th>
<th>MMM and recall Correlation</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Day 1 (n=49)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy (kcal/d)</td>
<td>1997</td>
<td>2013</td>
<td>-16</td>
<td>-132, 100</td>
<td>0.78</td>
<td>0.8</td>
<td>0.6, 0.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Protein (g/d)</td>
<td>78</td>
<td>80</td>
<td>-2</td>
<td>-7, 4</td>
<td>0.49</td>
<td>0.8</td>
<td>0.7, 0.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>CHO (g/d)</td>
<td>242</td>
<td>247</td>
<td>-5</td>
<td>-23, 13</td>
<td>0.57</td>
<td>0.6</td>
<td>0.4, 0.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fat (g/d)</td>
<td>69</td>
<td>72</td>
<td>-3</td>
<td>-11, 5</td>
<td>0.44</td>
<td>0.7</td>
<td>0.5, 0.8</td>
<td>&lt;0.001</td>
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</tbody>
</table>
# Results – usability

<table>
<thead>
<tr>
<th>Questionnaire item</th>
<th>Mean (95%CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>On average how long does it take you to enter a meal (min) ?</td>
<td>7 (6, 9)</td>
</tr>
<tr>
<td>On average how long did you spend each day on the app (min) ?</td>
<td>22 (19, 26)</td>
</tr>
<tr>
<td>How many days did it take until you felt comfortable using the phone (days) ?</td>
<td>1.1, (0.9, 1.4)</td>
</tr>
<tr>
<td>How many days did it take until you felt comfortable using &quot;MMM&quot; (days) ?</td>
<td>1.6, (1.3, 1.9)</td>
</tr>
</tbody>
</table>
Pilot Trial
Participant characteristics

Sample – from large Leeds employer:
• Responded to advert = 336 (247 F/89 M)
• Eligible = 182 (137 F/45 M)
• Randomised = 128 (99 F/29 M)

Mean BMI 34kg/m² (SD 5)

Age 42 years

40% already owned a smartphone; 61% had used an app
Method – RCT Design

Randomised by minimisation to 3 groups

- MMM app
- Online food diary
- Paper food diary
Primary outcomes:
• Acceptability & feasibility
• Process measures – drop-outs, adherence, frequency of use
• Characteristics of successful users

Secondary outcomes:
• Change in weight (kg), BMI (kgm$^2$), % fat to give an idea of effect size to inform a possible definitive trial
Some results from the pilot trial......

<table>
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<tr>
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<th>MMM</th>
<th>Website</th>
<th>Paper diary</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 month retention</td>
<td>93% 40/43</td>
<td>55% 19/42</td>
<td>53% 20/43</td>
</tr>
<tr>
<td>Days recorded</td>
<td>92 (SD 67)</td>
<td>35 (SD 44)</td>
<td>29 (SD 39)</td>
</tr>
<tr>
<td>Convenient to use</td>
<td>65%</td>
<td>53%</td>
<td>35%</td>
</tr>
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</table>
Summary and conclusions

- A smartphone application has been developed for the android operating system
- The views of potential end users, plus benchmarking used to guide development
- Comparison with 24 hour recall indicated good energy intake agreement at the group level
- To assess use and feasibility for a full weight loss trial, a 6 month pilot trial has been conducted
- Adherence and use data indicate that a fully powered weight loss trial is warranted to test this approach
Thank you