Development and evaluation of very brief interventions (VBIs) to increase physical activity in primary care
Aim of the VBI Programme

- To develop and evaluate very brief interventions (VBIs) to increase physical activity that could be delivered by a practice nurse or health care assistant in a Health Check or other primary care consultation.
Development work

WS1 Evidence synthesis
Estimate cost and effectiveness of promising VBIs

WS2 Qualitative study
Integration in NHS health checks

WS3 Pilot trial
Develop and pilot materials
Test feasibility, acceptability, fidelity, potential efficacy and cost

WS4 Main trial
Estimate cost and effectiveness of best-bet VBI

WS5 Health economics
Resource use of promising VBIs
Economic model of cost-effectiveness of VBIs
VBI Programme Team

**UNIVERSITY OF CAMBRIDGE**

Stephen Sutton (PI, Director)
Wendy Hardeman (Deputy Director)
Laura Lamming, Dan Mason (WS1)
Philip Miles, Simon Cohn (WS2)
Katie Morton, Sally Pears, Maaike Bijker,
Richard Parker (WS3)
Ann Louise Kinmonth, Gillian Orrow,
Sue Boase

**MRC Epidemiology Unit**

Simon Griffin, David Ogilvie

**KING'S College LONDON**

Toby Prevost

**NHS Cambridgeshire**

Janet Watkinson

**PPI Panel**

National Institute for Health Research (funder)

**UEA University of East Anglia**

Ed Wilson, Vijay Singh GC, Marc Suhrcke (WS5)
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Evidence for very brief interventions (VBIs) to increase physical activity has not been reviewed.

1. What is a very brief intervention? (Undefined in PA literature)

   “delivered face-to-face, preferably in a single session lasting no more than 10 minutes, but possibly also multiple brief sessions and/or distance contacts such as leaflets or telephone calls”

2. How can we find very brief interventions?
   - No formal definition – potentially difficult to search for primary studies.
   - Multiple reviews of PA interventions – review of reviews.
Objectives of the systematic review

1. To determine and describe the current working definition of a ‘very brief intervention’ in the physical activity intervention review literature.

2. To summarise what is known about very brief interventions to increase physical activity that could be delivered face-to-face in a primary care or community setting.

3. To assess and make recommendations for the reporting of interventions.
Methods

Inclusion criteria

Review Level:
- Review of physical activity interventions only (single risk factor)
- Systematic review/Meta-analysis
- Adults
- Not PA rehabilitation

VBI study level:
- Individual level
- Face-to-face component
- Less than 10 minutes
- Physical activity outcome

Data extraction
- Standardized proforma.
- Double checked by second researcher.
Results: Study selection

Records identified from electronic databases: N=11993

Records after duplicates removed N=5803

For Title screening N=5803

Excluded: N=5561

For Abstract screening* N=242

Excluded: N=88

For Full text screening* N=154

Excluded: N=98

For VBI screening* N=56

Excluded: N=40

No. of VBIs: 18 papers, reporting 13 separate studies evaluating 19 individual VBIs.

* Double screened
## Results: Preliminary synthesis

### Design and methods

<table>
<thead>
<tr>
<th>Characteristics of VBIs (13 studies)</th>
<th>Summary of results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Country</strong></td>
<td>9 USA, 1 NZ, 1 Netherlands, 1 UK, 1 Australia</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>8/13 Randomised</td>
</tr>
<tr>
<td><strong>Setting</strong></td>
<td>12 / 13 Primary care settings</td>
</tr>
<tr>
<td><strong>Providers</strong></td>
<td>11 / 13 - GPs/Physicians/Family physicians/Primary care providers (excluding nurses)</td>
</tr>
<tr>
<td><strong>Population age</strong></td>
<td>5/13 &gt;/= ‘middle aged’ (primarily)</td>
</tr>
<tr>
<td><strong>Sample size</strong></td>
<td>Range = 63 – 874, Median ~ 355</td>
</tr>
<tr>
<td><strong>Comparison</strong></td>
<td>5 Usual care, 5 Intervention, 2 Not reported, 1 Usual care + Intervention</td>
</tr>
<tr>
<td><strong>Follow up</strong></td>
<td>Median = 5 months. 8/13 reported ST follow up only (&lt;/=6 months)</td>
</tr>
<tr>
<td><strong>PA measures</strong></td>
<td>3/13 Objective measures, 12/13 Self report measures</td>
</tr>
<tr>
<td>Characteristics of VBIs (19 VBIs)</td>
<td>Summary of results</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| **Mode(s) of delivery**         | 19 / 19 - Individual face to face verbal  
14 / 19 - Written materials  
8 / 19 - Phone calls  
4 / 19 - Computer |
| **Content**                     | 19 Advice/counselling on increasing PA, sometimes stage based or tailored; at least 2 based on pre-assessment.  
14 Exercise prescriptions/educational materials/tip sheets or posters/stage based or tailored materials.  
8 ‘Booster’ calls/exercise counselling calls/follow ups |
<p>| <strong>Duration</strong>                    | Range = 2-10 minutes. Mode = 5 minutes. |</p>
<table>
<thead>
<tr>
<th>Effect</th>
<th>VBI content</th>
<th>Sample</th>
<th>Control</th>
<th>Follow up</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reports at least 1 positive effect of a VBI</td>
<td>Advice. +/-Phone counselling.</td>
<td>100</td>
<td>Int</td>
<td>3/6 mos</td>
<td>SR+Obj</td>
</tr>
<tr>
<td></td>
<td>Assessment. Counselling, stage of change tailored goal setting, stage of change tailored written advice/tips. Booster phone call. (3 studies)</td>
<td>255**</td>
<td>Usual care**</td>
<td>4-6 wks*</td>
<td>SR+Obj, SR*</td>
</tr>
<tr>
<td></td>
<td>Advice (prompted/unprompted), educational hand-out.</td>
<td>383</td>
<td>Usual care</td>
<td>1 mo</td>
<td>SR</td>
</tr>
<tr>
<td></td>
<td>Assessment. Goal oriented advice +/- written prescription. Phone call.</td>
<td>491</td>
<td>Int</td>
<td>6 wks</td>
<td>SR</td>
</tr>
<tr>
<td></td>
<td>Counselling. Mailed standard/ tailored pamphlet.</td>
<td>763</td>
<td>Usual care</td>
<td>1/6/(12 mos – NS)</td>
<td>SR</td>
</tr>
<tr>
<td>No effect of a VBI</td>
<td>Computer delivered PACE+ counselling. +/- Booster mailings, phone calls.</td>
<td>173</td>
<td>Int</td>
<td>1 wk, 4 mos</td>
<td>SR</td>
</tr>
<tr>
<td></td>
<td>Stage based/non stage based advice and materials, leisure pass.</td>
<td>294</td>
<td>Int+Usual care</td>
<td>2/6 mos</td>
<td>SR</td>
</tr>
<tr>
<td></td>
<td>Assessment. Stage specific advice, benefits, self-efficacy barriers, referral to community resources, prescription, manual. Follow up visit, phone calls, newsletters. (2 studies)</td>
<td>355, 63.</td>
<td>Usual care</td>
<td>6 wks, 8 mos &amp; 1wk, 6 wks.</td>
<td>SR</td>
</tr>
<tr>
<td></td>
<td>Advice and encouragement. +/- Booster phone calls and additional counselling protocols.</td>
<td>358</td>
<td>Int</td>
<td>8 wks, 6, 12 mos</td>
<td>SR</td>
</tr>
<tr>
<td></td>
<td>Assessment. Advice on national guidelines, referral to health educator for clarification and materials.</td>
<td>874</td>
<td>Int</td>
<td>6, 12, 24 mos</td>
<td>SR+Obj</td>
</tr>
</tbody>
</table>

* = a study that did not report this detail.
Preliminary conclusions

- Very few VBIs.
- Content and delivery poorly specified.
- Impact of quality on effectiveness?
- Conflicting findings - no observable pattern between intervention design and effectiveness.

Recommendations:
- Comprehensive reporting of intervention characteristics.
- More robust evaluations of VBIs.
Limitations & Next steps

- Review of reviews – could have missed some VBIs.
- Data extraction at the level of the review, not primary studies – more detail? ‘real’ VBIs?

Next...
- Synthesise data & double check
Methods: Search strategy

Search strategy

Key terms:
“physical activity”, “exercise”, “increase”, “brief intervention”, “counselling”, “systematic review”, “meta analysis”.

Period covered: 1854 - October 2011.

Databases

- CINAHL
- Cochrane Database of Systematic Reviews
- Database of Abstracts of Reviews of Effects (DARE) on Cochrane Library and Centre for Reviews and Dissemination (CRD)
- Health Technology Assessment database on Cochrane Library and Centre for Reviews and Dissemination (CRD)
- Embase
- MEDLINE
- PsycINFO
- SCI-Expanded
- SSCI SIGN
- Hand search of first authors’ (LL) personal collections of articles
The effectiveness of pedometers to increase physical activity: a systematic review and meta-analysis.

Dan Mason, Laura Lamming, Sally Pears, Katie Morton, Maaike Bijker, Ed Wilson, Vijay Singh GC, Stephen Sutton, Wendy Hardeman.
Systematic review of pedometers to increase physical activity

Bravata et al (2007) JAMA; 298:19; 2296-2304

8 RCTs: pedometers increased steps by 2419±1394 per day

18 observational studies: increased steps by 2183±613 per day

*Lots of different study designs*

*Interventions typically multi-component; do not isolate pedometer effect*

- More studies now = greater power to examine heterogeneity
## Additional vs residual components

<table>
<thead>
<tr>
<th>Additional components</th>
<th>Substantial addition to pedometer e.g. PA counselling, access to PA website</th>
<th>Pedometer NOT isolated if these vary between groups</th>
</tr>
</thead>
</table>
| Residual components   | • Instructions to increase PA  
                        | • Given a PA goal  
                        | • Asked to record daily PA | Pedometer IS “isolated” if only these things vary between groups |
Search

9752 identified through database searches

6 identified through manual searches

4170 after duplicates removed

228 retained for full text screening

81 papers describing 74 studies included

2495 not pedometer/physical activity/human studies
325 no physical activity intervention
175 not adults and free-living
780 design criteria not met

149 other reasons e.g. dissertations, conferences, protocols, non-English, reviews, device validations

105 design criteria not met (e.g. pedometer intervention, non-pedometer control, comparable groups)
5 not free-living adults/activity
13 no physical activity/fitness outcome
24 other reasons e.g. no pedometer, protocol, review, device validation paper
Preliminary subgroup: select by measurement

Objective physical activity measure
N=27

Self-report physical activity measure
N=15
N=26

Fitness outcomes only
N=6
Preliminary subgroup: select by design

- Pedometer isolated e.g. “ped+X vs X”
  - N=23

- Pedometer not isolated e.g. “ped+X vs Y”
  - N=6
  - N=45
Preliminary subgroup: final selection N=13

Objective physical activity measure
N=29

Pedometer isolated e.g. “ped+X vs X”
N=16

N=13
# Residual intervention components

<table>
<thead>
<tr>
<th></th>
<th>Instructions vary</th>
<th>Logging PA varies</th>
<th>Goals vary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker 2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carr 2008</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Du Vall 2004</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Gray 2009</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Hultquist 2007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McMurdo 2010</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ornes 2007</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Samuels 2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugden 2008</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vallance 2007</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Yates 2009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastep 2004</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Strath 2011</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Results – pedometer effect isolated, N=13

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Pedometer</th>
<th>Control</th>
<th>Std. Mean Difference</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Total</td>
<td>Weight</td>
</tr>
<tr>
<td>Carr 2008</td>
<td>9,668</td>
<td>1,556</td>
<td>5</td>
<td>2.9%</td>
</tr>
<tr>
<td>Eastep 2004</td>
<td>63,421</td>
<td>23,265</td>
<td>12</td>
<td>5.9%</td>
</tr>
<tr>
<td>Strath 2011</td>
<td>5,754</td>
<td>1,756</td>
<td>16</td>
<td>7.1%</td>
</tr>
<tr>
<td>Duvall 2004</td>
<td>322.93</td>
<td>88</td>
<td>17</td>
<td>7.3%</td>
</tr>
<tr>
<td>Samuels 2011</td>
<td>8,877</td>
<td>2,394</td>
<td>14</td>
<td>7.6%</td>
</tr>
<tr>
<td>Ornes 2007</td>
<td>8,890</td>
<td>1,172</td>
<td>30</td>
<td>7.8%</td>
</tr>
<tr>
<td>Hultquist 2007</td>
<td>8,491</td>
<td>2,187</td>
<td>23</td>
<td>7.9%</td>
</tr>
<tr>
<td>Gray 2009</td>
<td>10,182</td>
<td>4,081</td>
<td>24</td>
<td>8.0%</td>
</tr>
<tr>
<td>Sugden 2008</td>
<td>108,738</td>
<td>54,728</td>
<td>27</td>
<td>8.0%</td>
</tr>
<tr>
<td>Baker 2011</td>
<td>9,573</td>
<td>2,587</td>
<td>23</td>
<td>8.1%</td>
</tr>
<tr>
<td>Yates 2009</td>
<td>8,995</td>
<td>2,402</td>
<td>33</td>
<td>8.8%</td>
</tr>
<tr>
<td>McMurdo 2010</td>
<td>147,142</td>
<td>56,458</td>
<td>60</td>
<td>9.8%</td>
</tr>
<tr>
<td>Vallance 2007</td>
<td>8,109</td>
<td>4,302</td>
<td>172</td>
<td>10.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>456</strong></td>
<td></td>
<td><strong>436</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Heterogeneity: $\tau^2 = 0.22$; $\chi^2 = 49.25$, df = 12 ($P < 0.00001$); $I^2 = 76$

Test for overall effect: $Z = 2.30$ ($P = 0.02$)
## Results – step goal subgroup analysis, N=13 x 3 subgroups

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Pedometer</th>
<th>Control</th>
<th>Std. Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.3.1 Ped+goal compared to no-ped no-goal group (isolated)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carr 2008</td>
<td>9,668</td>
<td>6,618</td>
<td>2.9%</td>
</tr>
<tr>
<td>Strath 2011</td>
<td>5,754</td>
<td>5,000</td>
<td>7.1%</td>
</tr>
<tr>
<td>DuVall 2004</td>
<td>322.93</td>
<td>318.33</td>
<td>7.3%</td>
</tr>
<tr>
<td>Gray 2009</td>
<td>10,182</td>
<td>6,709</td>
<td>8.0%</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>62</td>
<td>60</td>
<td>25.3%</td>
</tr>
</tbody>
</table>
| Heterogeneity: Tau² = 0.15; Chi² = 5.89, df = 3 (P = 0.12); I² = 49%
Test for overall effect: Z = 2.18 (P = 0.03) |

| **4.3.2 Ped+goal compared to no-ped+goal group (isolated)** | | | |
| Samuels 2011 | 8,877 | 7,921 | 7.6% | 0.47 [-0.18, 1.11] |
| Hultquist 2007 | 8,491 | 9,073 | 7.9% | -0.24 [-0.85, 0.36] |
| Sugden 2008 | 108,738 | 113,822 | 8.0% | -0.09 [-0.68, 0.51] |
| Baker 2011 | 9,573 | 10,279 | 8.1% | -0.27 [-0.85, 0.31] |
| Yates 2009 | 8,995 | 7,922 | 8.8% | 0.30 [-0.20, 0.81] |
| McMurdo 2010 | 147,142 | 139,714 | 9.8% | 0.13 [-0.24, 0.50] |
| Vallance 2007 | 8,109 | 8,070 | 10.8% | 0.01 [-0.20, 0.22] |
| **Subtotal (95% CI)** | 352 | 338 | 61.0% | 0.04 [-0.11, 0.19] |
| Heterogeneity: Tau² = 0.00; Chi² = 5.13, df = 6 (P = 0.53); I² = 0%
Test for overall effect: Z = 0.52 (P = 0.60) |

| **4.3.3 Ped+no goal compared to no-ped no-goal (isolated)** | | | |
| Eastep 2004 | 63,421 | 52,505 | 5.9% | 0.43 [-0.45, 1.31] |
| Ornes 2007 | 8,890 | 6,673 | 7.8% | 1.93 [1.30, 2.55] |
| **Subtotal (95% CI)** | 42 | 38 | 13.7% | 1.21 [-0.26, 2.68] |
| Heterogeneity: Tau² = 0.97; Chi² = 7.45, df = 1 (P = 0.006); I² = 87%
Test for overall effect: Z = 1.62 (P = 0.11) |

| **Total (95% CI)** | 456 | 436 | 100.0% | 0.36 [0.05, 0.67] |
| Heterogeneity: Tau² = 0.22; Chi² = 49.25, df = 12 (P < 0.00001); I² = 76%
Test for overall effect: Z = 2.30 (P = 0.02)
Test for subgroup differences: Chi² = 6.14, df = 2 (P = 0.05), I² = 67.4% |

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**Diagram**: Forest plot showing the effect sizes and 95% confidence intervals for each study or subgroup, with a funnel plot illustrating the potential for publication bias.
**Discussion**

- **Preliminary** analysis suggests overall increase in physical activity in pedometer groups when (somewhat) isolated against a non-pedometer control.

- Subgroup analyses possible on PA goals, PA logs, goal review etc.
  - But these components are all correlated to some extent...

- Further studies to integrate with self-report measures.

- Further data on intervention intensity.
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Substantive trial

WS4 Main trial
Estimate cost and effectiveness of best-bet VBI
Select best-bet VBI
Qualitative approach
- Interview based
- On-site at Health Centers et al
- Observation of Health Check (HC)
- Waiting Room ‘assessment’

Sample Size
- 40 patient interviews and 4/5/6 practitioner interview

Interview Structure
- 30-50 minute, semi-structured, one-on-one, private setting
Field Work

- 6 locations
- Time frame: January 27\textsuperscript{th} – March 27\textsuperscript{th} 2012
- Morning and afternoon appointments
- Not all nurses give consent to observation
- Not all patients give consent (on the day)
- Overall success / average interview time circa. 40 minutes
The Health Check

- Health Check structure as observed:
  - Formulaic:
    - General health probing and structure of session
    - Weight and height/BMI
    - ['VBI’ on PA generally at this stage] / Diet
    - Smoking
    - Alcohol
    - Blood Pressure
    - Risk Assessment
    - Bloods
    - General discussion/conclusion
Data Themes

- The Health Check (HC) as a forum of general health
- Self-selection
- Expectations
- Dynamics
- Concerns
Data Themes (2)

- The HC as ‘reassurance’
- The HC as ‘truth’
- The HC is not ‘expert’ but ‘confirmation’
- The HC is not long enough
  - Detail
  - Advice
  - Insight
Data Themes (3)

- HC is seen as merely a ‘first phase’ of a wider ‘consultation’ on health.
  - A reoccurring theme in all practices with all patients.
  - Average ‘Type’
  - ‘Checks’ are ‘checks’, not a platform for ‘diagnosis’
    - thus not a platform for solutions (or advice)
  - Empathy and Advice
  - Common sense should prevail at all times on how to look after yourself
Advice

- Advice not always present
- Nurses/HCA’s often skip advice if patient ‘looks’ ok
- Patients split on ‘best time’ for a ‘VBI’ on PA – at the time, or at the end. Sometimes both – with concluding statements aimed at ‘sending them out into the world’ with advice
- Leaflets are unpopular
- Advice is not seen as ‘part’ of the HC. Patients do not stress ‘advice’ as something that is ‘missing’ (like, for example, lung capacity testing)
VBI on Physical Activity:
- Advice is patchy
- Advice is not bespoke
- Advice has even chance of ‘impact’ at end of meeting (as a composite) or attached to PA-theme during HC
- PA is common sense
- PA is activity
Development work

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Substantive trial
Aim and objectives of WS3

- **Aim:**
  - To pilot and test promising VBIs in a pilot trial

- **Objectives:**
  1. To develop and pilot intervention protocols, training manual, intervention materials and quality assurance (fidelity) instruments
  2. To test the fidelity, feasibility, acceptability and potential efficacy of the VBIs
  3. To decide which single or combined VBI to take forward to evaluation in a substantive trial (WS4)
Phase 1: Prototype ‘brief’ interventions will be piloted in three practices (n=180) using an iterative approach to assess feasibility and acceptability of the interventions:

Control Group: No control group.

Intervention Groups: Participants will receive one of four very brief interventions for increasing physical activity, *for instance*:

1. motivational counselling intervention OR
2. planning intervention OR
3. pedometer intervention OR
4. activity diary (self-monitoring) intervention
Phase 2: An individually randomised controlled trial will be conducted in 5-8 practices (n=500) to test the feasibility, acceptability and potential efficacy of up to 7 very brief interventions:

- Control Group: Participants will receive the standard NHS Health Check.
- Intervention Groups: Participants will receive the standard NHS Health Check PLUS one of (up to) seven very brief interventions for increasing physical activity, for example:
  
  1. motivational intervention OR
  2. planning intervention OR
  3. pedometer intervention OR
  4. activity diary intervention OR
  5-7 a combination of interventions determined by the pilot testing in Phase 1 and the expert consultation (e.g., 1 + 2 OR 1 + 3 +4).
Development of the Very Brief Interventions

The four very brief interventions have been designed and developed based on:

1. **Previous research:** that has shown these techniques to be the most likely to bring about a change in physical activity (e.g. evidence that brief counselling, making specific plans, monitoring steps with a pedometer or diary have been effective at increasing physical activity).

2. **Qualitative Research of WS2:** interviews with health care practitioners who deliver Health Checks, and with patients after they attended a health check.

3. **Consultation:** with academics, commissioners, practitioners and end-users (the PPI, patient public involvement panel) on their experience of what techniques are likely to be both feasible and effective.
VBI 1: Motivational Counselling & Booklet

Brief discussion of:

- PA recommendations.

- Physical activity assessment (Active or Under-Active).

- Benefits of increasing physical activity.

- Ways of increasing physical activity.

- **Motivational Booklet:** given to the participant to take away and encouraged to ‘give it a try’ for 4 weeks.
VBI 2: Planning

Brief discussion of:

- PA recommendations.

- Physical activity assessment (Active or Under-Active).

- Activity Planning Sheet: participant asked to identify and write down a specific plan of how they might increase their physical activity. Given to the participant and encouraged to ‘give it a try’ for 4 weeks.
VBI 3: Pedometer

Brief discussion of:

- PA recommendations (10,000 steps a day).
- Physical activity assessment (Active or Under-Active).
- Using a pedometer to measure steps walked.
- How to use and wear the pedometer.
- Pedometer Information Booklet: Given to the participant to take away and encouraged to ‘give it a try’ for 4 weeks.
Brief discussion of:

- PA recommendations (10,000 steps a day).
- Physical activity assessment (Active or Under-Active).
- Activity Diary:
  - participant asked to identify and write down a physical activity goal for the next week.
  - participant shown how to monitor daily and weekly activity (as well as thoughts and feelings about the activity), and how to review goals each week.

- Physical Activity Diary: Given to the participant to take away and encouraged to ‘give it a try’ for 4 weeks.
Thank you!

http://bitly.com/vbi-programme