EFFECTIVENESS AND COST-EFFECTIVENESS OF A VERY BRIEF PEDOMETER-BASED INTERVENTION: THE VBI RANDOMISED CONTROL TRIAL

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on behalf of the Very Brief Interventions Team

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**BACKGROUND**

**Physical inactivity** is the 4th leading risk factor for death worldwide\(^1,2\)

Important modifiable risk factor for chronic diseases\(^3\)

Estimated cost to the NHS £1.06 billion/year\(^4\) and $53.8 billion to healthcare systems worldwide\(^5\)

Majority of adults in England do not meet current guidelines\(^6\)

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\(^1\) WHO (2010) Global Recommendations on Physical Activity for Health


\(^4\) Allender et al. (2007) The burden of physical activity-related ill health in the UK. J Epidemiol Community Health


**Brief interventions**

<30 mins
Potentially effective\(^7,8\)

**Very brief interventions (VBIs)**

<5 mins

- Inexpensive
- Scalable
- Large reach
- May have substantial public health impact

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\(^7\) NICE 2013. Physical activity: brief advice for adults in primary care. NICE public health guidance 44.

\(^8\) Vijay GC et al. Are brief interventions to increase physical activity cost-effective? A systematic review. BJSM 50(7):408-17
Aim of the VBI Trial

To assess the effectiveness and cost-effectiveness of a very brief pedometer-based intervention “Step It Up”

Step It Up based on:
- Development work
- Feasibility testing
- Preliminary trial including extensive process evaluation$^{9,10}$

**TRIAL DESIGN**

Primary care setting
- NHS Health Check
  - Preventative consultation
  - Adults 40-74 years

Two parallel-group RCT with 1:1 individual allocation
- NHS Health Check
- NHS Health Check + Step It Up

1,007 participants from 23 practices in the East of England

3 months follow up
STEP IT UP

Your Current Physical Activity Level:

☐ You’re already active, well done! Keep up the good work!

☐ You could benefit from increasing your physical activity.

Step Chart
Face-to-face discussion:
• Feedback on PA
• PA recommendations
• How to use pedometer
• Steps/day goal
• How to self-monitor

Step It Up Booklet:
• Feedback on PA
• PA recommendations
• How to use pedometer
• Steps/day goal
• How to self-monitor
• Benefits of PA
• Tips for increasing PA
• Local resources info

1.1 Goal setting (behaviour)
1.4 Action Planning
2.2 Feedback on behaviour
4.1 Instruction on how to perform the behaviour
2.3 Self-monitoring of behaviour
5.1 Information about health consequences
5.3 Information about social and environmental consequences
5.6 Information about emotional consequences
12.5 Adding objects to the environment

Pedometer & Step Chart
**Participant recruitment**
- Trial invitation letter + NHS health check invitation to subset of eligible patients
- Patients expressed interest in trial when arranging health check appointment

**Start of NHS health check**
Informed consent, short questionnaire, randomisation through web-based program

- **NHS health check only**
- **NHS health check + Step It Up**

**Three month postal follow-up**
- **Accelerometer**: Actigraph
- **Questionnaire**: Self-reported physical activity (RPAQ), resource use, and recall and enactment (use of BCTs)
**CONSORT DIAGRAM**

**Invited**
- n=6200

**Randomised**
- n=1007

**Allocation**
- Intention to treat
  - n=502
- Intention to treat
  - n=505

**Follow-up at 3 months**
- Lost to follow up
  - (n=58)
- Lost to follow up
  - (n=84)

**Analysis**
- n=442
  - Excluded from analysis
    - (n=2)
- n=417
  - Excluded from analysis
    - (n=4)
### Baseline Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Control N=502</th>
<th>Intervention N=505</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Female</td>
<td>61%</td>
<td>63%</td>
</tr>
<tr>
<td>Age [mean (SD)]</td>
<td>56.5 (9.4)</td>
<td>55.7 (9.6)</td>
</tr>
<tr>
<td>Ethnicity % White</td>
<td>95% (476/502)</td>
<td>96% (484/505)</td>
</tr>
<tr>
<td>Occupational group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Manual</td>
<td>24% (71/295)</td>
<td>27% (84/314)</td>
</tr>
<tr>
<td>% Non-manual</td>
<td>68% (200/295)</td>
<td>65% (203/314)</td>
</tr>
<tr>
<td>% Other</td>
<td>8% (24/295)</td>
<td>9% (27/314)</td>
</tr>
<tr>
<td>Work Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Paid work</td>
<td>61% (286/472)</td>
<td>62% (301/482)</td>
</tr>
<tr>
<td>% Unemployed/homemaker</td>
<td>6% (29/472)</td>
<td>6% (28/482)</td>
</tr>
<tr>
<td>% Full-time student</td>
<td>0% (0/472)</td>
<td>0% (1/482)</td>
</tr>
<tr>
<td>% Retired</td>
<td>32% (152/472)</td>
<td>31% (148/482)</td>
</tr>
<tr>
<td>% Other</td>
<td>1% (4/472)</td>
<td>1% (4/482)</td>
</tr>
</tbody>
</table>

31% reported being inactive or moderately inactive
RESULTS: OBJECTIVELY MEASURED PA

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Intervention</th>
<th>Intervention compared to Control</th>
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<tbody>
<tr>
<td></td>
<td>N=442</td>
<td>N=417</td>
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<tr>
<td></td>
<td>(88%</td>
<td>(83%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>response)</td>
<td>response)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean ++</td>
<td>Mean ++</td>
<td>Adjusted difference in means</td>
</tr>
<tr>
<td></td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
</tr>
<tr>
<td>Accelerometer counts per minute (primary outcome)</td>
<td>660 (641, 679)</td>
<td>668 (648, 689)</td>
<td>8.8 (-18.7, 36.3) p=0.53</td>
</tr>
<tr>
<td>Step counts per day (adjusted)</td>
<td>8191 (7911, 8471)</td>
<td>8419 (8110, 8729)</td>
<td>242 (-172, 656) p=0.25</td>
</tr>
</tbody>
</table>

R E S U L T S : O B J E C T I V E L Y M E A S U R E D P A

- **Accelerometer counts per minute (primary outcome)**: 660 (641, 679) vs. 668 (648, 689) with an adjusted difference of 8.8 (-18.7, 36.3) (p=0.53).
- **Step counts per day (adjusted)**: 8191 (7911, 8471) vs. 8419 (8110, 8729) with an adjusted difference of 242 (-172, 656) (p=0.25).
### RESULTS: SELF REPORTED PA

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Intervention</th>
<th>Intervention relative to Control</th>
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<tbody>
<tr>
<td><strong>Self-report PA measures (RPAQ)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>Mean+ (95% CI)</td>
<td>N</td>
</tr>
<tr>
<td>PAEE Physical activity energy expenditure (kJ/kg/day)</td>
<td>440</td>
<td>28.0 (26.0, 30.0)</td>
<td>418</td>
</tr>
<tr>
<td>Home based PAEE (kJ/kg/day)</td>
<td>439</td>
<td>2.7 (2.5, 2.9)</td>
<td>418</td>
</tr>
<tr>
<td>Work based PAEE (kJ/kg/day)</td>
<td>273</td>
<td>11.8 (10.6, 13.2)</td>
<td>269</td>
</tr>
<tr>
<td>Leisure based PAEE (kJ/kg/day)</td>
<td>440</td>
<td>12.0 (10.7, 13.4)</td>
<td>416</td>
</tr>
<tr>
<td>Commuting PAEE (kJ/kg/day)</td>
<td>266</td>
<td>0.60 (0.50, 0.80)</td>
<td>257</td>
</tr>
<tr>
<td>Screen/TV time (hours/day)</td>
<td>439</td>
<td>2.80 (2.60, 2.90)</td>
<td>418</td>
</tr>
</tbody>
</table>

* Means are geometric means for skewed PAEE outcomes and compared as percentage increase of the intervention group to the control group.
STRENGTHS & LIMITATIONS

Strengths

• Large pedometer based intervention
• Well-balanced sample
• 85% retention
• Objective measure of PA

Limitations

• Objective baseline measurement
• Generalisability
CONCLUSION

Step It Up did not lead to higher levels of physical activity at 3 months than the NHS Health Check alone

- Potential explanations:
  - Insufficient fidelity of delivery (in progress)
  - Already physically active sample\(^{11}\)
  - Insufficient intensity

\(^{11}\text{Harris et al. (2015) A primary care pedometer-based walking intervention with and without practice nurse support: PACE-UP cluster-randomised controlled trial. Lancet}\)
But...

- Step It Up
  - Very small positive effect
  - Low-cost (£18.04)

Better than doing nothing?
ACKNOWLEDGEMENTS

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E-mail: VBI_Study@medschl.cam.ac.uk

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