How about a walk in the park?

Green exercise for wellbeing
Overview of talk

• My background
• Green activity/exercise
• Ecological dynamic framework
• Urban parks
• River walkways
• Group walks for wellbeing
• Walking environments
• The way forward...
Physician? Nature?
Health is...

Interconnectedness Model of Healthy Living

Warber & Irvine, ms in prep
Problems

• Urbanization $\iff$ poor physical and mental health
• 1.5 billion people worldwide are overweight or obese (WHO)

• Depression is a leading cause of disability, affecting 121 million people (WHO)
Green Exercise

• Term coined by Pretty et al; included any physical activity in nature
• Proposed as a cost effective solution for improving health (mental & physical)
• Meta-analysis of 10 UK studies, n=1252
• Variety of activities, variety of environments
• Outcomes: Self Esteem, Mood
• Dose response

Systematic Review

- 11 studies, n=833
- Outdoor exercise (walking or running) vs. indoor exercise
- Methods poorly reported; 6 studies in university students
- 13 different mental health outcomes; no physical outcomes
- All single episodes of exercise; immediate effects

<table>
<thead>
<tr>
<th>Table 5. Summarized Results of Included Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>short-term studies - walking</td>
</tr>
<tr>
<td>effects on positive emotions</td>
</tr>
<tr>
<td>effects on negative emotions</td>
</tr>
<tr>
<td>effects on feelings of tension</td>
</tr>
<tr>
<td>effects on feelings of energy and revitalization</td>
</tr>
<tr>
<td>enjoyment of activity</td>
</tr>
<tr>
<td>intention to repeat activity</td>
</tr>
</tbody>
</table>

Review of nature’s effects on physiologic outcomes

- 17 studies
- 20 measures
- Males, Students
- 3 clinical populations
- Small samples
- Japan, USA, Europe

Haluza D, et al. IJERPH 2014; 11:5445-5461
Ecological dynamic model

Activity

Individuals

Population groups

Nature

Engagement

Intensity & duration

Frequency

Skill level

Adventure

Health & Wellbeing

Individual – environment – wellbeing

Urban nature

Irvine, Warber et al. IJERPH 2013; 10:417-442

Katherine Irvine, PhD
James Hutton Institute
Aberdeen, UK
Study 1: Urban Parks

- Do people notice biodiversity?
- What contribution does biodiversity make to sense of place and reflection?
- To what extent do park users self-identify health and well-being benefits?

Method

• *In situ* cross sectional study design
• Interdisciplinary Mixed Methods:
  • Questionnaire – open & closed questions
  • Ecological Surveys (e.g. species richness)
• 312 park users
• 15 urban parks
  • Publicly accessible
  • Sheffield, UK
Is species richness noticed in the landscape?

![Image of a landscape with a graph showing perceived plant richness vs. log10 plant species richness. The graph indicates a positive correlation, with $R^2 = 0.71$.](image-url)
What role does species richness play in reflection?

![Graph showing the relationship between reflection and log10 plant species richness. The graph has a linear trend with an R² value of 0.328.]

Fuller, Irvine et al. 2007 Biology Letters, 3, 390
Is health/well-being self-identified?

Question

- Thinking about after you leave the park: what words would you use to describe how you feel after you leave here?
- N=527 comments

Analysis: Iterative content analysis

Responses ➔ Codes ➔ Themes ➔ Domains

Quantification process – frequency mentioned
Findings: Derived Effects

‘relaxed, quite joyful, peaceful despite noise one hears in park, quite clear headed actually, therapeutic – being here is therapeutic’

- Feelings represented multiple dimensions of well-being
- Predominant state is relaxed
- High level of positive emotions about oneself & the green space
- Aspects of spiritual well-being prominently identified
- Cognitive benefit experienced in terms of satisfaction, being mentally recharged
- Minimal self-identified social

Irvine, Warber et al. IJERPH 2013;10(1):417-42
Measurement Model for Person-Environment-Health Relationship

Motivators
- Person Level
  - Physical
  - Cognitive
  - Social
  - Children
  - Place Connection
  - Unstructured Time
- Environment Level
  - Nature
    - Fresh Air, Sun
    - Fauna, Flora
    - View
  - Park Features
    - Location
    - Facilities
    - Atmosphere

Outcomes
- Individual Well-being
  - Global
  - Physical
  - Cognitive
  - Affective
  - Social
  - Spiritual

Study 2: River Study

- Confirm & extend park study analysis
  - Perceived & actual species richness
  - Species richness & well-being
  - Well-being framework?
- Population - sociodemographics
- Dose exploration – frequency of visit
- N= 1,100 greenspace users

Sheffield UK

Mismatch between perceived and actual plant richness

Reflection positively correlated with perceived plant richness
Wellbeing domains - Themes

- Place attachment: 285, 20%
- Personal emotions: 273, 19%
- Relaxed: 277, 19%
- Physical-other: 180, 12%
- Spiritual: 279, 19%
- Cognitive: 121, 8%
- Global well-being: 42, 3%

Irvine, Warber et al in prep
### Sociodemographics vs Domains

<table>
<thead>
<tr>
<th></th>
<th>Chi-squared</th>
<th>p-value</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>7.94</td>
<td>0.094</td>
<td>No differences</td>
</tr>
<tr>
<td>Group size</td>
<td>27.40</td>
<td>0.000</td>
<td>Group (2+) more physical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Alone more affective</td>
</tr>
<tr>
<td>Age group</td>
<td>54.16</td>
<td>0.000</td>
<td>20s/50s more physical</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30s more spiritual</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60s/&gt;70 more affective</td>
</tr>
<tr>
<td>Visit Frequency*</td>
<td>6.22</td>
<td>0.183</td>
<td>No differences</td>
</tr>
<tr>
<td>Dog walking</td>
<td>2.68</td>
<td>0.612</td>
<td>No differences</td>
</tr>
</tbody>
</table>

*daily vs weekly or less*
Park Prescriptions

- Physician/health provider actions
- Programmatic interventions
- Follow-up/Evaluation

- Trails
- Mapping
- Safety
- Grading
- Incentives
Program-nature-mental wellbeing

Group walks in nature

Marselle M, Irvine KN, Warber SL. *IJERPH* 2013, 10(11):5603-5628
Marselle M, Irvine KN, Warber SL. *Ecopsychology* 2014, 6(3):134-147
WALKING FOR HEALTH (WfH)

- Walking for Health provides free, led group walks in England.
- Initiated by a UK General Practitioner
- One of the largest public health interventions for physical activity in the UK.

Walking groups and physical activity

• Meta-analysis of 19 studies, 4,572 participants, age 44-88
• Outcome: increased physical activity (questionnaires/pedometers)
• Moderate effect size (d=0.52, 95% CI 0.32-0.71, p < 0.0001)
• Larger effect sizes in studies with both genders vs women only
  • d = 0.61 vs d = 0.18
• No difference in studies of lay walk leaders vs professionals
• Large fail-safe N = 753 (studies w no effect needed)

Research questions & design

- Do group walks in nature foster mental wellbeing?
- Contribution of stress and physical activity?
- Large longitudinal controlled cohort study
Data Collection

Before 1st WfHa Walk
- Ethnicity
- GPb referral
- Health screening
- Medical conditions
- Disability
- Past physical activity

Time 1 (T1)
- Group walk status prior to T1
  - Age
  - Gender
  - Marital status
  - Education
  - Social deprivation
  - Past stressful life events

Unspecified time

Time 2 (T2)
- Group walk status T1-T2
- Environment of group walks
- Frequency & duration of individual green walks
- Recent physical activity
- Recent stressful life events
  - Depression
  - Perceived stress
  - Negative affect
  - Positive affect
  - Mental well-being
  - Social support

13 weeks

aWalking for Health, bGeneral Practitioner
Matching Group Nature Walkers vs. Non-group Walkers

Valid Responses on T1\(^a\) & T2\(^b\) 1991

Group Walkers 1258
Non-Group Walkers 733

Non-Nature Walkers 83
Nature Group Walkers 1175

Missing Values 94

Final Nature Group Walkers 1081
Final Non-Group Walkers 435

Missing Values 113
Non-Group Walkers 620
PSM\(^c\) Pruning 185

\(^a\)Time 1 questionnaire
\(^b\)Time 2 questionnaire
\(^c\)Propensity score match
**Table 2.** Comparison of mean scores of Time 2 depression, perceived stress, negative affect, positive affect, mental well-being, and social support for matched\(^a\) Nature Group Walkers and Non-Group Walkers.

<table>
<thead>
<tr>
<th>Outcomes(^b)</th>
<th>Nature Group Walkers</th>
<th>Non-Group Walkers</th>
<th>t-test(^c)</th>
<th>Effect size (r)^d</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 1081)</td>
<td>(n = 435)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(mean (SD))</td>
<td>(mean (SD))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression(^e)</td>
<td>6.53 (5.70)</td>
<td>9.78 (7.96)</td>
<td>(t(1514) = 8.47***)</td>
<td>.21</td>
</tr>
<tr>
<td>Perceived stress(^f)</td>
<td>11.27 (6.15)</td>
<td>13.54 (7.02)</td>
<td>(t(715.75) = 5.89***)</td>
<td>.22</td>
</tr>
<tr>
<td>Negative affect(^f)</td>
<td>14.38 (4.76)</td>
<td>16.26 (6.08)</td>
<td>(t(710.41) = 6.05***)</td>
<td>.22</td>
</tr>
<tr>
<td>Positive affect(^f)</td>
<td>34.80 (6.90)</td>
<td>31.87 (8.33)</td>
<td>(t(685.52) = -6.50***)</td>
<td>.24</td>
</tr>
<tr>
<td>Mental well-being(^f)</td>
<td>53.04 (7.27)</td>
<td>50.55 (8.87)</td>
<td>(t(680.92) = -5.18***)</td>
<td>.19</td>
</tr>
<tr>
<td>Social support</td>
<td>22.94 (6.44)</td>
<td>22.82 (6.47)</td>
<td>(t(1514) = -.328)</td>
<td>.01</td>
</tr>
</tbody>
</table>
Disentangling

• Regression controlled for recent stressful life events, other nature walks (frequency & duration), recent physical activity

• Nature group walk → ↓ depression
• Stressful life events →
  • ↑ perceived stress, negative affect
  • independent ↓ for Nature group walkers
• Physical activity →
  • ↑ positive affect and mental well-being
  • independent ↑ for Nature group walkers
Does the type of environment matter?

- Participants: n=708
  - Subsample - Frequent Group Walkers (once per week or more) at T2
- Adjustment for sociodemographics, walking behavior, physical activity, stressful life events
- Hierarchical multiple regression
“What is the **main** type of environment you walk in with this group?”

<table>
<thead>
<tr>
<th>Environment type</th>
<th>Example</th>
<th>( n )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural and Semi-natural places</td>
<td>Country Park, Nature Reserve</td>
<td>216</td>
</tr>
<tr>
<td>Green corridor</td>
<td>river path, cycleways, bridleways</td>
<td>190</td>
</tr>
<tr>
<td>Farmland</td>
<td></td>
<td>102</td>
</tr>
<tr>
<td>Urban green space</td>
<td>public gardens, formal parks, amenity green space, allotments, community gardens, sports pitch</td>
<td>71</td>
</tr>
<tr>
<td>Coastal</td>
<td>seaside, estuary</td>
<td>45</td>
</tr>
<tr>
<td>Urban public space</td>
<td>streets, shopping centre, plaza</td>
<td>44</td>
</tr>
<tr>
<td>Mixture of 2 or more environments</td>
<td>“a combination of all of the above”</td>
<td>40</td>
</tr>
</tbody>
</table>
Results

• Group walks in farmland or green corridors were associated with less perceived stress and negative affect and greater mental well-being
• The **duration of walks**
  • longer group walks ↔ reduced feelings of depression
  • longer non-WfH walks in green space ↔ increased positive emotions.
• More **frequent** non-WfH walks in green spaces ↔ decreased perceived stress
• Duration & frequency of outdoor walks influenced well-being
Ecological dynamic model

- Activity
- Engagement
- Skill level
- Population groups
- Intensity & duration
- Adventure
- Nature
- Frequency
- Health & Wellbeing

Where do we go from here?

Thank you!
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