“Should I even bother attending?”

Determining Maximal Intervention Benefit from Public Health Trials using Randomisation-Based Efficacy Estimators

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Motivation

• Why evaluate interventions using RCTs?
• Intention to treat analysis
• Compliance with public health interventions
• Traditional efficacy analysis
Randomisation-based efficacy

- Selection bias
- Potential outcomes
- Randomisation as an instrument
- Binary or quantitative exposure
### Study 1: Project SFP Cymru

#### PICO description of Project SFP Cymru

<table>
<thead>
<tr>
<th>Participants</th>
<th>Families with adolescents aged 10 to 14 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Strengthening Families Programme</td>
</tr>
<tr>
<td>Control</td>
<td>Usual care / Locally available services</td>
</tr>
<tr>
<td>Outcome</td>
<td>Adolescent alcohol use in the previous 30 days at 24 months post-randomisation</td>
</tr>
</tbody>
</table>

- Intervention receipt defined as attending five or more sessions without missing more than one in a row
- Total number of weeks attended also used
Study 1: Project SFP Cymru

- 66% of adolescents “received” the intervention
  - 37% attended all 7 sessions
  - 16% attended 0 sessions

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Adjusted odds ratio for alcohol use at 24 months*</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITT</td>
<td>1.12</td>
<td>0.72</td>
<td>1.73</td>
<td>0.625</td>
</tr>
<tr>
<td>CACE (binary)</td>
<td>1.21</td>
<td>0.79</td>
<td>1.86</td>
<td>0.384</td>
</tr>
<tr>
<td>SMM (per week)</td>
<td>1.03</td>
<td>0.97</td>
<td>1.09</td>
<td>0.382</td>
</tr>
<tr>
<td>SMM (per 7 weeks)</td>
<td>1.20</td>
<td>0.79</td>
<td>1.83</td>
<td></td>
</tr>
</tbody>
</table>

*SFP compared to control. Adjusted for average age of adolescents within the family, recruitment area, level of challenge exhibited by the family.
## Study 2: The WILMA trial

### PICO description of WILMA

<table>
<thead>
<tr>
<th>Participants</th>
<th>Overweight adults who had lost at least 5% of their bodyweight in previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention(s)</td>
<td>Individually-tailored motivational interviewing</td>
</tr>
<tr>
<td>Control</td>
<td>Leaflet on healthy lifestyle</td>
</tr>
<tr>
<td>Outcome</td>
<td>BMI (kg/m²) at 12 months post-randomisation</td>
</tr>
</tbody>
</table>

- Intervention receipt defined as attending
  - 5/6 face-to-face sessions (intensive arm)
  - 2/2 face-to-face sessions (less intensive arm)
Study 2: The WILMA trial

- **Intensive arm: 83% ; Less intensive arm: 91%**

- Potential clustering by therapist (individually RCT):
  - Outcome ICC = 0, **Compliance ICC = 0.057**, small cluster sizes **(average = 3)**
  - Unlikely to bias variance/standard error estimation (Jo et al., Jo et al.)

- **Three arm trial** (Cheng J, Long Q)

![Graph showing adjusted between-group mean difference in post-intervention BMI](graph.png)

- Favours intervention
- Favours control
**PICO description of Anger Management**

<table>
<thead>
<tr>
<th>Participants</th>
<th>Adults with mild to moderate learning disabilities who had problems managing their anger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>12-week group-based cognitive behavioural therapy</td>
</tr>
<tr>
<td>Control</td>
<td>Waiting list care as usual</td>
</tr>
<tr>
<td>Outcome</td>
<td>Provocation Index at 10 months post-randomisation</td>
</tr>
</tbody>
</table>

- Intervention receipt defined as attending 8/12 sessions
Study 3: The Anger Management trial

- 75% of participants attended 8/12 sessions
  - 30% attended all 12 sessions
  - 15% attended 0 sessions
- Potential clustering by centres (cluster RCT):
  - Outcome ICC = 0.2, compliance ICC = 0.4, but cluster sizes again small (average = 6)
- Analysis adjusts for clustered nature of outcome, but not compliance

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Adjusted mean difference in PI at 10 months*</th>
<th>Lower 95% CI</th>
<th>Upper 95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITT</td>
<td>-2.8</td>
<td>-7.4</td>
<td>1.7</td>
<td>0.210</td>
</tr>
<tr>
<td>CACE</td>
<td>-3.3</td>
<td>-7.9</td>
<td>1.4</td>
<td>0.165</td>
</tr>
</tbody>
</table>

*Intervention minus control. Adjusted for baseline PI and clustering of participants within centres.
• Added value of RBEEs
• Answer question of value to participants
  • Potentially to policy makers too
• Linearity versus exclusion restriction
• Clustering
• Missing data

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References

• White IR, Kalaitzaki E, Thompson SG. Allowing for missing outcome data and incomplete uptake of randomised interventions, with application to an Internet-based alcohol trial. Statistics in medicine. 2011, 30(27), 3192-3207.