PHYSICAL EXERCISE FOR SLEEP PROBLEMS WITH THE ELDERLY

What's the evidence?
Drawbacks of hypnotic medications

- Controversial for long-term use because of potential risk of tolerance and dependency (NIH 1990)
- Older people more likely to be affected by daytime residual effects (Prinz 1990; Morgan 1988)
- May increase likelihood of developing sleep apnoea (Kripke 1983)
- Associated with increased mortality (Kripke 1998)
## Non-Drug Treatments Investigated

<table>
<thead>
<tr>
<th>Cognitive-behavioural therapy (CBT)</th>
<th>Montgomery 2003</th>
<th>Some evidence of effectiveness</th>
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<tbody>
<tr>
<td>Bright light therapy</td>
<td>Montgomery 2002</td>
<td>No studies identified</td>
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<tr>
<td>Physical exercise</td>
<td>Montgomery 2002</td>
<td>This review</td>
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</table>
Traditional theories for exercise & sleep

- Thermoregulation
- Body restoration
- Energy conservation
More recent hypotheses

- Anti-anxiety & antidepressant effects on sleep
  - E.g., two RCTs found significant effects of exercise on depression with older people (Singh et al 2001; Mather et al 2002)
- Raising levels of adenosine
- Modifying circadian rhythm
Common exercise types for elderly

- Resistance training (e.g., light weights)
- Traditional cardio (e.g., brisk walking)
- Aerobic (e.g., tai chi)
Montgomery P, Dennis JA. 2002. Physical exercise for sleep problems in adults aged 60+. Cochrane Database of Systematic Reviews
**Review Criteria**

- **Design**: Randomized controlled trials
- **Intervention**: Exercise programs for older adults
- **Population**:
  - > 60 years of age
  - Screened to exclude those with dementia or depression
Sleep Problems

Primary Insomnia

- Difficulties initiating and maintaining sleep
- Sleep efficiency
- Delayed or advanced sleep phase problems
- Parasomnias
- Impaired daytime functioning
High-Quality Evidence

Randomized controlled trials
Review Results

- 1 study included in 2002 review:

- Post-2002 Additions
Brisk Walking

King et al. 1997
King et al 1997 RCT

- **Sample** (n=48)
  - Mean age: 62
  - Location: USA

- **Intervention** (n=24)
  - Moderate-intensity community-based exercise training (low impact aerobics; brisk walking)
  - 4 x 30-40 min per wk for 16 wks

- **Control** (n=24)
  - No intervention/waitlist
Results: King et al

Significant positive effects compared to control on:

- Sleep quality
- Sleep onset latency (9 min less per night than control)
- Sleep duration (48 min more per night than comparison)
Sleep Onset Latency, minutes

- Exercise
  - Baseline: 28.4
  - Posttest: 14.6
- Control
  - Baseline: 26.1
  - Posttest: 23.8

King et al 1997
Sleep Duration, hours

<table>
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<tr>
<th></th>
<th>Baseline</th>
<th>Posttest</th>
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<tr>
<td>Control</td>
<td>5.8</td>
<td>6.0</td>
</tr>
<tr>
<td>Exercise</td>
<td>6.0</td>
<td>6.8</td>
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</tbody>
</table>

King et al. 1997

p = .047
Tai Chi

Li et al
2004
Li et al 2004 RCT

- **Sample** (n=118)
  - Mean age: 75
  - Location: USA

- **Intervention** (n=62)
  - Tai chi emphasizing movement coordination and regulated breathing
  - 3 x 1hr per wk for 24 wks

- **Control** (n=56)
  - Low-impact exercise (seated exercise with controlled breathing, stretching, relaxation)
  - 3 x 1hr per wk for 24 wks
Results: Li et al

Significant positive effects compared to low-intensity exercise on:

- Sleep quality
- Sleep onset latency (18 min less per night than comparison)
- Sleep duration (48 min more per night than comparison)
- Sleep efficiency
- Sleep disturbances
Intervention drawbacks

- Moderate intensity exercise may be unsuitable for many older people
High-Quality Evidence

Other non-drug interventions
1 study identified (non-systematic review)

- **Sample**: 60 (30 intervention, 30 no-treatment control)
  - Mean age: 67; Location: Taiwan
- **Intervention**: 45 min sedative music tapes at bedtime for 3 wks

- **Significant positive effects on**:
  - Sleep quality
  - Sleep duration
  - Sleep efficiency
  - Sleep onset latency
  - Daytime dysfunction
Lower-Quality Evidence

Quasi-experimental and crossover studies
Warm Baths

- Passive body heating, e.g., via immersion to neck in 40-41°C water for 30 min
- Crossover study suggests could increase slow wave (deep sleep) in healthy female elderly with insomnia (Liao 2002)
- Elderly reports of better sleep and quicker falling asleep (n=30) (Kanda et al 1999)
Herbal Agents & Teas

Review by Shimazaki et al 2007:

- Very little evidence aside from small studies with subjective measurements
- Unclear whether agents pose risks in long-term care due to potential drug interactions
Conclusions
Physical exercise

- Very little evidence
- Durable effects of interventions unknown
- Promising results from King et al 1997 & Li et al 2004 for physical exercise
- Underlying mechanisms of tai chi for impact on sleep unclear (enhanced feeling of wellbeing via relaxation techniques and smooth movements and modification of circadian rhythm suspected)
- Li et al findings suggests tai chi more effective than low-intensity exercise
- Further research justifiable, particularly considering negative consequences of pharmacological treatments
Other non-drug interventions

- Again, very limited evidence
- Promising results from Lai et al 2006 study on soft music, but only 1 study
- Especially little known about efficacy of warm bathing and herbal agents for elderly sleep problems
- Further randomized controlled trials needed
References

- Kripke DF. 1983. Why we need a tax on sleeping pills. Southern Medical Journal 76:632-6
References (continued)