A Brief School-Entry Sleep Intervention Improves Child Sleep But Not Other Outcomes: A Randomized Controlled Trial

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Background

• A successful transition to school depends on a child’s physical health and wellbeing, social competence, emotional maturity, language and cognitive skills, and approach to learning
• Daily expression of each can be affected by immediate factors such as sleep
• Behavioral sleep problems affect up to 40% of school entrants and are associated with social, emotional, behavioural, and learning problems
• Systematically identifying and managing sleep problems at school entry could improve child psychosocial functioning, sleep and a range of other outcomes
Efficacy Trial (2008-2010)

- RCT of a behavioral sleep intervention
- N=108 new school entrants in 22 schools in Melbourne, Australia
- Sleep intervention:
  - 2 fortnightly face-to-face consultations + 1 telephone call two weeks later if required
  - suite of interventions, tailored to family needs
  - delivered at child’s school, by trained research assistants
- At 6 months, intervention vs control children had better psychosocial health-related QoL, sleep, and parent mental health.

Aims

To determine whether the same intervention, delivered by school nurses, can improve outcomes in school entrants with behavioral sleep problems.

**Primary**
- PedsQLv.4 (psychosocial health-related quality of life (QoL))

**Secondary**
- Sleep problems and patterns
- Behavior
- Academic achievement (blinded child assessment)
- Overall child QoL
- Parent mental health and QoL
Methods

Design

• School entry survey to systematically identify children with parent reported moderate or severe sleep problems
• RCT of a behavioral sleep intervention versus ‘usual care’

Intervention

• School nurse-delivered (24 nurses, 2 x 3 hour training sessions)
• 1 x 45 min face-to-face consultation at the child’s school
• Follow up telephone call two weeks later to check progress
Sampling

Inclusion

• Child in first year of formal schooling
• Moderate or severe sleep problem by parent report on classroom survey
• Attending government (public) or Catholic schools, representative proportion of each school type

Exclusion

• Major illness or disability (eg IQ <70)
• Likely obstructive sleep apnoea (3 item questionnaire screen + clinician call to family)
• Non-English speaking
Intervention strategies

Good sleep hygiene PLUS

Standard clinical care:

- Limit setting disorder: helping parents to consistently manage behaviour, positive reinforcement, checking method
- Sleep onset association disorder: adult fading (i.e., camping out), checking method, rewards
- Insomnia: visual imagery & relaxation, simple cognitive restructuring, restricting time in bed
- Delayed sleep phase: bedtime fading, wake at same time every morning, early light exposure
- Night-time anxiety: coping skills (e.g., ‘brave behaviour’, relaxation, ‘worry book’, rewards, checking method
## Measures

| Construct                   | Measures                                                                 | Time point |   |
|-----------------------------|--------------------------------------------------------------------------|------------|
| **Child**                   |                                                                          |            |   |
| Psychosocial QoL            | Pediatric Quality of Life Inventory (PedsQL 4.0)                         | Parent     | ● |
|                             |                                                                          | Child      | ● |
| Sleep problems              | Moderate/severe sleep problems                                          | Parent     | ● |
|                             | Child Sleep Habits Questionnaire                                         | Parent     | ● |
|                             | Sleep timing – bed, sleep and wake times                                 | Parent     | ● |
| Behaviour                   | Strengths & Difficulties Questionnaire                                   | Parent     | ● |
|                             |                                                                          | Teacher    |   |
| Quality of Life             | Child Health Utilities Index (CHU-9D)                                    | Child      | ● |
|                             |                                                                          | Parent     | Limited |
| Academic achievement        | Wechsler Individual Achievement Test (WIAT-2 abbreviated)               | Child      | ● |
|                             | Academic Rating Scale                                                   | Teacher    | ● |
| Working Memory              | Automated Working Memory Assessment                                     | Child      | ● |
| Parent                      |                                                                          |            |   |
| Mental Health               | Depression Anxiety Stress Scale (DASS-21)                                | Parent     | Limited |
| Quality of life             | EuroQol                                                                  | Parent     | ● |
|                             |                                                                          | ●          |
Statistical analysis

• Intention-to-treat

• Compared scores between intervention & control groups
  – linear regression - mean difference (95% CI) for continuous data
  – logistic regression - odds ratio (95% CI) for categorical data

• Adjusted for baseline score of outcome (where available), child gender, primary caregiver education

• Effect sizes - ≤ 0.2 = small, 0.3-0.5 = moderate, ≥ 0.6 = large

• Additional analyses adjusted for potential clustering at the nurse and school level (mixed effects models with a random intercept for school and nurse (within the intervention group only))

• Economic evaluation
Approached for screening
n = 6635

Completed screening survey
n = 5355 (81%)

Eligible
n = 418 (11%)

Randomized
n = 334 (80%)

Did not consent
n = 84 (20%)

Allocated to intervention, n = 166
Allocated to usual care, n = 168

Received allocated intervention, n = 155 (93%)

6 month follow-up
Primary Outcome, n = 145 (87%)
Parent surveys, n = 137 (83%)
Teacher surveys, n = 160 (96%)
Child assessments completed, n = 160 (96%)

6 month follow-up
Primary Outcome, n = 155 (92%)
Parent surveys, n = 146 (87%)
Teacher surveys, n = 166 (99%)
Child assessments completed, n = 165 (98%)
<table>
<thead>
<tr>
<th>Baseline characteristics (%)</th>
<th>Intervention (n=166)</th>
<th>Usual care (n=168)</th>
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</thead>
<tbody>
<tr>
<td><strong>Child</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48.8</td>
<td>45.2</td>
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<tr>
<td>Age in years (mean (SD))</td>
<td>5.8 (0.37)</td>
<td>5.7 (0.39)</td>
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<tr>
<td>Public school</td>
<td>81.3</td>
<td>81.0</td>
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<tr>
<td>Psychosocial QoL (mean (SD))</td>
<td>69.3 (13.5)</td>
<td>68.4 (13.3)</td>
</tr>
<tr>
<td>Child Sleep Habits Q total (mean (SD))</td>
<td>53.8 (7.8)</td>
<td>53.7 (8.2)</td>
</tr>
<tr>
<td>Strengths &amp; Difficulties Q total (mean (SD))</td>
<td>12.1 (6.0)</td>
<td>12.6 (6.1)</td>
</tr>
<tr>
<td><strong>Primary caregiver</strong></td>
<td></td>
<td></td>
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<tr>
<td>Mother</td>
<td>93.9</td>
<td>92.9</td>
</tr>
<tr>
<td>Age in years (mean (SD))</td>
<td>38.8 (6.1)</td>
<td>38.3 (5.1)</td>
</tr>
<tr>
<td>Completed high school</td>
<td>84.1</td>
<td>82.7</td>
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<tr>
<td>Adjusted 6 month outcomes</td>
<td>Mean diff in scores (95% CI)</td>
<td>Effect Size</td>
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<tr>
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<tr>
<td><strong>Parent-report</strong></td>
<td></td>
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<tr>
<td>Psychosocial QoL</td>
<td>1.1 (-1.1 to 3.3)</td>
<td>.1</td>
</tr>
<tr>
<td>CSHQ total</td>
<td>-1.6 (-2.8 to -0.3)</td>
<td>-.2</td>
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<tr>
<td>Bedtime resistance</td>
<td>-.6 (-1.1 to -0.05)</td>
<td>-.2</td>
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<tr>
<td>Night waking</td>
<td>-0.2 (-.5 to 0.1)</td>
<td>-.1</td>
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<tr>
<td>Sleep onset delay (mins/night)</td>
<td>-12 (-6 to -18)</td>
<td>-</td>
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<tr>
<td>Sleep duration (mins/night)</td>
<td>12 (2 to 18)</td>
<td>-</td>
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<tr>
<td>SDQ (total)</td>
<td>-0.4 (-1.2 to 0.4)</td>
<td>-0.1</td>
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<tr>
<td><strong>ORs (95% CI)</strong></td>
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<tr>
<td>Parent mental health</td>
<td></td>
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<tr>
<td>Depression</td>
<td>0.7 (0.6 to 0.9)</td>
<td>-</td>
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<tr>
<td>Anxiety</td>
<td>0.8 (0.7 to 1.1)</td>
<td>-</td>
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<tr>
<td>Stress</td>
<td>0.8 (0.6 to 1.1)</td>
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Further Outcomes

• At 6 months intervention parents reported:
  – fewer moderate or severe sleep problems than control parents, ie 35% vs 53%, OR 0.5 (95% CI 0.3 to 0.8), p=0.002
  – no evidence for a difference in:
    • child academic achievement or working memory (blinded direct assessment)
    • child or parent QoL
• Intervention cost/child = $AUS 182 (training, resources, nurse time, travel)
Strengths

- First translational RCT to test the effectiveness of a behavioral sleep intervention, delivered by an existing workforce, in school entry students
- Families from a range of schools
- Validated outcome measures
- High follow up rates
Limitations

• Parent report unblinded so may bias outcomes
  – teacher reports and direct child included

• Nurses delivered only 1 face-to-face consultation
  (in contrast to 2 consultations in the efficacy trial)

• Well educated primary caregivers

• Non-English speaking families excluded
  – results may not generalise to these families
Conclusions

• Translating an efficacious sleep intervention into an existing (school nurse) workforce does not result in the same child health improvements, despite similar populations

• Sleep improves in both intervention and control group children, with a more marked improvement in intervention children

• Training school nurses to deliver a face-to-face intervention soon after school entry appears feasible and acceptable to parents and nurses alike
Co-investigators
Dr Jon Quach
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A/Prof Lisa Gold
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