Sleep length misperception and its association to subjective sleep quality and objective sleep duration in a large sample of women

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Aim
The present analysis investigates the relation of sleep length misperception with subjective sleep quality, objective sleep length, self-reported anxiety and depression.

Background
Sleep misperception, i.e. the mismatch between subjective and objective sleep length, is a common phenomenon that has been mostly addressed in insomnia patients. The mechanisms behind sleep misperception are still poorly understood; psychological distress has been discussed as one major contributing factor. The present study tests the hypothesis that sleep quality and psychological background factors are associated with sleep misperception in a large random sample of women.

Methods
Sample
• 268 non-pregnant women with complete data (from a random sample of 400 women, oversampling of snorers)
• Age: mean = 49.7 years, SD = 11.2, min = 22, max = 73

Procedure
• One night of ambulant polysomnography recording & questionnaires

Measures
• Subjective and objective total sleep time (TST)
• Sleep length misperception: Objective total sleep time (PSG) – subjective sleep length
• Subjective sleep quality (assessed on a visual analogue scale with a single item question (“How did you sleep?”))
• Self-reported sleep problems (yes/no)
• Self-reported depression and anxiety (HAD-scale)

Statistical analysis
• Multiple regression analyses (with and without adjusting for age, apnea-hypopnea-index, BMI) predicting sleep misperception; weighted for the oversampling of snorers

Results
• Average absolute misperception: 44 minutes (ranging between sleep length overestimation of 295 minutes and sleep length underestimation of 280 minutes)
• Curvilinear relationship between sleep misperception and subjective sleep quality (see Figure 1)
• Significant association of subjective sleep quality and total sleep time with sleep misperception (see Table 1)

Discussion
Sleep length misperception was on average 44 minutes. Over- and underestimation of sleep length were about equally frequent. Short sleepers tended to overestimate their sleep length, while long sleepers tended to underestimate their sleep length.

A curvilinear relation between subjective sleep quality for the respective night and sleep misperception was observed: Women reporting very bad sleep quality showed a strong underestimation of their actual sleep length.

Contrary to the expectation, self-reported habitual sleep problems, anxiety and depression were not significantly associated to sleep misperception.

Future analyses will address the relation between the sleep microstructure and sleep misperception.

Figure 1
Relation between sleep misperception and subjective sleep quality

Table 1:
Prediction of sleep misperception (objective total sleep time - subjective total sleep time)

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>SE</th>
<th>t</th>
<th>p</th>
<th>95% Conf. Interval</th>
<th>lower</th>
<th>upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep quality (linear)</td>
<td>2.453</td>
<td>1.121</td>
<td>2.19</td>
<td>0.030</td>
<td>0.246</td>
<td>4.660</td>
</tr>
<tr>
<td>Sleep quality (quadratic)</td>
<td>-0.056</td>
<td>0.027</td>
<td>-2.09</td>
<td>0.037</td>
<td>-0.109</td>
<td>-0.003</td>
</tr>
<tr>
<td>Sleep quality (cubic)</td>
<td>0.000</td>
<td>0.000</td>
<td>2.48</td>
<td>0.014</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>Sleep duration objective (min)</td>
<td>0.404</td>
<td>0.081</td>
<td>4.99</td>
<td>&lt; 0.001</td>
<td>0.245</td>
<td>0.564</td>
</tr>
<tr>
<td>Sleep problem (yes/no)</td>
<td>6.142</td>
<td>9.204</td>
<td>0.67</td>
<td>0.505</td>
<td>-11.984</td>
<td>24.269</td>
</tr>
<tr>
<td>Depression score (HAD)</td>
<td>0.622</td>
<td>1.739</td>
<td>0.36</td>
<td>0.721</td>
<td>-2.804</td>
<td>4.047</td>
</tr>
<tr>
<td>Anxiety score (HAD)</td>
<td>0.235</td>
<td>1.637</td>
<td>0.14</td>
<td>0.886</td>
<td>-2.990</td>
<td>3.459</td>
</tr>
<tr>
<td>Age (years)</td>
<td>1.010</td>
<td>0.454</td>
<td>2.23</td>
<td>0.027</td>
<td>0.117</td>
<td>1.904</td>
</tr>
<tr>
<td>Apnea-Hypopnea Index</td>
<td>-0.346</td>
<td>0.469</td>
<td>-0.74</td>
<td>0.462</td>
<td>-1.270</td>
<td>0.578</td>
</tr>
<tr>
<td>BMI</td>
<td>-1.018</td>
<td>1.305</td>
<td>-0.78</td>
<td>0.436</td>
<td>-3.589</td>
<td>-1.553</td>
</tr>
<tr>
<td>cons</td>
<td>-228.306</td>
<td>58.785</td>
<td>-3.88</td>
<td>&lt; 0.001</td>
<td>-344.081</td>
<td>-112.531</td>
</tr>
</tbody>
</table>

Note: 2 extreme values removed in this plot