Work-related factors, sleep debt and insomnia in IT professionals

Marketta Kivistö1, Mikko Härma2, Mikael Sallinen2 and Raija Kalimo3

Introduction

The global uptake of information technologies (IT) has fuelled the emergence of a 24-h society by providing people with the opportunity to work unlimited by the boundaries of time and space. In the work of IT professionals, this development is further enabled by flexible working hours. This could possibly generate risks for health and recovery from work (e.g. over commitment to work and insufficient sleep). Long working hours and reduced sleep have both been found to be associated with a higher risk of health problems. However, the relationship between long working hours and psychological health remains uncertain [1–3].

The aim of this study was to examine the prevalence of sleep debt, insomnia and long working hours among Finnish IT professionals and to identify work factors associated with sleep problems.

Methods

A questionnaire was sent out in 2001 to 5000 IT professionals who were members of the Finnish Information Processing Association (FIPA), an independent association of Finnish IT professionals and companies that either provide or utilize IT products and services. In order to ensure a sufficient representation of programmers in the sample, we used stratified sampling with varying probabilities. The construction of the target sample (5000) began with the inclusion of 234 programmers found in a sample of 10 000 people extracted from the mass of ~25 000 FIPA members (excluding students). The rest (4766) of the target samples (5000) were chosen on the basis of a random selection of all the members of FIPA. FIPA members constitute one-third of all Finnish IT professionals. Of these 5000 IT professionals, 4624 were included in the study. The 376 exclusions were for...
individuals who declared themselves to be unemployed, retired or otherwise uninvolved in work life for >6 months immediately before responding.

Self-reported sleep debt [4] (the difference between self-reported sleep need and self-reported sleep length) and insomnia [5] were the dependent factors used in hierarchical regression analyses. The independent factors were perceptions of work and work demands (see Table 1). Adjustment was made for age, gender and early/late-riser type. The results of the factor analyses of demands and perceptions of work were used to inform the regression analyses.

Results

A total of 2334 (50%) of the 4624 IT professionals responded to the questionnaire. The job titles of the respondents (71% of whom were men) were as follows: 23% were software designers, 15% managers, 11% programmers and testers, 8% project managers, 7% trainers and consults, 6% technical support, 6% consultants, 5% administrators and 5% sales/purchasing personnel. Fifty per cent of the respondents had a university education. The group of respondents was representative of Finnish IT professionals in all factors apart from age, which was 6 years higher than the mean age of all FIPA members.

The average self-reported sleep length of IT professionals was 7.2 h and 37% reported a sleep debt of at least 1 h and 6% of at least 2 h. Only 16% of respondents reported insomnia. Sleep debt was commoner in younger people. Also, sleep length was longer and need of sleep was higher among younger people. Insomnia was commoner in the older age group. Sleep debt and insomnia were commoner in women, and sleep debt was most commonly reported by late-riser types. The number of average weekly working hours was 44.3, and the average amount of time spent on work and study was 45.2 h a week. Twenty-seven per cent of the respondents spent at least 50 h a week working. The average hours spent on work per week were 43.5 in day workers (SD 7.6; n = 1937), 50.7 in shift workers (SD 14.7; n = 69), 43.4 in workers who had a self-determined working time but an agreed number of hours (±10.2; n = 92), 48.0 in workers subject to agreements based on work achievements (±11.6; n = 114) and 53.1 in workers with completely undetermined working hours (±12.8; n = 81). Overtime was reported by 82%, but only 16% reported receiving monetary compensation for it.

After adjustment for age, gender and early/late-riser type, the following perceptions of work were found to be significantly associated with both sleep debt and insomnia: importance of work in the person's life, poor job control, poor opportunities to develop and poor support from the person's immediate superior. When work demands were entered into the models regarding sleep debt, long hours at work and demands for mental stamina were found to be significantly associated with sleep debt (Table 2).

Discussion

We have found that even though long working hours are common among Finnish IT professionals, sleep debt or

### Table 1. The independent factors of the study

<table>
<thead>
<tr>
<th>The independent factors of the study</th>
<th>Number of items</th>
<th>Mean</th>
<th>SD</th>
<th>Gender</th>
<th>Age (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20–29 (n = 151)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Women (n = 680)</td>
<td>Men (n = 1644)</td>
</tr>
<tr>
<td>Work demands [6,7] for:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>4</td>
<td>3.6</td>
<td>0.8</td>
<td>3.6 ns</td>
<td>3.6</td>
</tr>
<tr>
<td>Problem solving</td>
<td>4</td>
<td>4.1</td>
<td>0.6</td>
<td>4.1 ns</td>
<td>4.1</td>
</tr>
<tr>
<td>Management</td>
<td>6</td>
<td>3.4</td>
<td>0.9</td>
<td>3.3</td>
<td>&lt;0.01***</td>
</tr>
<tr>
<td>Mental stamina</td>
<td>4</td>
<td>4.4</td>
<td>0.5</td>
<td>4.5</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>Expertise</td>
<td>2</td>
<td>4.2</td>
<td>0.7</td>
<td>4.1</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>New knowledge</td>
<td>3</td>
<td>3.4</td>
<td>0.8</td>
<td>3.2</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>Languages</td>
<td>1</td>
<td>3.8</td>
<td>1.0</td>
<td>3.6</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>Long hours</td>
<td>1</td>
<td>45.2</td>
<td>9.2</td>
<td>44.0</td>
<td>45.8</td>
</tr>
<tr>
<td>Perceptions of work [7,8]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Importance of work</td>
<td>7</td>
<td>3.3</td>
<td>0.7</td>
<td>3.3</td>
<td>ns</td>
</tr>
<tr>
<td>Job control</td>
<td>9</td>
<td>4.0</td>
<td>0.6</td>
<td>3.9</td>
<td>&lt;0.001***</td>
</tr>
<tr>
<td>Opportunity to develop</td>
<td>3</td>
<td>3.2</td>
<td>0.8</td>
<td>1.2</td>
<td>&lt;0.05*</td>
</tr>
<tr>
<td>Support from managers</td>
<td>3</td>
<td>3.1</td>
<td>0.7</td>
<td>3.3</td>
<td>ns</td>
</tr>
</tbody>
</table>

Statistical differences in the means according to age and gender, n = 2334; ns = not significant.

*P < 0.05; **P < 0.01; ***P < 0.001.
insomnia are not. The proportion of those working for at least 50 h a week (27%) was higher than in the general population in Finland (16%). Sleep debt was most common among the youngest and insomnia among the oldest respondents, which is compatible with previous observations [9]. Young men reported spending more time on work and study than others. Considering that the percentage of those who replied in this age group was smaller than expected, it is possible that the amount of time spent on work and study by young men in the IT sector is in reality even greater.

There was a strong correlation found between the importance placed on work and long working hours and shortened sleep. This could reflect IT professionals’ strong commitment to work, which can be very stressful. However, as 66% of the subjects did not receive payment for overtime, this result can be more easily understood if we suppose that the employees working long hours were perhaps internally motivated to do so.

Work-related factors were associated with insufficient sleep. A more positive perception of work and more suitable work demands might reduce sleep debt and insomnia and thus promote recovery from work. Because work-related factors explained only a small part of the variance in sleep debt and insomnia, there are still other, perhaps individual, factors that impact sleep problems and merit further study.

**Key points**

- Long working hours are common among IT professionals in Finland, while sleep debt and insomnia are not.
- With long working hours, internal motivation seems to serve as a protection against stress.
- Suitable work demands and positive perceptions of work may promote better sleep.

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**Conflicts of interest**

None declared.

**References**


**Table 2.** Perceptions of work and work demands associated with sleep debt and insomnia

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Sleep debt (n = 2151)</th>
<th>Insomnia (n = 2151)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early/late-riser type</td>
<td>0.18***</td>
<td>−0.09***</td>
</tr>
<tr>
<td>Age</td>
<td>−0.10***</td>
<td>ns</td>
</tr>
<tr>
<td>Gender</td>
<td>−0.11***</td>
<td>ns</td>
</tr>
<tr>
<td>Initial $R^2$</td>
<td>0.06***</td>
<td>0.01***</td>
</tr>
</tbody>
</table>

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