Work-family Conflict and Fatigue: The role of Working Time Arrangements

Nicole Jansen, IJmert Kant, Ludovic van Amelsvoort
Department of Epidemiology
Maastricht University
The Netherlands
Background

• Occupational health issues
  – Fatigue
  – Inability to combine work and private life

• Working time arrangements
  – Provide employees the actual time and timing to recover from their working day
    ➔ Associations with prolonged fatigue?
  – Amount of time demanded by work among the most obvious ways in which work can affect family life
    ➔ Associations with work-family conflict?
Model – Research goals

- To study the relationship between working time arrangements and fatigue
- To study the relationship between working time arrangements and work-family conflict
- To study the relationship between work-family conflict and fatigue
Maastricht Cohort Study

- Prospective cohort study; heterogeneous population
  - Men/women, different jobs, tasks, educational level, sectors/trades
- 3-year follow-up
- Frequent measurements (3 / year)
- Exposure variables
  - Work-related, domestic & social factors, individual characteristics
- Outcome variables
  - Work-family conflict
  - Fatigue-related outcomes
  - Sickness absence

Baseline population: 12,140 employees from 45 different companies & organizations
Working Time Arrangements

**Working hours**
- Fulltime (≥36u/wk) 73%
- Parttime (<36u/wk) 27%
- Overtime work 45%

**Work schedules**
- Day work 70%
- Shift work 30%

**Changes in working time arrangements**
- 8% started working fewer hours
- 13% started working more hours
Working Time Arrangements and Fatigue

Working time arrangements

Work-family conflict

Fatigue
Need for Recovery concept and measurement

- Short-term effects of a day of work
- For example:
  - Finding it hard to relax at the end of a working day
  - Often being too tired to start other activities after work
- Subscale of Questionnaire Experience and Evaluation of Work (VBBA)
  - 11 items, total score 0 - 100
- Cut-off point need for recovery: 
  upper quartile = 54.55
## Working Hours and Need for Recovery

<table>
<thead>
<tr>
<th></th>
<th>Need for recovery (mean)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>n</td>
<td>Women</td>
</tr>
<tr>
<td>Hours/week</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 25</td>
<td>37.27</td>
<td>51</td>
<td>26.70**</td>
</tr>
<tr>
<td>26-35</td>
<td>33.10</td>
<td>146</td>
<td>34.10</td>
</tr>
<tr>
<td>36-40(^1)</td>
<td>33.68</td>
<td>2392</td>
<td>35.68</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>37.85***</td>
<td>921</td>
<td>39.53</td>
</tr>
<tr>
<td>Frequent overtime work</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>38.39***</td>
<td>1518</td>
<td>35.63**</td>
</tr>
<tr>
<td>no(^1)</td>
<td>32.19</td>
<td>1995</td>
<td>29.97</td>
</tr>
</tbody>
</table>

\(^1\) Reference group

Statistically significant difference with reference group: ***, \(p<0.001\)

*Ergonomics, 2003, 46 (7), p. 664-80*
Work Schedules and Need for Recovery

<table>
<thead>
<tr>
<th></th>
<th>Need for recovery (mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td>Day work (fulltime)</td>
<td>33.01</td>
</tr>
<tr>
<td>Three-shift work</td>
<td>44.31***</td>
</tr>
<tr>
<td>Five-shift work</td>
<td>45.66***</td>
</tr>
<tr>
<td>Irregular shift work</td>
<td>35.30</td>
</tr>
</tbody>
</table>

Statistically significant difference with day work: *p<0.05, **p<0.01, ***p<0.001
Prolonged Fatigue measurement

- Checklist Individual Strength
- 20 items
- Four factors:
  - Fatigue severity
  - Reduced concentration
  - Reduced motivation
  - Reduced activity
- Total score range 20 to 140
- Fatigue case classification: Total score > 76
Prolonged Fatigue: prevalence and incidence

<table>
<thead>
<tr>
<th></th>
<th>Prolonged fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence</td>
<td>21.9 %</td>
</tr>
<tr>
<td>Incidence (1-yr)</td>
<td>12.0 %</td>
</tr>
</tbody>
</table>


*Occup Environ Med, 2003, 60(suppl 1), p. i32-9*
Work Schedules and Fatigue

<table>
<thead>
<tr>
<th>Shift Schedule</th>
<th>Prolonged fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day work</td>
<td>18 %</td>
</tr>
<tr>
<td>Three-shift work</td>
<td>29 %</td>
</tr>
<tr>
<td>Five-shift work</td>
<td>24 %</td>
</tr>
</tbody>
</table>

TIME

Shift work → Fatigue → Leaving shift work
RR=1.76 CI 1.36-2.29

Direction of shift schedule rotation in shift work

- Forward versus backward shift rotation
- Male three-shift workers
- Prospective study with 32 months follow-up

TIME

Backward versus forward rotation

Increased need for recovery
Poorer sleep quality
Poorer general health

## Risk factors for leaving shift work

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Relative Risk (RR)</th>
<th>Confidence Interval (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prolonged fatigue</td>
<td>1.76</td>
<td>1.36-2.29</td>
</tr>
<tr>
<td>Elevated need for recovery after work</td>
<td>1.60</td>
<td>1.23-2.07</td>
</tr>
<tr>
<td>Poor sleep quality</td>
<td>1.50</td>
<td>1.14-1.96</td>
</tr>
<tr>
<td>Poor general health</td>
<td>1.79</td>
<td>1.32-2.44</td>
</tr>
</tbody>
</table>

Work schedules and common infections

• Several psychosocial and work-related factors have been associated with an increased risk of infections

• Shift work likely to be associated with infections as well:
  – A few studies have reported depressed immune function in relation to shift work
  – Depression of the immune function often attributed to disturbed circadian rhythm
  – Shift work major cause of suboptimal sleep quality
  – Inefficient sleep associated with increased risk of colds
Acute common infections

- **Common cold:**
  - Clogged or running nose, a sore throat, coughing, and slight or no fever (temperature less than 38°C)
- **Flu-like illness:**
  - Fever (temperature 38°C or more), with at least four of the following six complaints:
    - Muscular pain, fatigue, sore throat, clogged or running nose, coughing, headache
- **Gastroenteritis:**
  - Slight or no fever, gastritis, nausea, vomiting and/or diarrhea
- Measured every four months by means of self-administered questionnaires
- Typical symptoms of infections included in questionnaire
Work schedules and the prevalence of Common Infections

<table>
<thead>
<tr>
<th></th>
<th>Day work</th>
<th>Three-shift work</th>
<th>Five-shift work</th>
<th>Irregular shift work</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>5,899</td>
<td>878</td>
<td>1,058</td>
<td>420</td>
</tr>
<tr>
<td>Common cold (%)</td>
<td>53.0</td>
<td>57.5*</td>
<td>51.0</td>
<td>55.5</td>
</tr>
<tr>
<td>Flu-like illness (%)</td>
<td>22.4</td>
<td>31.2***</td>
<td>22.1</td>
<td>30.5***</td>
</tr>
<tr>
<td>Gastroenteritis (%)</td>
<td>11.8</td>
<td>18.2***</td>
<td>15.4**</td>
<td>15.1*</td>
</tr>
</tbody>
</table>

Significant difference with day work: *p<0.05, **p<0.01, ***p<0.001
Working time arrangements and fatigue-related outcomes

Summary

• Working time arrangements related to increased risk of
  • Elevated need for recovery
  • Prolonged fatigue
  • Common infections
• Both in cross-sectional and longitudinal analyses
• Reversed causation: fatigue itself also affects (choices for) working time arrangements
Working Time Arrangements and Work-Family Conflict

Working time arrangements

Work-family conflict

Fatigue
Work-Family Conflict concept

• Work-family conflict: a form of interrole conflict in which the role pressures from the work and family domains are mutually incompatible in some respect

• Perception of insufficient energy and time to successfully perform work and family roles

• For example:
  – Frequently having to cancel family appointments because of overtime work
  – Having little energy at work because of high demands at home
Work-family conflict measurement

Two different operationalisations
• 1 item measure
  – ‘Are you able to adequately combine work and family life?’
  – Response yes/no

• Shortened version Survey Work-Home Interference Nijmegen (SWING)
  – Directions and domains of work-home interference
  – 11 items / 4-point likert scales
  – Cronbach’s alpha 0.80
  – Example: “How often do you have difficulty meeting the expectations at home, because you are preoccupied with your work?”
Prevalence and Incidence of work-family conflict

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence</td>
<td>11.1%</td>
<td>9.0%</td>
</tr>
<tr>
<td>Cumulative incidence (1-yr)</td>
<td>5.2%</td>
<td>4.6%</td>
</tr>
</tbody>
</table>
### Antecedents of work-family conflict:
#### Job content

<table>
<thead>
<tr>
<th></th>
<th>RR* men</th>
<th>RR* women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychological job demands</td>
<td>1.33 (1.17-1.50)</td>
<td>1.24 (0.90-1.72)</td>
</tr>
<tr>
<td>Decision latitude</td>
<td>0.77 (0.68-0.87)</td>
<td>1.12 (0.80-1.58)</td>
</tr>
<tr>
<td>Physical demands</td>
<td>1.84 (1.35-2.50)</td>
<td>2.13 (1.01-4.46)</td>
</tr>
<tr>
<td>Emotional demands</td>
<td>1.33 (1.19-1.47)</td>
<td>1.30 (0.97-1.73)</td>
</tr>
<tr>
<td>Social support co-workers</td>
<td>0.83 (0.74-0.94)</td>
<td>0.79 (0.57-1.11)</td>
</tr>
<tr>
<td>Social support supervisor</td>
<td>0.80 (0.71-0.90)</td>
<td>0.96 (0.70-1.31)</td>
</tr>
<tr>
<td>Conflict with co-workers</td>
<td>1.55 (1.03-2.33)</td>
<td>1.11 (0.34-3.65)</td>
</tr>
<tr>
<td>Conflict with supervisor</td>
<td>1.72 (1.21-2.46)</td>
<td>1.36 (0.48-3.90)</td>
</tr>
<tr>
<td>Commute to work &gt;30 minutes</td>
<td>0.99 (0.74-1.32)</td>
<td>2.74 (1.37-5.46)</td>
</tr>
</tbody>
</table>

* RR adjusted for age, presence of a long-term disease and educational level

Antecedents of work-family conflict: Characteristics private situation

<table>
<thead>
<tr>
<th></th>
<th>RR* men</th>
<th>RR* women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full responsibility housekeeping</td>
<td>1.65 (1.09-2.48)</td>
<td>0.97 (0.27-3.45)</td>
</tr>
<tr>
<td>Having dependent children at home</td>
<td>1.06 (0.82-1.36)</td>
<td>1.98 (1.00-3.93)</td>
</tr>
<tr>
<td>Domestic help</td>
<td>1.23 (0.86-1.76)</td>
<td>0.41 (0.18-0.96)</td>
</tr>
<tr>
<td>Care chronically ill family member at home</td>
<td>2.04 (1.13-3.67)</td>
<td>-</td>
</tr>
</tbody>
</table>

* RR adjusted for age, presence of a long-term disease and educational level
Antecedents of work-family conflict:
Working time arrangements

- Shift work
- Fulltime work
- Overtime work
- Change in working hours
- Long commuting time

More work-family conflict

TIME

Compensation overtime hours
Opportunity to take a day off
Familiarity work roster

Less work-family conflict

Antecedents of work-family conflict
Summary

• Important risk factors for work-family conflict in
  – Work environment
    • Job content
    • Working time arrangements
  – Private situation

• Consequences of work-family conflict?
  – Fatigue-related outcomes
  – Sickness absence
  – Labor force participation
Consequences of work-family conflict: Need for recovery from work

- Short-term effects of a day of work
- For example:
  - Finding it hard to relax at the end of a working day
  - Often being too tired to start other activities after work
- Subscale VBBA

Consequences of work-family conflict: Prolonged fatigue

- Characteristics prolonged fatigue
  - Subjective fatigue
  - Reduced activity
  - Reduced concentration
  - Reduced motivation

- Checklist Individual Strength

\[
\text{RR}=1.77 \text{ CI (1.43-2.20)}
\]

Consequences of work-family conflict: Sickness absence

- Time to onset
  - Shorter time to sick leave

- Sickness absence duration
  - Average number of absent days over 6 months follow-up was 4 days higher in women with high work-family conflict compared to women with low-medium conflict
Consequences of work-family conflict: Labor force participation

• Changing work schedules:
  – Leave shift work
    RR=1.46 CI (1.12-1.91)

• Changing working hours
  – Men RR=1.36 CI (1.08-1.72)
  – Women RR=2.04 CI (1.18-3.52)
Summary findings within Dutch setting

• Work-family conflict highly prevalent
• Important risk factors in the work environment and private situation for work-family conflict
• Work-family conflict important predictor of
  — (mental) health
  — Sickness absence
  — Labor force participation
• Urge for active measures to prevent and/or reduce work-family conflict
Preventive measures I

• Results Maastricht Cohort Study could provide sound basis for preventive measures on
  – Individual level
  – Work organizational level

• Starting points for preventive measures may be found in several domains
  – Eligible for change?
  – Working time arrangements in essence modifiable factors
Preventive measures II

• Role of working hours
  – Limitation overtime hours
  – Compensation overtime work
  – Control over working hours
  – Predictability of working hours
  – Flexible working hours
  – Ability to adjust working hours
Preventive measures III

• Role of Work schedules
  – Shift work as compared to day work important risk factor for both fatigue and work-family conflict

  – Recommendations within shift work
    • Full continuous shift systems as opposed to semi-continuous shift systems
    • Optimization in terms of direction of shift rotation \( \rightarrow \) forward as opposed to backward rotation
Preventive measures IV

• Most effective strategies aim at:
  – Highly prevalent risk factors
  – Risk factors with large impact
  – Risk factors that are eligible for change

• Example: limiting overtime work
  – RR=2.71 → high impact
  – Prevalence overtime work = 45%
  – Eligible for change
Considerations

• Generalizability to other countries?
  – Etiology more or less similar
  – Distribution of risk factor(s) may be different
    ➤ efficacy of preventive measures may be different

• Not all risk factors identified yet
  – Some determinants are ‘hidden’ since they are part of the national policy. Examples:
    • Child care facilities in the Netherlands
    • Part time work as a means to combine work and family life adequately

➤ Need for cross-national studies
Surplus value
cross-national comparisons

• Insight in full spectrum of risk factors
  – Enables development of effective preventive measures

• Insight in the effects of different policies
  – Ability to estimate the effect of changing policies
  – Anticipate on and adapt to new policies

• Impact of work-family conflict on demographic developments
  – Family size and family planning
  – Labor force participation

• Future research: cross-national collaborations on work-family issues