It Started with Fatigue …

Airline Pilots under Pressure

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Content

• Commercial pilot working conditions
• Flight Time Limitations and real duty times
• My preliminary results:
  • Sample / demographics
  • Prevalence & severity of fatigue
  • Use of Screening Instruments: traps, artefakts, cave!
  • Pilot Fatigue and correlates in mental health dimensions
Not presented

- Definitions
- Theory
- Attitudes of commercial pilots regarding
  - FTL (Flight Time Limitations)
  - Protection from fatigue
  - Severe fatigue in the cockpit
  - Fatigue reports
- Fatigue promoting factors
- New scales to measure pilot fatigue
Economic Pressure in Aviation

- Airline pilots’ protection from fatigue by flight time limitations (FTL)
  - maximum flight/duty times,
  - minimum rest
- Hard limits become goals of productivity
- Fatigue: high risk among airline pilots
  - threat to aviation safety
  - can impair human performance
  - health risk?
Flight Hours / Month 1986 vs. 2018

- **Sloan & Cooper (1986):**
  Airline pilots: M=45.7 (SD=30)

- **Present study:**
  M=67 (SD=21) + 30%
Last 3 years

<table>
<thead>
<tr>
<th>Longest duty time (hours)</th>
<th>0.0</th>
<th>5.0</th>
<th>10.0</th>
<th>15.0</th>
<th>20.0</th>
<th>25.0</th>
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<tbody>
<tr>
<td>Short and Medium Haul</td>
<td>14.5</td>
<td>16.6</td>
<td></td>
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<tr>
<td>Long-Haul</td>
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<table>
<thead>
<tr>
<th>Longest time awake (duty/standby) (hours)</th>
<th>0.0</th>
<th>5.0</th>
<th>10.0</th>
<th>15.0</th>
<th>20.0</th>
<th>25.0</th>
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<tr>
<td>Long-Haul</td>
<td>21.1</td>
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</table>
Present Legal Flight Time Limitations

• Lack of scientific evidence

• Maximum Flight Hours/Year
  • 1400 hours/year in the United States
  • 900 hours/year in Australia and
  • 900 hours/year EASA
Ph. D. Research
Marion Venus (2018)
Correlates of Flight Time Limitations, Fatigue, Employment Conditions in Airline Pilots’ Mental Health and Wellbeing

University of Bern
Inst. for Clinical Psychology
Demographics of N=197 (551) Commercial Pilots

- Age: M= 40.61 years (SD=10.4)
- 8% female airline pilots, 92% male
- 50% Captains
- 80% full time airline pilots
- Total of flight hours: M=8’798 (SD=5’754)
- 64% Legacy Carriers
- 60% Short-Haul
- 87% Contract with Airline
Last Month:

<table>
<thead>
<tr>
<th>Description</th>
<th>Short and Medium Haul</th>
<th>Long-Haul</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty Hours</td>
<td>123.9</td>
<td>100.6</td>
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<tr>
<td>Flight Hours</td>
<td>67.3</td>
<td>66.7</td>
</tr>
<tr>
<td>Sectors Flown</td>
<td>39.4</td>
<td>10.5</td>
</tr>
</tbody>
</table>

- Duty hours
- Flight hours
- Sectors flown

Short and Medium Haul | Long-Haul
Present Study: Cross-Sectional Online Survey

- approved by Ethics Committe Uni Bern
- Dependent Variables: self assessment screening tools
  - Wellbeing-Index (WHO-5)
  - Depression (PHQ-8)
  - Anxiety (GAD-7)
  - Common mental disorders (SRQ-20)
  - Fatigue Severity Scale (FSS)
  - Jenkins Sleep Scale (JSS)
Hypothesis: Legal Framework:

• $H_{10}$ Pilots are not allowed to fly when fatigued
• $H_{11}$

• 75% of short-haul pilots (Jackson & Laurie, 2006) to 90% active commercial pilots (Reis, Mestre, Canhão, Gradwell, Paiva, 2016) are severely fatigued (FSS > 4)
Fatigue Severity Scale (FSS)

- Validation of the Fatigue Severity Scale in a Swiss Cohort (Valko, Bassetti, Bloch, Held, Baumann, 2008)
- fatigue specific self-report questionnaire
- FSS scores
  - $4.66 \pm 1.64$ (mean $\pm$ SD) in patients with MS
  - $4.34 \pm 1.64$ in patients with Sleep-Wake disorders
  - $3.00 \pm 1.08$
    - significantly lower FSS in healthy subjects, $p<.001$
Fatigue Severity Scale (FSS)

- M = 4.71
- SD = 1.16
- 92% airline pilots with FSS > 3
- 53% FSS ≥ 4.71 (mean airline pilots)
- Patients with MS: M = 4.66
$H_{11}$ confirmed

9 of 10 airline pilots are fatigued
1 of 2 active pilots are severely fatigued
Fitness to Fly???
Is it?
Or isn’t it?

Traps for the mental fitness assessment of airline pilots
Clinical Psychological Diagnostic Process

• Consists of
  • thorough clinical interview
  • psychological questionnaires
  • feedback about results, additional questions (validation of results)

• Report

• NO SHORTCUTS
Screening Instruments (e.g. PHQ8, GAD7)

• **NO (remote) diagnosis** (e.g. self assessment, Online Survey)

• **Positive screening results:**
  • likely diagnosis of e.g. depression/anxiety,
  • requires confirmation by standardized clin. psych. diagnostics

• **NO SHORTCUTS**

• **Cave ARTEFACTS** (looks like ... but is not!)
PHQ-8 Self Assessed Depression Symptoms: M=6.00, SD=5.05
Over the last 2 weeks

0.00  0.50  1.00  1.50  2.00  2.50  3.00

Little interest or pleasure in doing things
Feeling down, depressed, or hopeless
Trouble falling or staying asleep, or sleeping too much
Feeling tired or having little energy
Poor appetite or overeating
Feeling bad about yourself — or have let yourself or your family down
Trouble concentrating on things, such as reading ...
Moving or speaking so slowly ... or the opposite

0 = not at all  1 = several days  2 = more than half the days  3 = nearly every day

M=6.00, SD=5.05
**Self Assessed WHO-5 Wellbeing-Index:**

\[ M=56.3 \ (SD=20), \ 0 = \text{at no time} / 5 = \text{all the time} \]

<table>
<thead>
<tr>
<th>WHO5 Item</th>
<th>Score</th>
</tr>
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<tbody>
<tr>
<td>My daily life has been filled with things that interest me</td>
<td>2.90</td>
</tr>
<tr>
<td>I woke up feeling fresh and rested</td>
<td>2.34</td>
</tr>
<tr>
<td>I have felt active and vigorous</td>
<td>2.70</td>
</tr>
<tr>
<td>I have felt calm and relaxed</td>
<td>3.11</td>
</tr>
<tr>
<td>Over the last two weeks: I have felt cheerful and in good...</td>
<td>3.09</td>
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</tbody>
</table>
### GAD7 Screening Instrument for Gen. Anxiety

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAD7_Over the last 2 weeks: Feeling nervous, anxious or on…</td>
<td>0.54</td>
<td></td>
</tr>
<tr>
<td>GAD7_Not being able to stop or control worrying</td>
<td>0.42</td>
<td></td>
</tr>
<tr>
<td>GAD7_Worrying too much about different things</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>GAD7_Trouble relaxing</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>GAD7_Being so restless that it is hard to sit still</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>GAD7_Becoming easily annoyed or irritable</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>GAD7_Feeling afraid as if something awful might happen</td>
<td>0.28</td>
<td></td>
</tr>
</tbody>
</table>

**Gen. Anxiety M=4.02**

0 = not at all
3 = nearly every day
PHQ-Stress: $M=4.01$ (SD=3.9; Range: 0-20)

0.00  0.50  1.00  1.50  2.00

- Worries about your health: 0.84
- Your weight or your look/appearance: 0.77
- Little or no sexual desire or pleasure in...: 0.52
- Difficulties with your spouse, partner...: 0.69
- Burden of caring for children, parents...: 0.58
- Stress at work or at school: 0.65
- Financial problems or worries: 0.36
- To have nobody to talk about problems: 0.37
- Something bad that happened recently: 0.20
- Thoughts of scary events of the past or...: 0.14

0 = not at all
1 = a little affected
2 = severely impaired
SRQ20 (0=No, 1=Yes)
Symptoms in % of N=187

- easily tired?
- sleep badly?
- daily activities?
- tired all the time?
- lost interest in things?
- uncomfortable feelings in your...
- nervous, tense or worried?
- feel unhappy?
- digestion poor?
- thinking clearly?
- difficult to make decisions?
- often have headaches?
- appetite poor?
- hands shake?
- worthless person?
- your life been on...
- feel more than usual?
- easily frightened?

ICASM 2018 * Bangkok * It Started with Fatigue * Nov. 15, 2018 * Mag. Marion Venus * Ph.D. University of Bern, Switzerland
Is it? Or isn’t it?

• **Working Hypothesis:**

• It started with fatigue and turned out to be

• impaired wellbeing, exhaustion (not depression) and

• massive worries, concerns about loss of license, loss of career and job (not anxiety)
Research question 2
The more flight hours/month, the more common mental disorders
Feijó, Luiz, Camara (2012)
depression, anxiety in commercial pilots
O’Hagan, Issartel, Nevill, and Warrington (2016)
### Zwischensubjektfaktoren

<table>
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<tr>
<th>Workload Flight Hours Last Month</th>
<th>N</th>
</tr>
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<tbody>
<tr>
<td>less than 70 flight hours</td>
<td>68</td>
</tr>
<tr>
<td>70-80 flight hours</td>
<td>50</td>
</tr>
<tr>
<td>more than 80 flight hours</td>
<td>49</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Konst. Term</th>
<th>Pillai-Spur</th>
<th>Wert</th>
<th>F</th>
<th>Hypothese df</th>
<th>Fehler df</th>
<th>Sig.</th>
<th>Partielle s Eta-Quadrat</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.987</td>
<td>2008.718</td>
<td>6</td>
<td>159</td>
<td>0.000</td>
<td>0.987</td>
</tr>
<tr>
<td></td>
<td>Workload</td>
<td>0.018</td>
<td>0.249</td>
<td>12</td>
<td>320</td>
<td>0.995</td>
<td>0.009</td>
</tr>
</tbody>
</table>
>>> Take Fatigue instead of Flight Hours >>>
Research Question 3

Not fatigued airline pilots are significantly healthier (fewer common mental disorders, less “depression”, “anxiety”) than fatigued pilots

GLM Comparison of 3 Groups

Pilots not fatigued // Fatigued // Severely fatigued
FSS_8_items (Range: 1 - 7)

FSS < 3

FSS 3 to 4.70

FSS >= 4.71

Fehlerbalken: 95% CI
WHO-5 (Range: 0 - 100)

FSS < 3
71.20

FSS 3 to 4.70
65.31

FSS >= 4.71
48.13

Fehlerbalken: 95% CI
SRQ-20 Common Mental Disorders (Range: 0 - 20)

FSS < 3: 2.27
FSS 3 to 4.70: 2.59
FSS >= 4.71: 5.44
GAD Sum (Range: 0 - 21)

FSS < 3: 1.80
FSS 3 to 4.70: 2.63
FSS >= 4.71: 5.12

Fehlerbalken: 95% CI
PHQ-Stress Sum (Range: 0 - 20)

FSS < 3

FSS 3 to 4,70

FSS >= 4,71

Geschätzte Randmittel: 2.73

Geschätzte Randmittel: 3.60

Geschätzte Randmittel: 6.47

Fehlerbalken: 95% CI
Jenkins Sleep Scale (Range: 0 - 5)

Geschatzte Randmittel

<table>
<thead>
<tr>
<th>FSS_classes</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSS &lt; 3</td>
<td>1.42</td>
</tr>
<tr>
<td>FSS 3 to 4.70</td>
<td>1.50</td>
</tr>
<tr>
<td>FSS &gt;= 4.71</td>
<td>2.31</td>
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Fehlerbalken: 95% CI
Conclusion
It started with Fatigue ...
Take Away Message

• 92% commercial pilots more fatigued than the healthy population
• 53% severely fatigued (FSS > 4,70)
• What’s the role of fatigue in
  >> Burnout (Brezonakova, 2017)
  >> Depression
  >> Anxiety / massive fear to lose everything
  >> Common mental disorders?
Trainings to cover the new EASA regulations after Germanwings

Commission Regulation (EU) 2018/1042, Part-MED
• **Nov. 29th, 2018 (Zürich):** One day workshop: “Airline pilots’ health under pressure.” Mandatory for non aviation professionals.

• **Nov. 30th, 2018 (Zürich):** One day workshop Pilot Peer Support: with Marion Venus, Capt. Michael Gruber

• Two days workshop pilot assessment for a) pilot selection, b) full mental fitness assessment of airline pilots for Medical Class 1, (Feb. 2019).

• **Workshop Pilot Fatigue and Mental Health**

• **In-House Workshops, Policy Development**

• [www.venus-aviation.ch](http://www.venus-aviation.ch)