Neue Risiken in der Flugsicherheit oder ‚Der Elefant im Cockpit‘

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4 peer-reviewed Publications for PhD (Dissertation)

Transportation Research Interdisciplinary Perspectives 13 (2022) 100529

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Australian and EASA based pilots' duty schedules, stress, sleep difficulties, fatigue, wellbeing, symptoms of depression and anxiety

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4 peer-reviewed Publications for PhD (Dissertation)

EMBRY-RIDDLE Aeronautical University
SCHOLARLY COMMONS

International Journal of Aviation, Aeronautics, and Aerospace

Manuscript 1579

How Duty Rosters and Stress Relate to Sleep Problems and Fatigue of International Pilots

Marion Venus

Martin grosse Holtforth

4 peer-reviewed Publications for PhD (Dissertation)

EMBRY-RIDDLE Aeronautical University
SCHOLARLY COMMONS

International Journal of Aviation, Aeronautics, and Aerospace

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Interactions of International Pilots' Stress, Fatigue, Symptoms of Depression, Anxiety, Common Mental Disorders and Wellbeing

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4 peer-reviewed Publications for PhD (Dissertation)

Short and Long Haul Pilots' Rosters, Stress, Sleep Problems, Fatigue, Mental Health, and Well-Being

Marion Venus; Martin grosse Holtforth

OBJECTIVE: This research was conducted to compare short haul (SH) and long haul (LH) pilots regarding sleep restrictions and fatigue risks on flight duty, stress, sleep problems, fatigue severity, well-being, and mental health.

METHOD: There were 406 international SH and LH pilots who completed the cross-sectional online survey. Pilots' sleep restrictions and fatigue-risk profiles (e.g., time pressure, late arrivals, minimum rest), sleep problems, fatigue severity, well-being, and symptoms of depression, anxiety, and common mental disorders (CMD) were measured and compared for SH and LH pilots.

RESULTS: Although SH and LH pilots were scheduled for only 51.4–65.4% of the legally allowed duty and flight hours, 44.8% of SH pilots reported severe fatigue (FSS ≥ 4 to 4.9), and an additional 31.7% high fatigue (FSS ≥ 5), compared with 34.7% and 37.3% LH pilots. Considerable sleep problems in ≥8 nights/mo were reported by 24.6% SH vs. 23.5% LH pilots. Positive depression screenings were reported by 18.1% SH and 19.3% LH pilots. Positive anxiety screenings were reported by 9.6% SH and 5% LH pilots. Of all investigated pilots, 20% reported significant symptoms of depression or anxiety, and 7.23% had positive depression and anxiety screenings. LH pilots reported significantly better well-being than SH pilots.

CONCLUSIONS: Our results show that even far less duty and flight hours than legally allowed according to flight time limitations lead to high levels of fatigue, sleep problems, and significant mental health issues among pilots. SH pilots were even more affected than LH pilots. Pilots' fatigue should be considered an immediate threat to aviation safety and pilots' fitness to fly by promoting fatigue and burnout.

KEYWORDS: fatigue severity, sleep problems, short haul and long haul pilots, work-related and psychosocial stress, common mental disorders, fatigue risks, sleep restrictions, mental health.

Venus M, grosse Holtforth M. *Short and long haul pilots' rosters, stress, sleep problems, fatigue, mental health, and well-being.* Aerosp Med Hum Perform. 2021; 92(10):786–797.

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December 9, 2021

Marion Venus. Ph.D.
Wassbergstrasse 37, 8127 Maur,
Zurich, Switzerland

Dear Dr. Venus:

It is a great pleasure to inform you that you are the 2nd Place winner of the 2021 AsMA Fellows Scholarship in the amount of $1,000 U.S. Congratulations!!!

You were selected winner by the AsMA Fellows Scholarship Committee based on the high scientific value, originality, quality and relevance of your AsMA presentation and AMHP manuscript on *"Short and Long Haul Pilot's Rosters, Stress, Sleep Problems, Fatigue, Mental Health, and Well Being"*.

We encourage you to attend the 2022 Scientific Meeting of the Aerospace Medical Association, May 22-26, at the Peppermill Resort Hotel, Reno, NV.

Please accept our invitation to be a special guest at the AsMA Fellows Dinner (at no cost to you) to be publicly recognized for your achievement. Let us know if you will be able to attend.
Once again, congratulations for a well-deserved recognition.

Best regards,

Melchor J. Antuñano, M.D., M.S., FAsMA, FAsHFA
Chair,
AsMA Fellows Scholarship Committee

AEROSPACE MEDICAL ASSOCIATION

Space Medicine Association

3 September, 2021

Marion Venus PhD
Bern
Switzerland

Dear Dr. Venus,

For your presentation at the 2021 Aerospace Medical Association meeting you were named as First Runner-up in the Space Medicine Association Jeff Myers Young Investigator
Award competition.

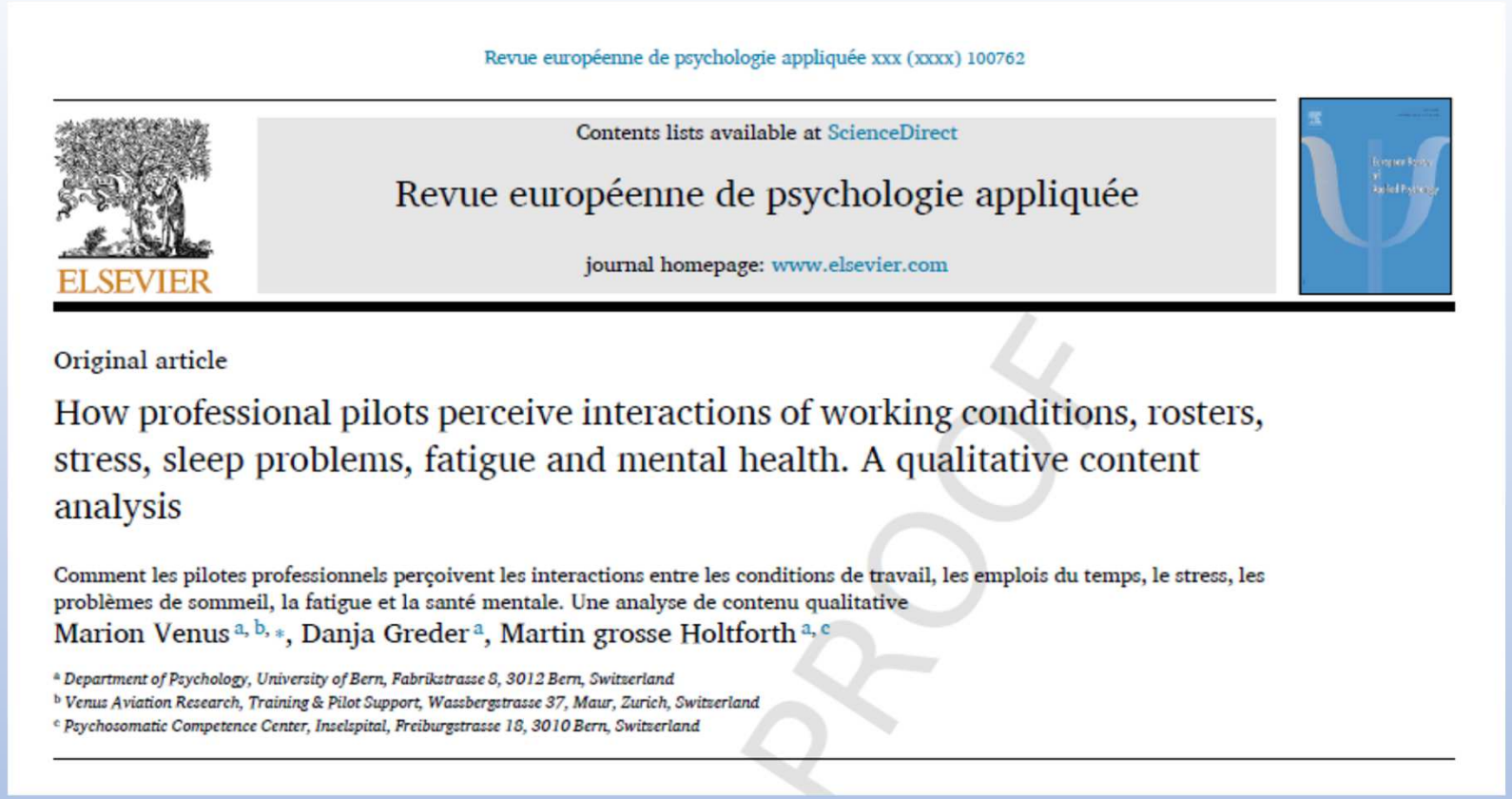
Your presentation was judged to represent the top of the performances from a field of some 153 contestants in this year's competition.

This is an accomplishment for which you, and your sponsoring institution can be proud.

The Space Medicine Association looks forward to your continuing contribution to the field in future years.

Sincerely,

K. Jeffrey Myers MD
Chair, Young Investigator Award
Space Medicine Association



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Original article

How professional pilots perceive interactions of working conditions, rosters, stress, sleep problems, fatigue and mental health. A qualitative content analysis

Comment les pilotes professionnels perçoivent les interactions entre les conditions de travail, les emplois du temps, le stress, les problèmes de sommeil, la fatigue et la santé mentale. Une analyse de contenu qualitative

Marion Venus [a, b, *], Danja Greder [a], Martin grosse Holtforth [a, c]

[a] Department of Psychology, University of Bern, Fabrikstrasse 8, 3012 Bern, Switzerland
[b] Venus Aviation Research, Training & Pilot Support, Wassbergstrasse 37, Maur, Zurich, Switzerland
[c] Psychosomatic Competence Center, Inselspital, Freiburgstrasse 18, 3010 Bern, Switzerland

- Airline Business Models: Impact on Working Conditions, Stress, Sleep, Fatigue, Mental Health and Well-being of Pilots
  - Peter Wild & Marion Venus

Problematik

Definitionen
Erklärungen

Fatigue

Chronische Übermüdung, Erschöpfung Schläfrigkeit (Sleepiness) ist nur 1 Symptom von Fatigue

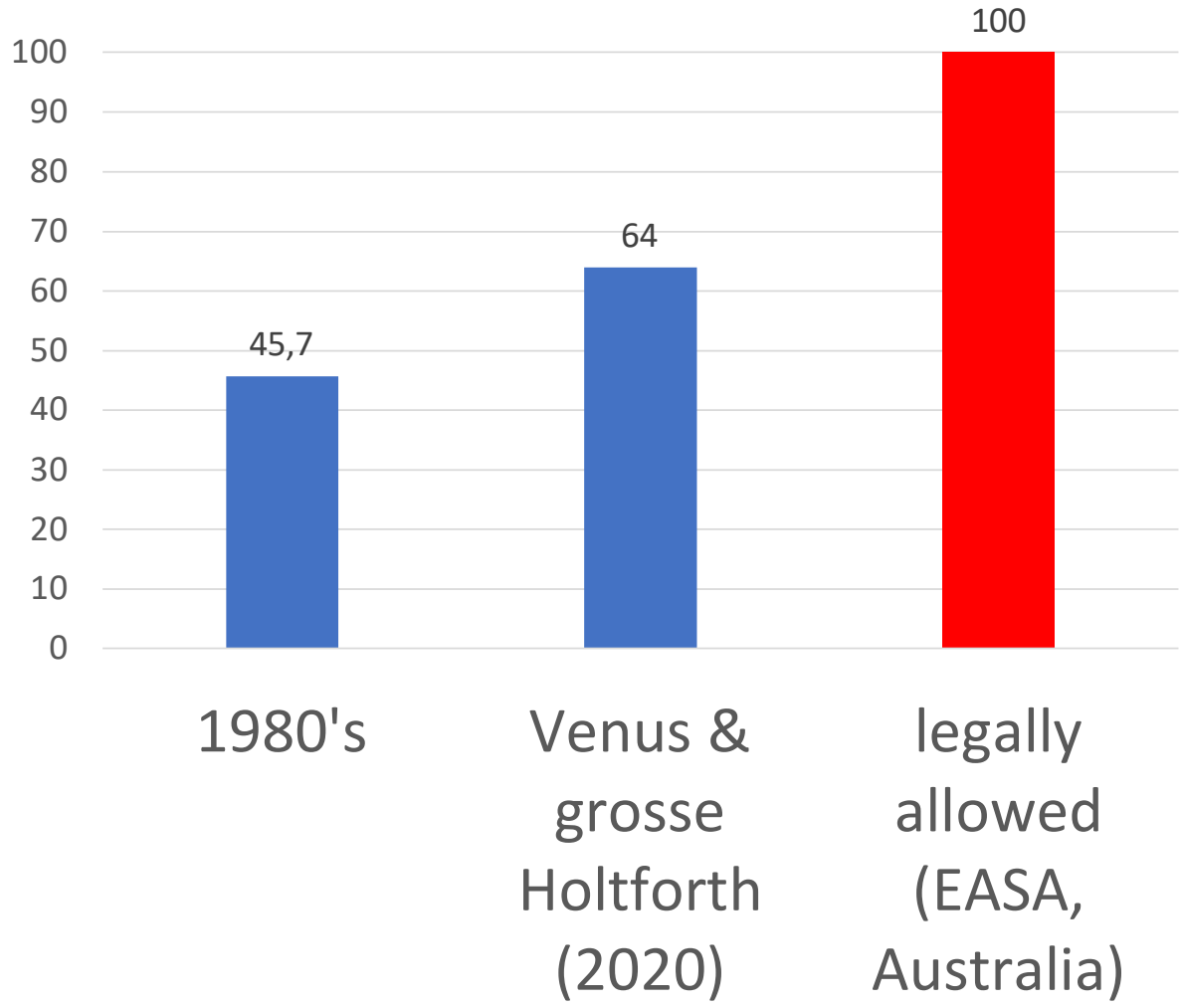
Definition von Fatigue (ICAO)

Chronische Übermüdung, Erschöpfung

- Fatigue ist ein physiologischer Zustand
- reduzierter geistiger oder körperlicher Leistungsfähigkeit
- aufgrund von Schlafmangel, verlängerter Wachheit,
- zirkadianer Phase und/oder Arbeitsbelastung (geistige und/oder körperliche Aktivität), der die
- Aufmerksamkeit und Fähigkeit einer Person beeinträchtigen kann,
- sicherheitsrelevante betriebliche Aufgaben angemessen zu erfüllen. .

Flugstunden/ Monat

Flight hours/month (airborne)



Überblick über FTL Flight Time Limitations

In effect until March 2019		EASA FTL: ORO.FTL.210	CASA FTL 48.1	FAA Part 121
Duty period or duty hours*/pilot (multi pilot operation)	Max. duty hours	13 duty hours	14 duty hours	14 duty hours
	Max. duty hours/month	190 duty hours	200 duty hours	
	Commander's Discretion** (Extension of max. duty hours)	max. 13 duty hours plus max. 2 duty hours	max. 14 duty hours plus max. 1 duty hour	max. 14 duty hours plus max. 2 duty hours
Augmented Crews§	depending on time of day	FDP > 9-13 duty hours	FDP > 8-14 duty hours	FDP > 9-14 duty hours
Flight hours†/pilot (multi pilot operation)	In any 28 consecutive days	100 flight hours	100 flight hours	100 flight hours
	In any calendar year	900 flight hours		1000 flight hours
	In any 12 consec. months	1000 flight hours	1000 flight hours	
Minimum rest‡	Before flight duty	10 hours (exceptions)	10 hours (exceptions)	10 hours

Dissertationsprojekt Marion Venus

Uni Bern, Klinische Psychologie, Prof. Dr. grosse Holtforth

Professioneller Support und Co-Autor:
TRI, TRE, Commander Doz. Dr. Peter Wild

17 commercial aviation accidents and incidents with 576 fatalities where mental health problems, negative life events played a substantial role (Mulder & de Rooy, 2018)

Table I. Incidents and Accidents Related to Pilot Mental Health Problems.

FLIGHT/DATE/REFERENCE	FATALITIES	SHORT DESCRIPTION	MENTAL CONDITION/NEGATIVE LIFE EVENTS
Japan Airlines 350 (1982)[3,39]	24	Deliberate crash	Psychosis
FedEx 705 (1994)[61]	-	Hijack and attempted crash	Facing termination of employment
Royal Air Maroc 630 (1994)[25,34]	44	Most likely deliberate crash	No mental illness known, lovers quarrel in popular media
British Airways (1996)[13]	-	Panic attack	Panic/anxiety disorder
Silk Air 185 (1997)[24]	104	Deliberate crash most likely	Financial losses, disciplinary actions from airline for violating company regulations
Air Botswana (1999)[4]	1	Deliberate crash	Declared unfit for duty due to medical reasons
EgyptAir 990 (1999)[45,63]	217	Deliberate crash	In popular media, report that the first officer had been demoted a few hours before the flight
Galaxy Air Cargo (2001)[46]	2	Collision with mountain	Previous imprisonment for cocaine distribution, first officer's medical considered for denial, use of cocaine by captain, and antidepressants by first officer
Air Canada 848 (2008)[50]	-	Acute mental distress of copilot	Acute psychosis
JetBlue 191 (2012)[22,50]	-	Captain became severely confused	Acute psychosis
St. George Municipal Airport (2012)[5,18]	1	Attempted stealing of aircraft and subsequent suicide	Accusation of murder
LAM Mozambique 470 (2013)[44]	33	Deliberate crash	Loss of son and marital problems
Air Canada 584 (2013)[37,51]	-	Copilot suffered acute mental distress	Most likely acute psychosis
Alitalia (2015)[2,35,56]	-	Pilot threatened to crash his aircraft	Marital problems
Condor 7438 (2015)[1,31]	-	Panic attack	Most likely anxiety disorder
Germanwings 9525 (2015)[13]	150	Deliberate crash	Depressive disorder, problems with vision, relationship problems
United Airlines (2017)[19,57]	-	Acute mental distress	Most likely coping problems after divorce, formal diagnosis of a mental disorder is not known

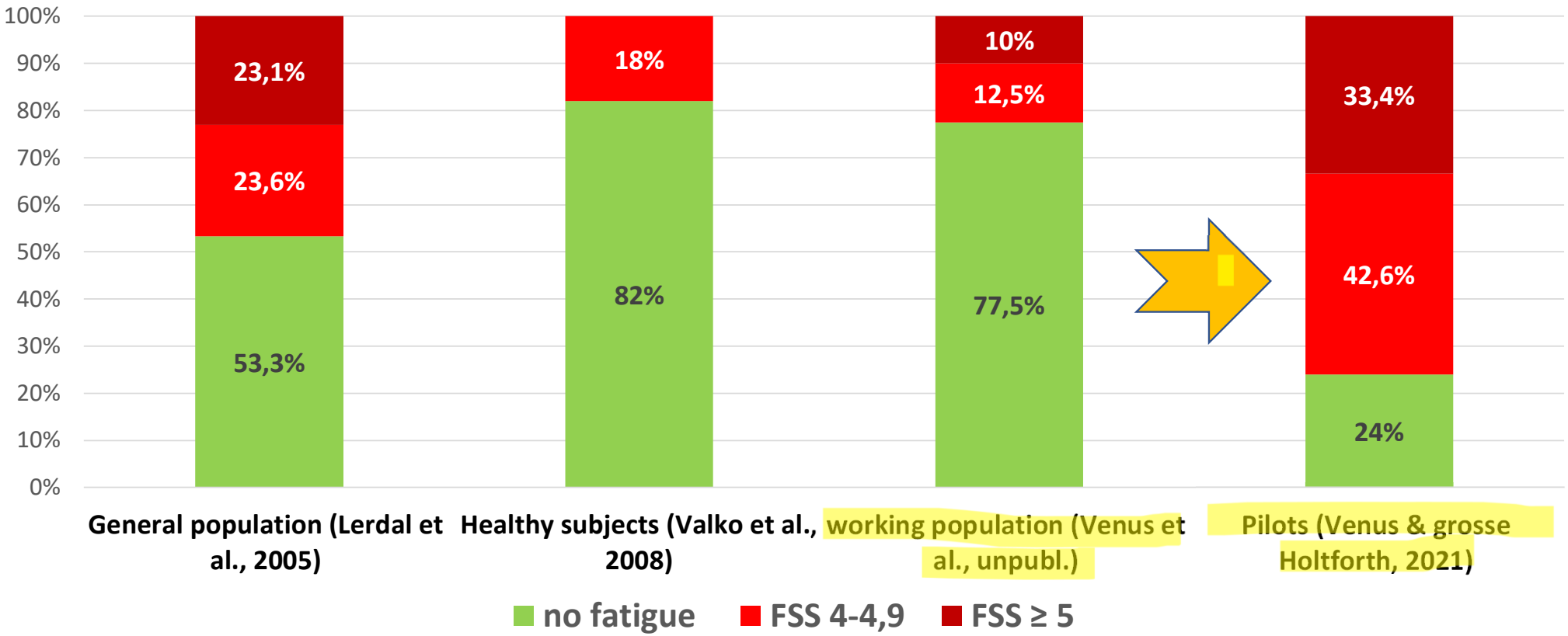
Fatigue Severity Scale (FSS)

Übermüdung, chronsische Erschöpfung, noch kein Burnout

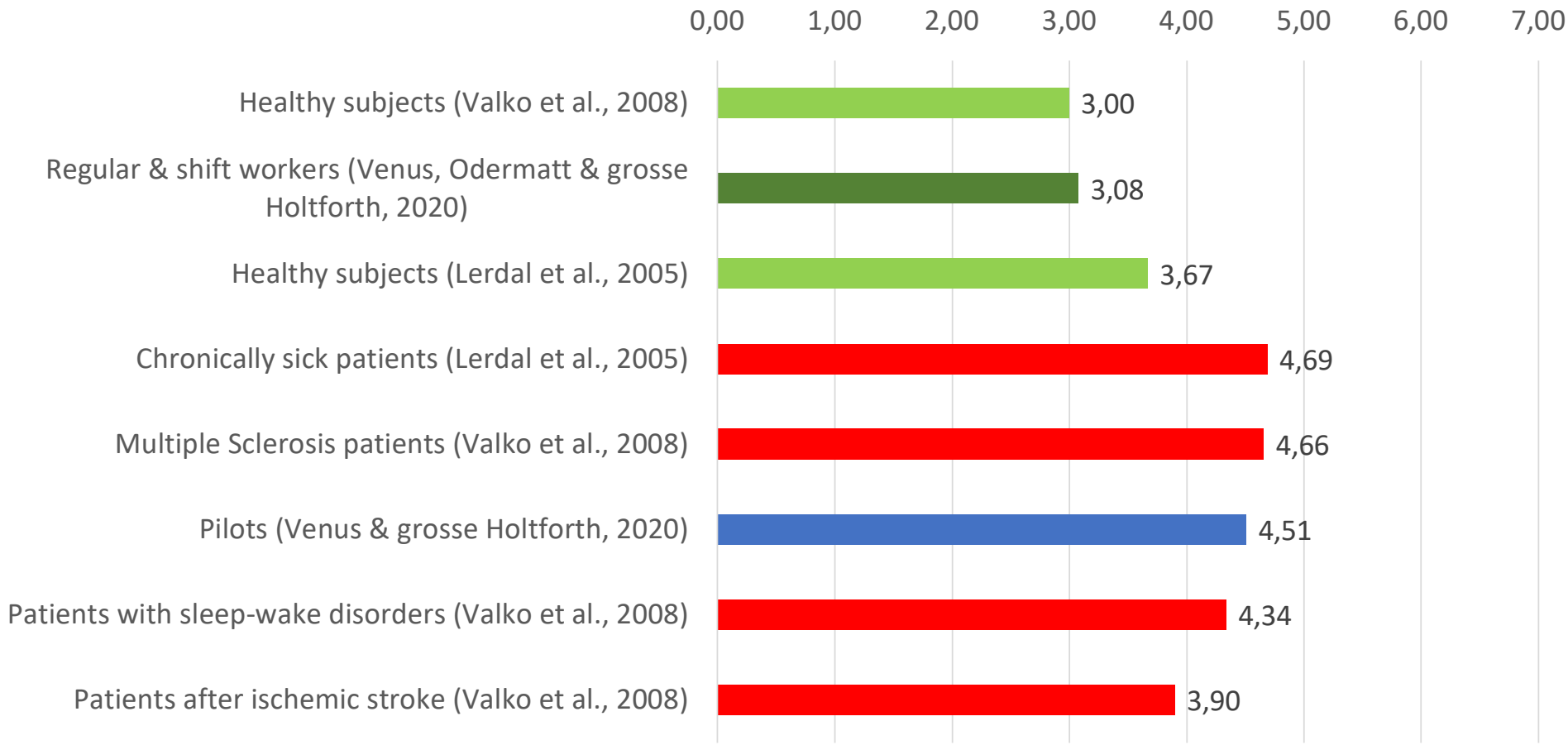
Fatigue Severity Scale (FSS, German version)

Ich finde, dass während der vergangenen Woche folgendes zutraf:	*Stimme gar nicht zu*						*Stimme voll-kommen zu*
	1	**2**	**3**	**4**	**5**	**6**	**7**
1. Ich bin weniger motiviert, wenn ich müde bin.	0	0	0	0	0	0	0
2. Körperliche Bewegung macht mich müde.	0	0	0	0	0	0	0
3. Ich ermüde rasch.	0	0	0	0	0	0	0
4. Meine Müdigkeit beeinträchtigt meine körperliche Leistungsfähigkeit.	0	0	0	0	0	0	0
5. Meine Müdigkeit bereitet mir oft Probleme.	0	0	0	0	0	0	0
6. Meine Müdigkeit verhindert längerdauernde körperliche Tätigkeiten.	0	0	0	0	0	0	0
7. Meine Müdigkeit beeinträchtigt mich, gewisse Pflichten und Verantwortungen zu erfüllen.	0	0	0	0	0	0	0
8. Meine Müdigkeit gehört zu den drei Beschwerden, die mich am meisten behindern.	0	0	0	0	0	0	0
9. Meine Müdigkeit beeinträchtigt meine Arbeit, meine Familie oder mein soziales Leben.	0	0	0	0	0	0	0

Anteil der Personen mit schwerer (FSS 4 - 4,9) und sehr hoher Fatigue (FSS ≥ 5) bei Gesunden



Published and new Fatigue Severity (FSS, Krupp et al., 1989): professional pilots: 4,51 ± 0,98



Microsleeps on the flight deck

- Coombes et al. (2020):
  - 7.3 micro-sleep cases per 1000 flight hours: one pilot's micro-sleep on the flight-deck
  - 1.1 micro-sleep cases per 2000 flight hours: both pilots nodded without coordination,
- 45% to 76% pilots: microsleeps in the cockpit
  - Aljurf et al., 2018; Venus & grosse Holtforth, 2021a; Williamson & Friswell, 2017

Themen und Fragebogen

Quellen: Gesundheitsfragebogen für Patienten

Fatigue Severity Scale (FSS)

Jenkins Sleep Scale (JSS)

Überblick über verschiedene Arten von Stressoren und Beispiele für Stressoren, die für Piloten besonders relevant sind (Venus & grosse Holtforth, 2022)

Stressor Typ	Psychophysiologische Stress Reaktionen

Physiologische Stressoren	• körperliche oder geistige Anstrengung, Überanstrengung
	• extreme Temperaturen
	• Hunger, Durst
	• Unfall, Trauma,
	• Infektion,
	• Entzündung
	• Schlafstörungen, Schlaflosigkeit
	• Schlafbeschränkungen wegen Einsatzplänen
	  • unregelmäßiger Schichtarbeit
	  • häufigen Überquerens von Zeitzonen

Psychologische Stressoren	• realistische Angst vor einem Flugzeugabsturz aufgrund hoher Ermüdung • (Angst vor) sozialer Niederlage, • Demütigung • Enttäuschung
Psychosoziale Stressoren	• Gesundheitsprobleme (Burnout, psychische Probleme) • partnerschaftliche Probleme • Betreuungsstress (Kinder, pflegebedürftige Verwandte, …) • finanzielle Probleme • Mit niemanden über Probleme reden zu können usw.

Überblick über verschiedene Arten von Stressoren und Beispiele für Stressoren, die für Piloten besonders relevant sind (Venus & grosse Holtforth, 2022)

Stressor Typ	Stress Reaktion

Arbeitsbezogene Stressoren	• wenig Erfahrung in einem modernen Cockpit (z. B. nach Type-Rating)
	• Konflikte am Arbeitsplatz (z. B. Untersuchung des Privatlebens von Piloten nach Ermüdungsmeldungen, Schuldzuweisung an Piloten für ihre eigene Erschöpfung)
	• Zeitdruck wegen
	  • wirtschaftlichem Druck,
	  • Mindestruhezeiten und Mindestumlaufzeiten
	  • lange Flugdienste im überfüllten Luftraum, die auf überfüllten Flughäfen beginnen und enden

Existentielle oder chronische arbeitsbezogene Stressoren	• drohende Insolvenzen oder Fusionen von Flugbetrieben (in den letzten Jahren z. B. Flybe, SunExpress, LATAM, Thomas Cook, Air Berlin etc.) • Arbeitsplatzunsicherheit durch atypische Verträge (z. B. Pay-to-Fly, Scheinselbstständigkeit) • „Pilot Pushing“ • Verantwortung für Hunderte von Passagieren und Besatzung während der Flüge
Unmittelbare Bedrohungen für das eigene Leben / Flugsicherheit	• Blendung des Piloten durch Laserpointer im Short Final • Air Prox / Near Miss mit Drohne Minuten oder Sekunden vor dem Aufsetzen • beide Piloten schlafen am Steuer / im Cockpit ein • Überfliegen aktiver Kriegsgebiete (z.B. Syrien, Ukraine, …)

Fragebogen psychosozialer Stress

12 Wie stark fühlten Sie sich im Verlauf der letzten 4 Wochen durch die folgenden Beschwerden beeinträchtigt?		Nicht beeinträchtigt	Wenig beeinträchtigt	Stark beeinträchtigt
a.	Sorgen über Ihre Gesundheit	☐	☐	☐
b.	Sorgen über Ihr Gewicht oder Ihr Aussehen	☐	☐	☐
c.	Wenig oder kein sexuelles Verlangen oder Vergnügen beim Geschlechtsverkehr	☐	☐	☐
d.	Schwierigkeiten mit dem Ehepartner, Lebensgefährten, Freundin/Freund	☐	☐	☐
e.	Belastung durch die Versorgung von Kindern, Eltern oder anderen Familienangehörigen	☐	☐	☐
f.	Stress bei der Arbeit oder in der Schule	☐	☐	☐
g.	Finanzielle Probleme oder Sorgen	☐	☐	☐
h.	Niemanden zu haben, mit dem man Probleme besprechen kann	☐	☐	☐
i.	Etwas Schlimmes, das vor kurzem passiert ist	☐	☐	☐
j.	Gedanken an schreckliche Ereignisse von früher oder Träume darüber – z. B. die Zerstörung des eigenen Heimes, ein schwerer Unfall, körperliche Gewalt oder eine sexuelle Handlung unter Zwang	☐	☐	☐

Depressions Screening (PHQ8)

(Antriebslosigkeit, Hoffnungslosigkeit, Müdigkeit, …)

2 Wie oft fühlten Sie sich im Verlauf der letzten 2 Wochen durch die folgenden Beschwerden beeinträchtigt?	Über-haupt nicht	An einzelnen Tagen	An mehr als der Hälfte der Tage	Bei-nahe jeden Tag
a. Wenig Interesse oder Freude an Ihren Tätigkeiten	☐	☐	☐	☐
b. Niedergeschlagenheit, Schwermut oder Hoffnungslosigkeit	☐	☐	☐	☐
c. Schwierigkeiten, ein- oder durchzuschlafen, oder vermehrter Schlaf	☐	☐	☐	☐
d. Müdigkeit oder Gefühl, keine Energie zu haben	☐	☐	☐	☐
e. Verminderter Appetit oder übermäßiges Bedürfnis zu essen	☐	☐	☐	☐
f. Schlechte Meinung von sich selbst; Gefühl, ein Versager zu sein oder die Familie enttäuscht zu haben	☐	☐	☐	☐
g. Schwierigkeiten, sich auf etwas zu konzentrieren, z. B. beim Zeitunglesen oder Fernsehen	☐	☐	☐	☐
h. Waren Ihre Bewegungen oder Ihre Sprache so verlangsamt, dass es auch anderen auffallen würde? Oder waren Sie im Gegenteil „zappelig" oder ruhelos und hatten dadurch einen stärkeren Bewegungsdrang als sonst?	☐	☐	☐	☐
i. Gedanken, dass Sie lieber tot wären oder sich Leid zufügen möchten	☐	☐	☐	☐

Positive depression screenings/significant symptoms of depression

Previous Research:

- Wu et al. (2016): positive depression-screening (PHQ9 ≥ 10) for 13.5% pilots
- Aljurf et al. (2018): 34.5% pilots reported significant symptoms of depression (HADS ≥ 8).
- Cahill et al. (2021): 16% pilots PHQ8 ≥10
- Venus & grosse Holtforth (2022): 19%

- 9.1% **general population** reported PHQ8 ≥ 10 (Kroenke et al., 2009)
- 9.7% of the **working general population** reported PHQ8 ≥ 10 (Venus, Odermatt & grosse Holtforth, 2020)

Hypothesis 4

- More professional pilots compared with the general population (>9.1%) report significant symptoms of depression (PHQ8 ≥10).

Screening generalisierte Angst (GAD7)

(übertriebene Angst, Sorgen, Anspannung, keine Phobie)

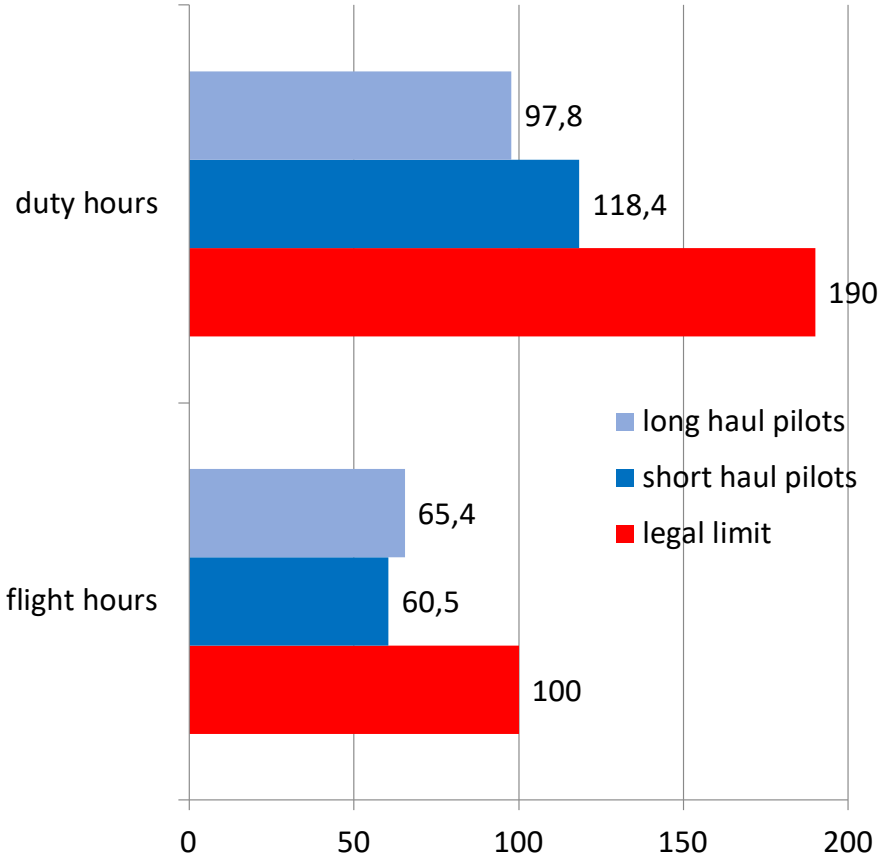
5 Wie oft fühlten Sie sich im Verlauf der letzten 4 Wochen durch die folgenden Beschwerden beeinträchtigt?	Überhaupt nicht	An einzelnen Tagen	An mehr als der Hälfte der Tage
a. Nervosität, Ängstlichkeit, Anspannung oder übermäßige Besorgnis	☐	☐	☐

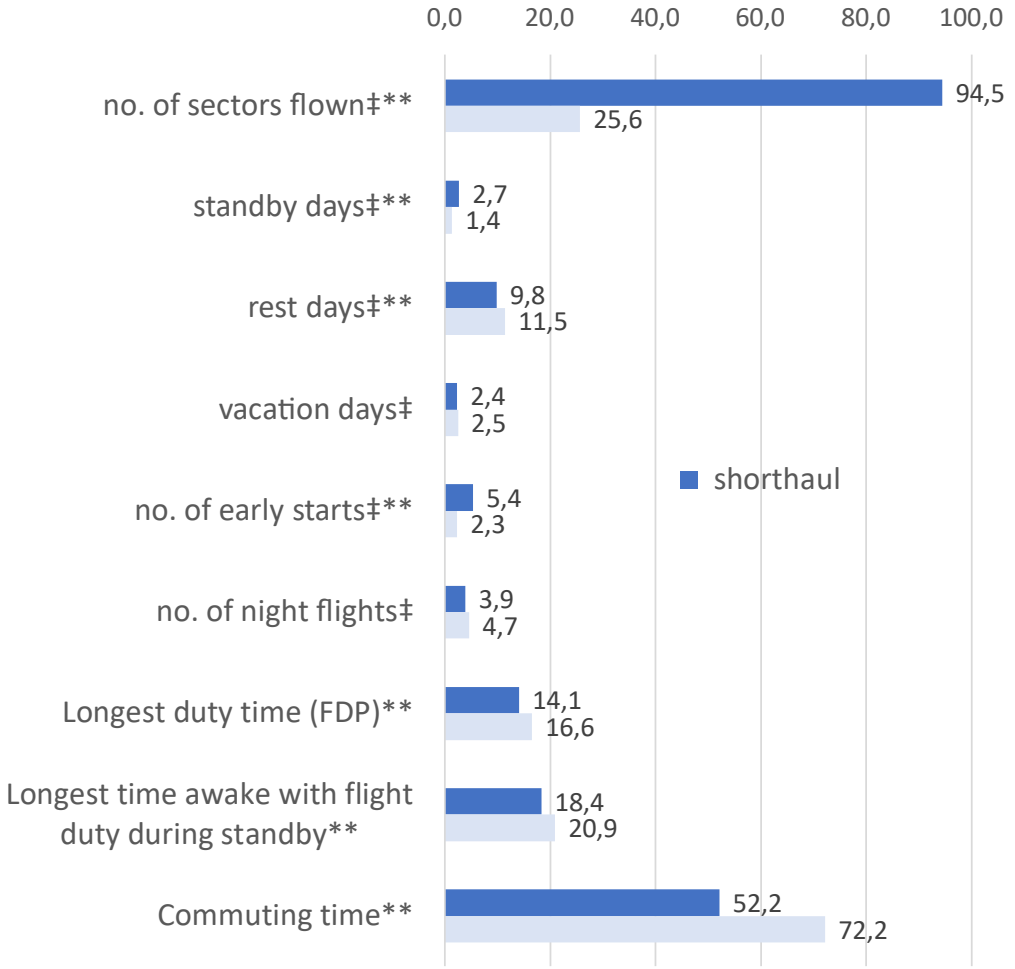
Wenn „Überhaupt nicht", gehen Sie bitte weiter zu Frage 6.

b. Gefühle der Unruhe, sodass Stillsitzen schwer fällt	☐	☐	☐
c. Leichte Ermüdbarkeit	☐	☐	☐
d. Muskelverspannungen, Muskelschmerzen	☐	☐	☐
e. Schwierigkeiten beim Ein- oder Durchschlafen	☐	☐	☐
f. Schwierigkeiten, sich auf etwas zu konzentrieren, z. B. beim Lesen oder beim Fernsehen	☐	☐	☐
g. Leichte Reizbarkeit, Überempfindlichkeit	☐	☐	☐

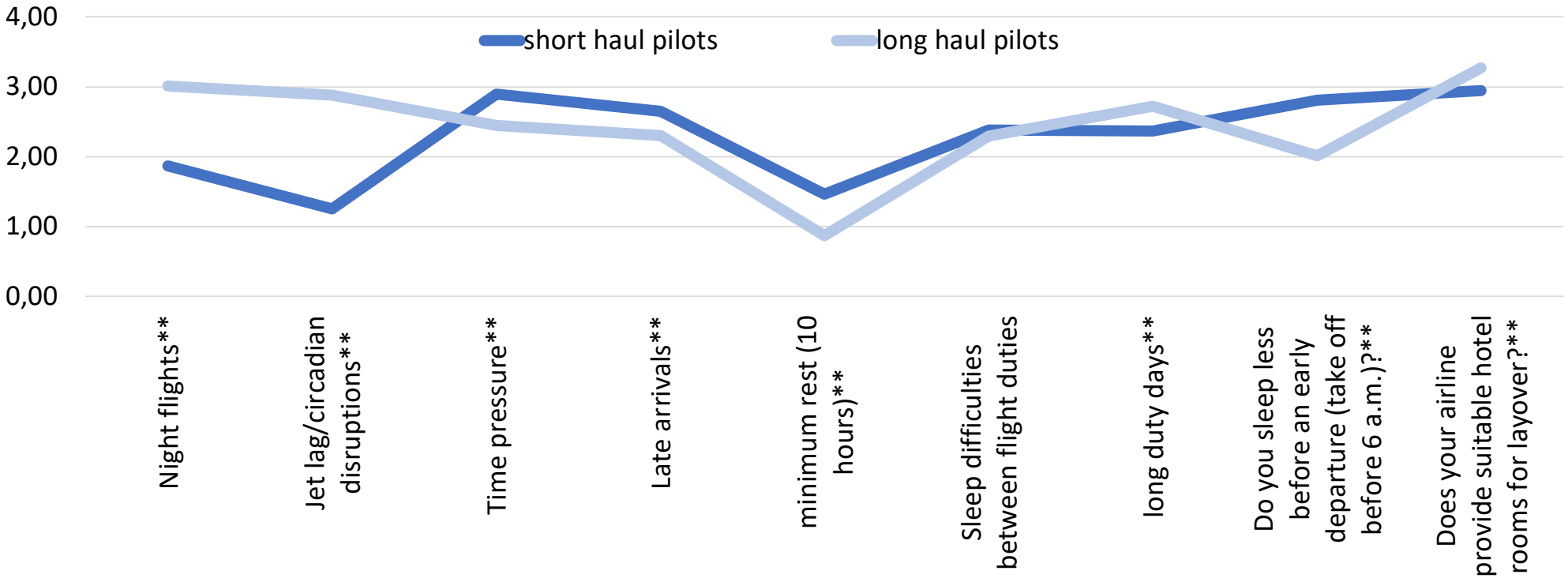
Vergleich Kurz- und Langstrecken Piloten

Results

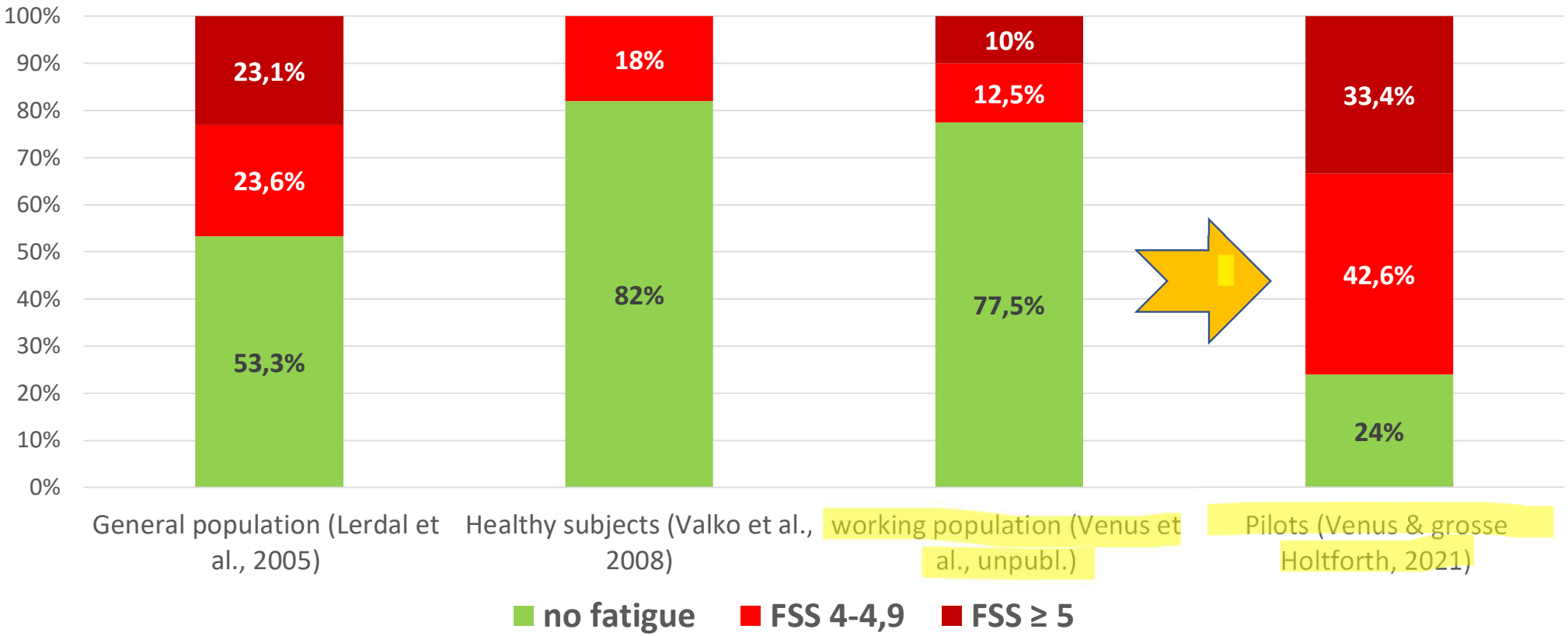

duty hours
flight hours
97,8
118,4
190
65,4
60,5
100
long haul pilots
short haul pilots
legal limit
0
50
100
150
200


0,0
20,0
40,0
60,0
80,0
100,0
no. of sectors flown‡**
94,5
25,6
standby days‡**
2,7
1,4
rest days‡**
9,8
11,5
vacation days‡
2,4
2,5
no. of early starts‡**
5,4
2,3
no. of night flights‡
3,9
4,7
Longest duty time (FDP)**
14,1
16,6
Longest time awake with flight duty during standby**
18,4
20,9
Commuting time**
52,2
72,2
shorthaul

Fatigue Risks associated with Flight Duties



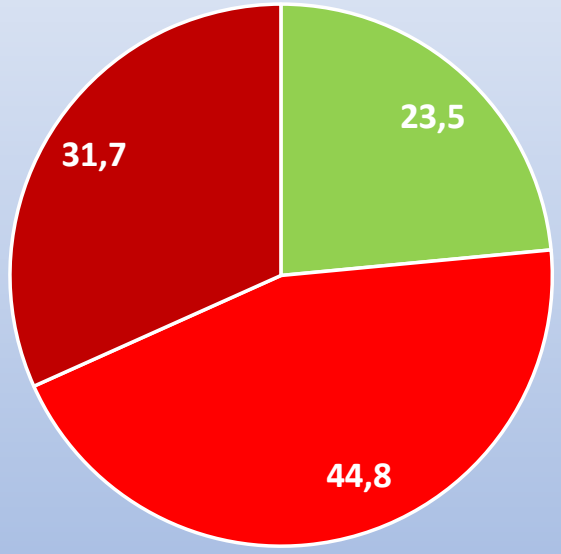
Severe (FSS 4 - 4,9) and High Fatigue (FSS ≥ 5) of Healthy Subjects



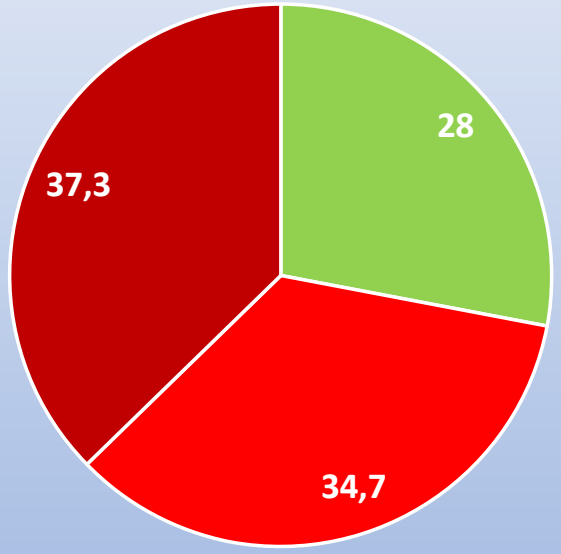
High & Severe Fatigue (FSS)

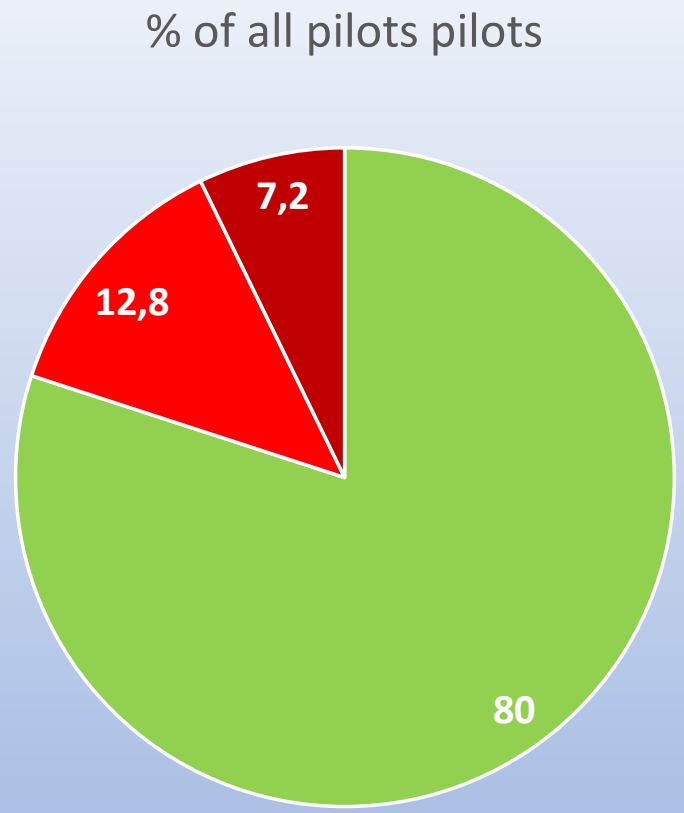
SH and LH pilots **scheduled for only 51.4% to 65.4% of the legally allowed duty and flight hours**

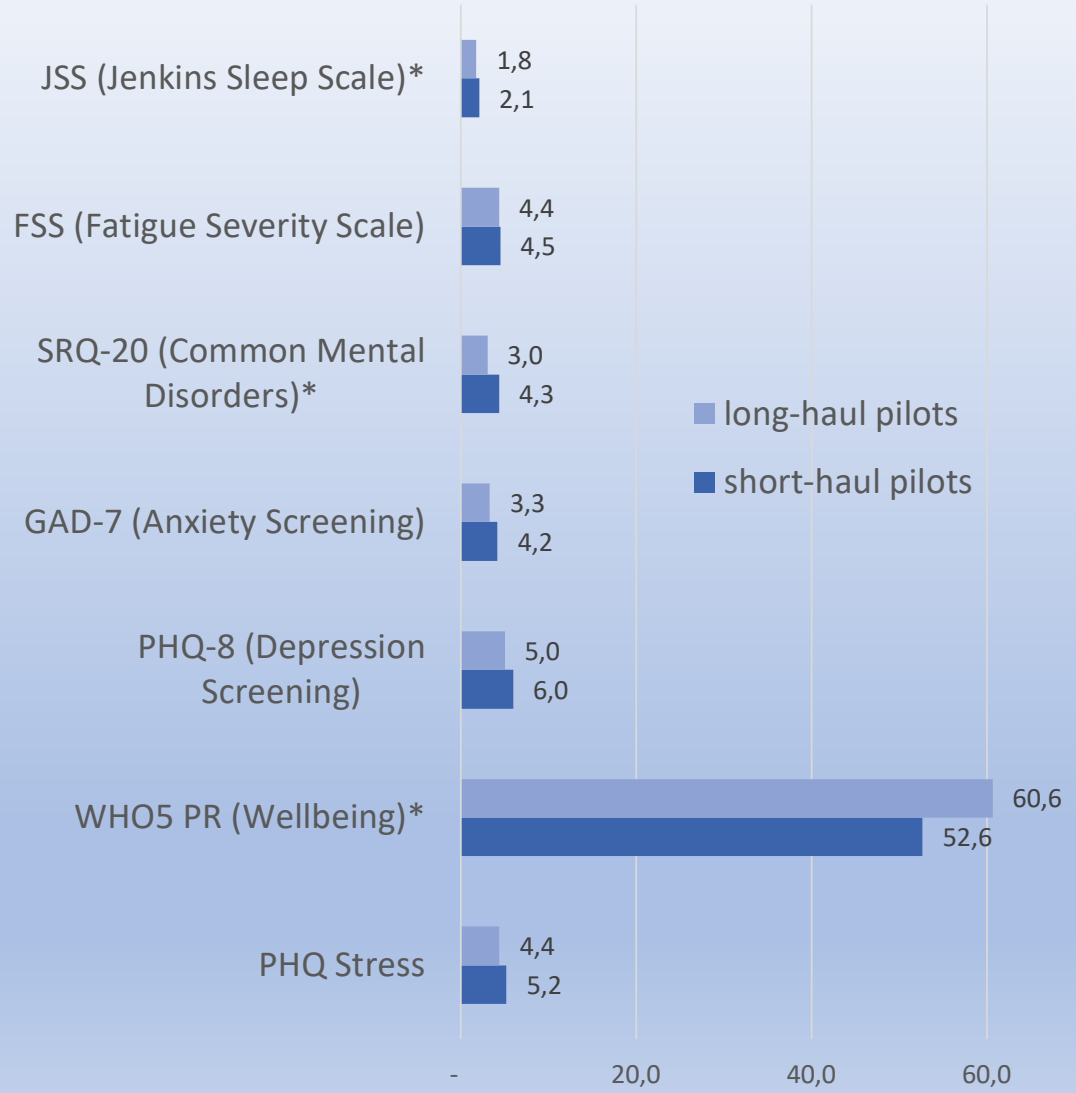
% short-haul pilots



% long-haul pilots

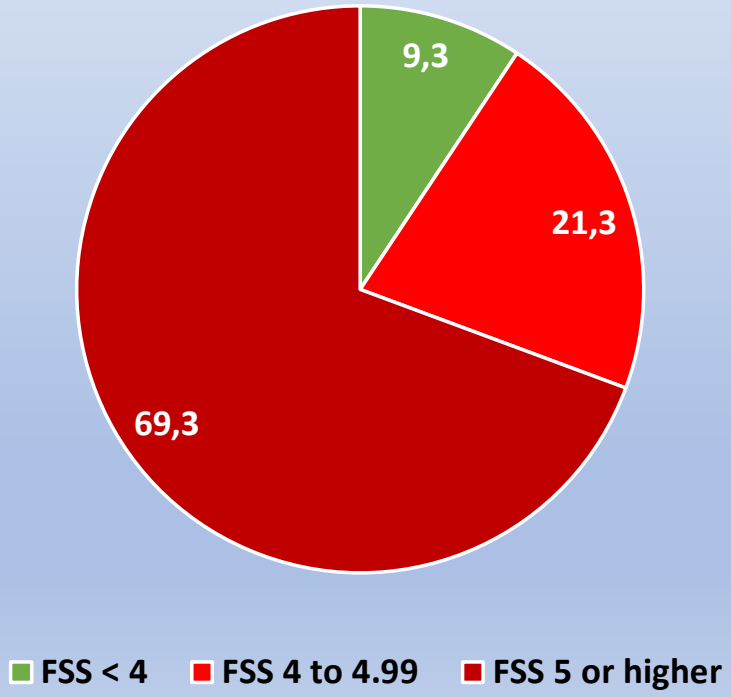



% of all pilots pilots
7,2
12,8
80
well
positive depression or anxiety screening
positive depression and anxiety screening

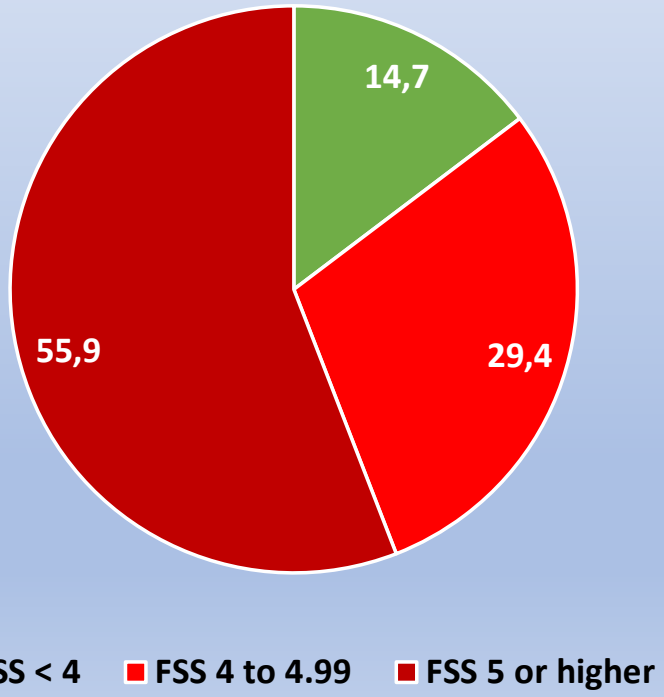

JSS (Jenkins Sleep Scale)*
1,8
2,1
FSS (Fatigue Severity Scale)
4,4
4,5
SRQ-20 (Common Mental Disorders)*
3,0
4,3
GAD-7 (Anxiety Screening)
3,3
4,2
PHQ-8 (Depression Screening)
5,0
6,0
WHO5 PR (Wellbeing)*
60,6
52,6
PHQ Stress
4,4
5,2
long-haul pilots
short-haul pilots
-
20,0
40,0
60,0

Pilots with Positive Mental Health Screening Results

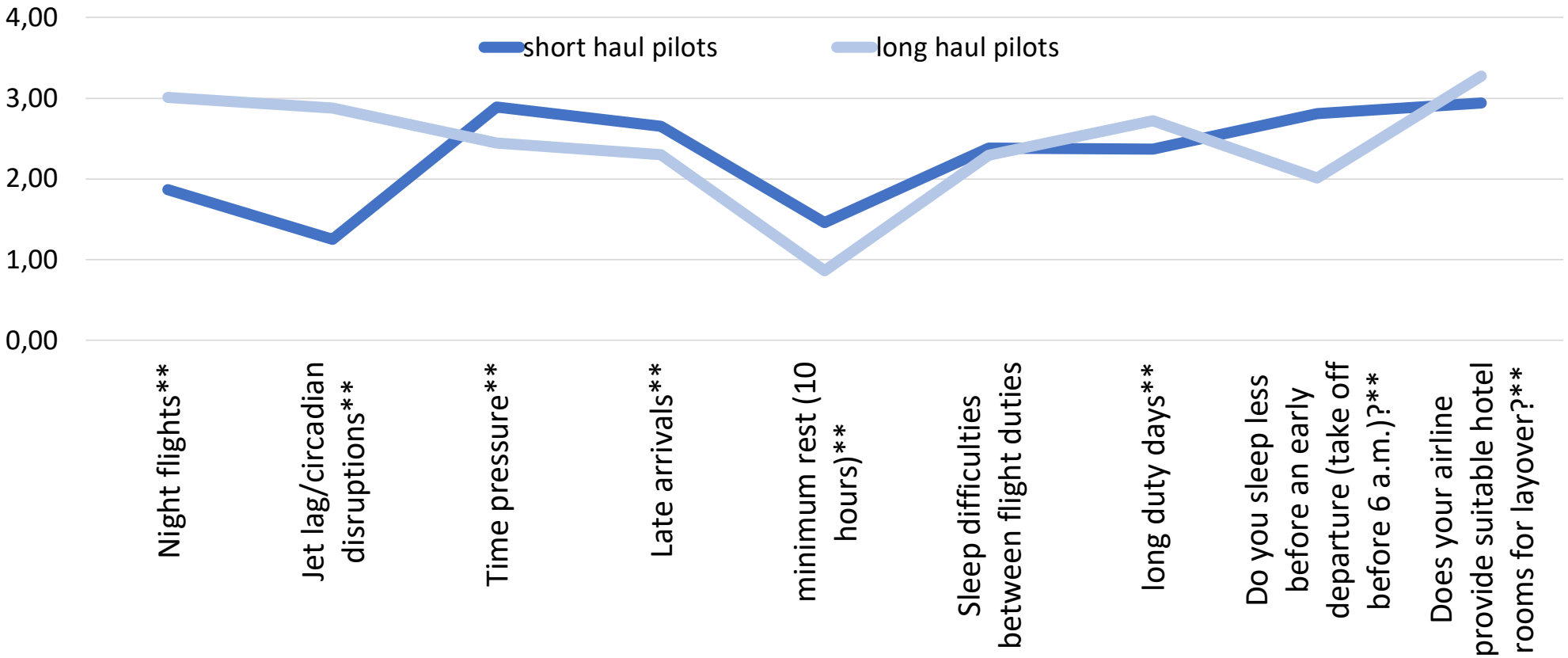
% pilots with positive
depression screening results (n=75)



% pilots with positive
anxiety screening results (n=34)



Fatigue Risks associated with Flight Duties

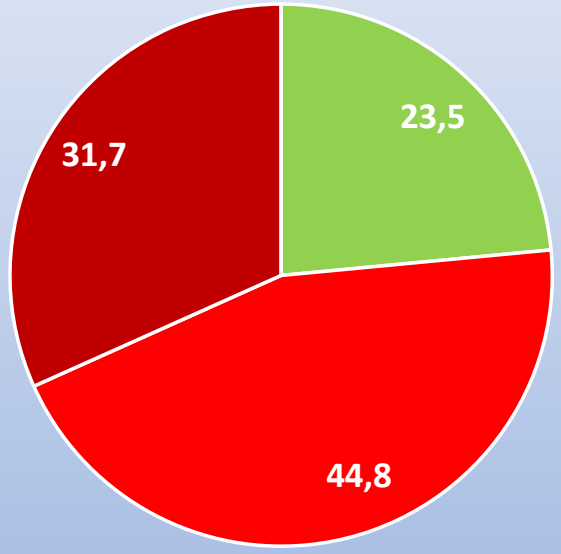


0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = always

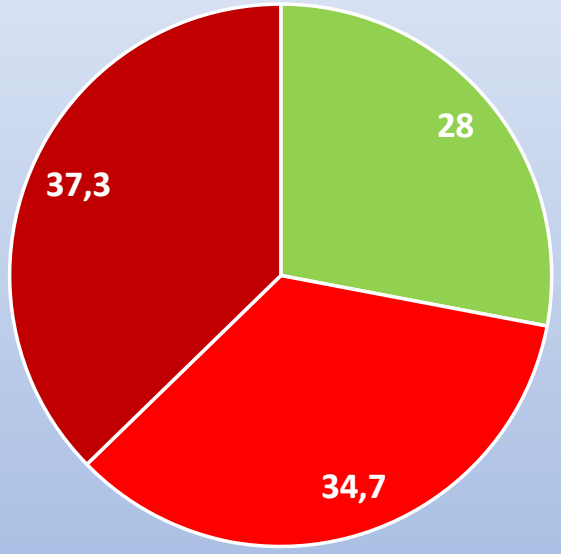
High & Severe Fatigue (FSS)

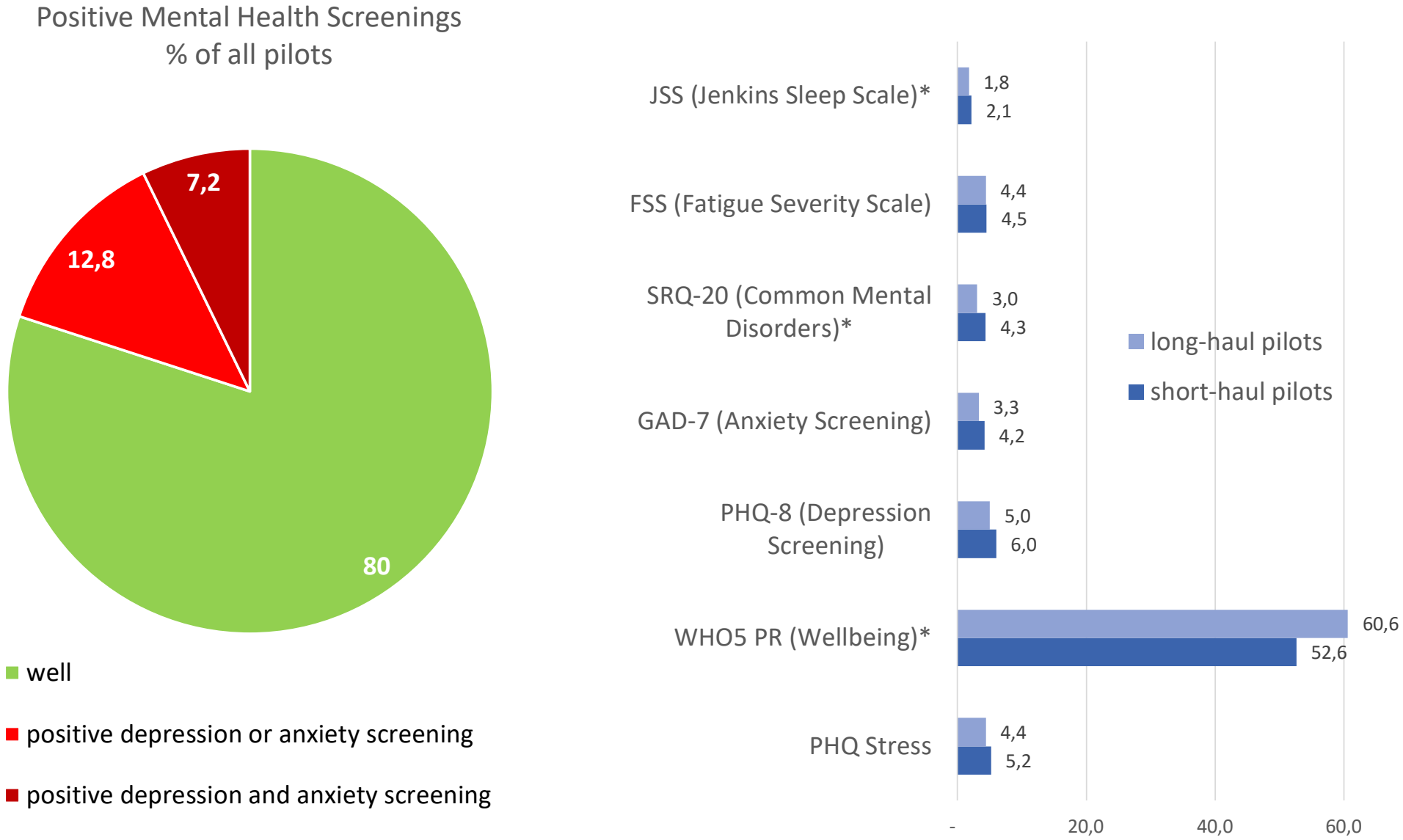
SH and LH pilots **scheduled for only 51% to 65% of the legally allowed duty and flight hours**

% short-haul pilots



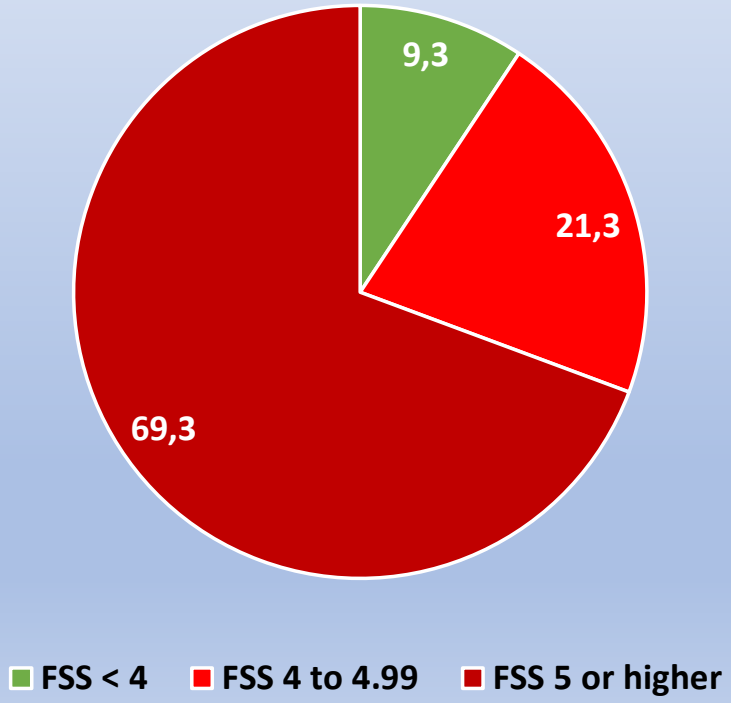
% long-haul pilots



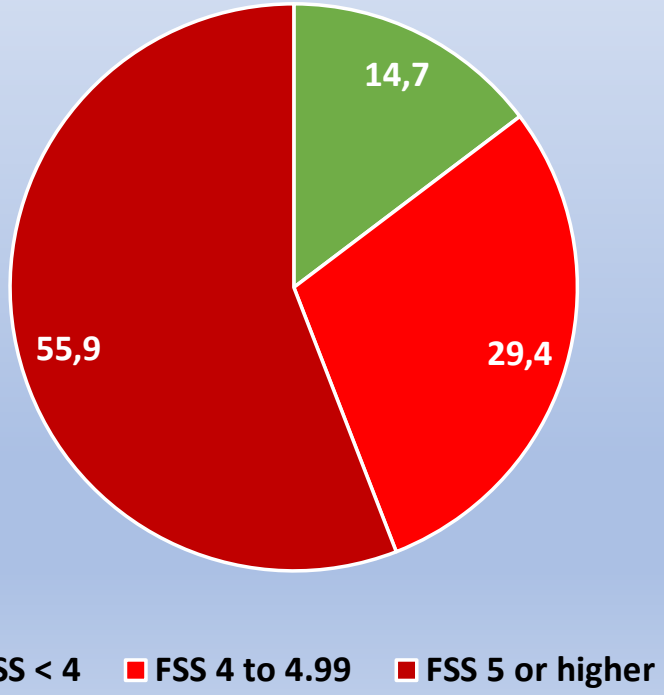

Positive Mental Health Screenings
% of all pilots
7,2
12,8
80
well
positive depression or anxiety screening
positive depression and anxiety screening
JSS (Jenkins Sleep Scale)*
1,8
2,1
FSS (Fatigue Severity Scale)
4,4
4,5
SRQ-20 (Common Mental Disorders)*
3,0
4,3
GAD-7 (Anxiety Screening)
3,3
4,2
PHQ-8 (Depression Screening)
5,0
6,0
WHO5 PR (Wellbeing)*
60,6
52,6
PHQ Stress
4,4
5,2
long-haul pilots
short-haul pilots
-
20,0
40,0
60,0

Fatigue among Pilots with Positive Mental Health Screenings

% pilots with **positive depression screening** results (n=75)



% pilots with **positive anxiety screening** results (n=34)



Vergleich Piloten von Billigfluglinien (Low Cost Carrier, LCC) Network Carriern (KLM, LH)

Comparison of Aviation Business Models

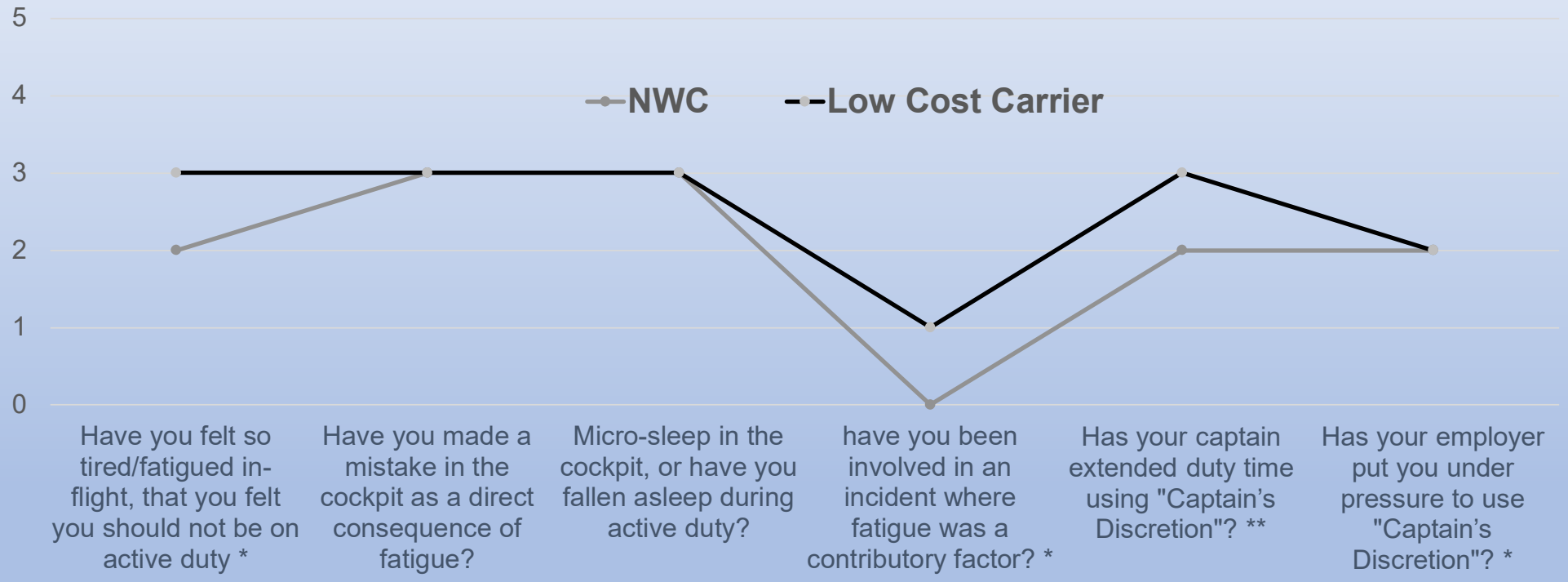
Characteristics	NWC (Network Carriers)	LCC (Low -ost Carriers)
Generic Strategy	Differentiation	Cost Leadership
Scale	Large/ often intercontinental/ traditional airline business model with many supporting business units	Regional/ continental/ virtual airline business model with single core flight operation and small overhead/outsourced supporting functions
Network	Hub and spoke/ short haul and long-haul/ Primary airports/ various aircraft types/ Frequent schedules	Point-to-point/short haul/ Secondary airports/ single aircraft type
Market/Pricing	Inelastic markets/ Business travelers and 'Visit Friends & Relatives passengers/ price discrimination with various tariffs /	Elastic markets /VFR and Holiday passengers/ yield management/modular pricing/ancillary revenues
Operational	Hub and spoke lead to several waves at the hub with a lot or required labor/ comprehensive services on ground and in the air/ high-quality image/longer turnaround times/prearranged seating	Only point-to-point operation with no guaranteed connection/ little or no services/ low-cost image/free seating/ticketless
Distribution	Complex reservation systems/travel agents/website	Mainly website
Efficiency	Reduced efficiency due to rigid system/reduced aircraft utilization	Flat hierarchy/high utilization of aircrafts and labor

Datenbasierter Vergleich bez. Einsatz der Piloten

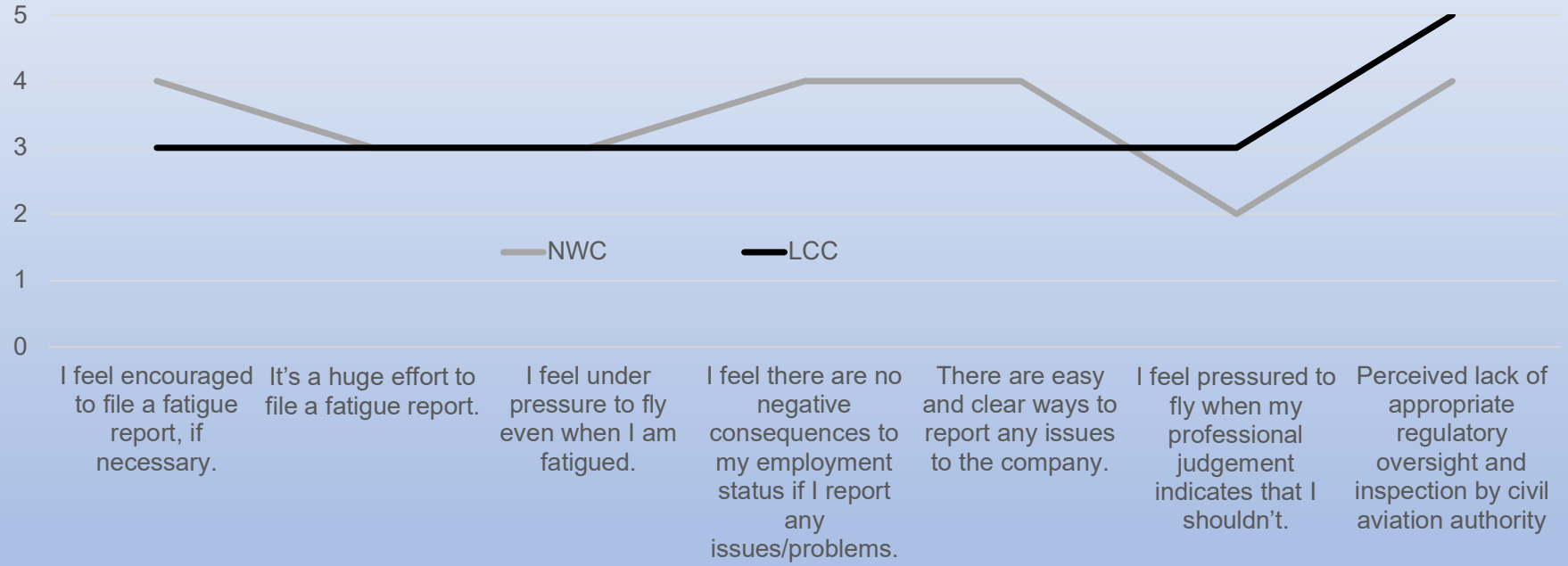
Fatigue, Einhaltung der FTL (Flight Time Limitations), Burnout, Depression, Job-Sicherheit, Arbeitsvertrag, Einkommen, Sicherheitskultur

	NWC	LCC
Better	British Airways KLM Air France	easyJet Eurowings Jetstar Norwegian Virgin Australia
Worse to worst	Lufthansa, Austrian Airlines Swiss Cathay Pacific, Emirates, Etihad Qantas SAS	Bulgarian-Eagle Cobham Ryanair Wizz Air Hongkong Express Airways

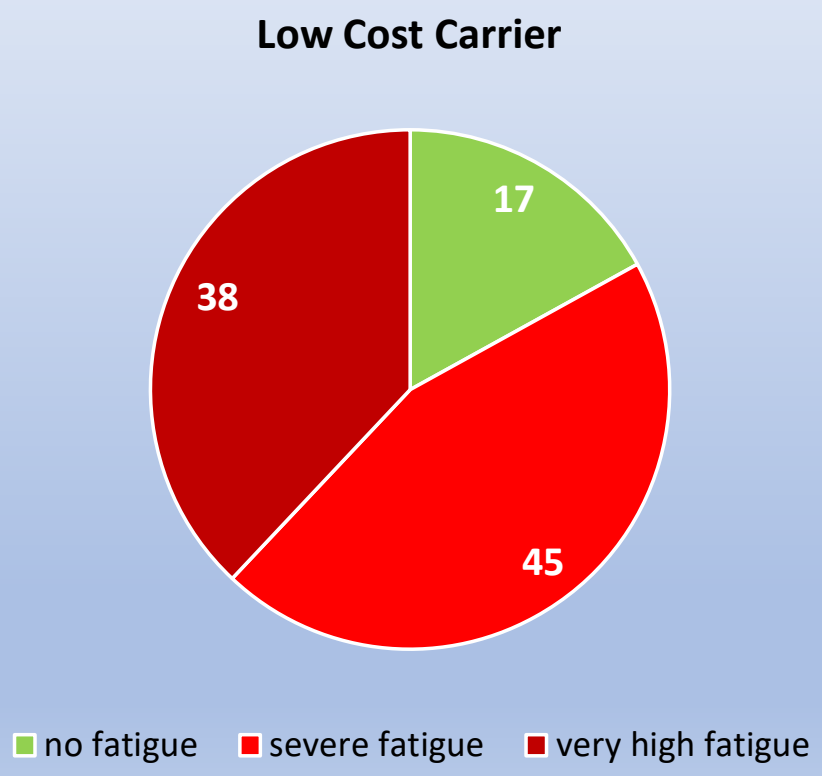
NWC and LCC pilots (N=338) reporting fatigue-related events such as high fatigue or microsleeps in the cockpit, fatigue-related mistakes or incidents, and commander's discretion. "How often in the last year have you …."
0=never, 1=once, 2=rarely, 3=several times; 4=once a month, 5=more often

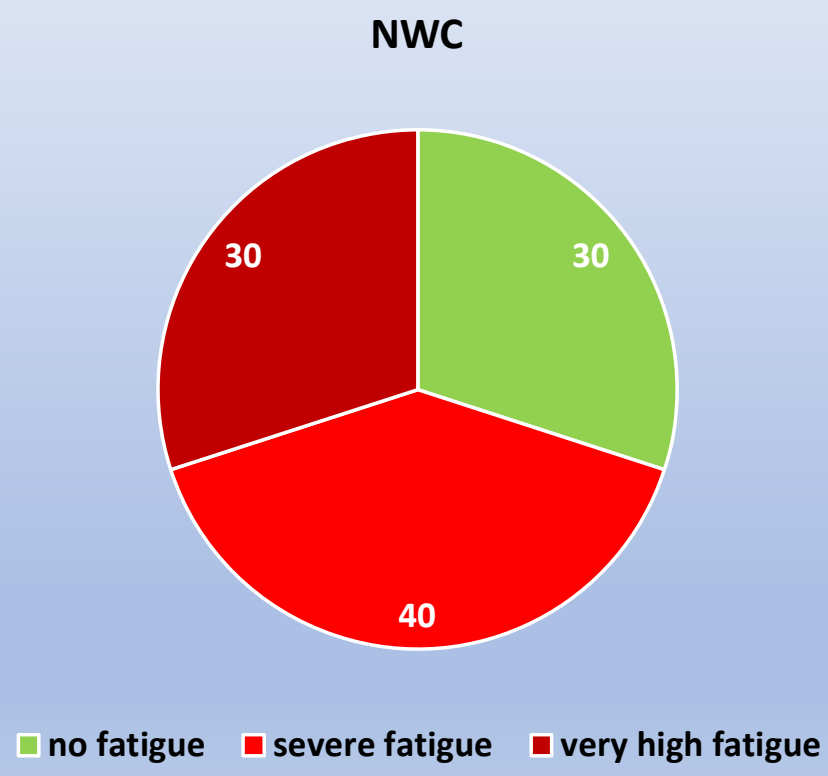


NWC and LCC pilots' (N=338) perception of fatigue reports, potential consequences, pressure referring to pilot pushing, and perceived regulatory oversight. "How strongly do you agree with the following statements?"
5=I strongly agree, 0=I strongly disagree.

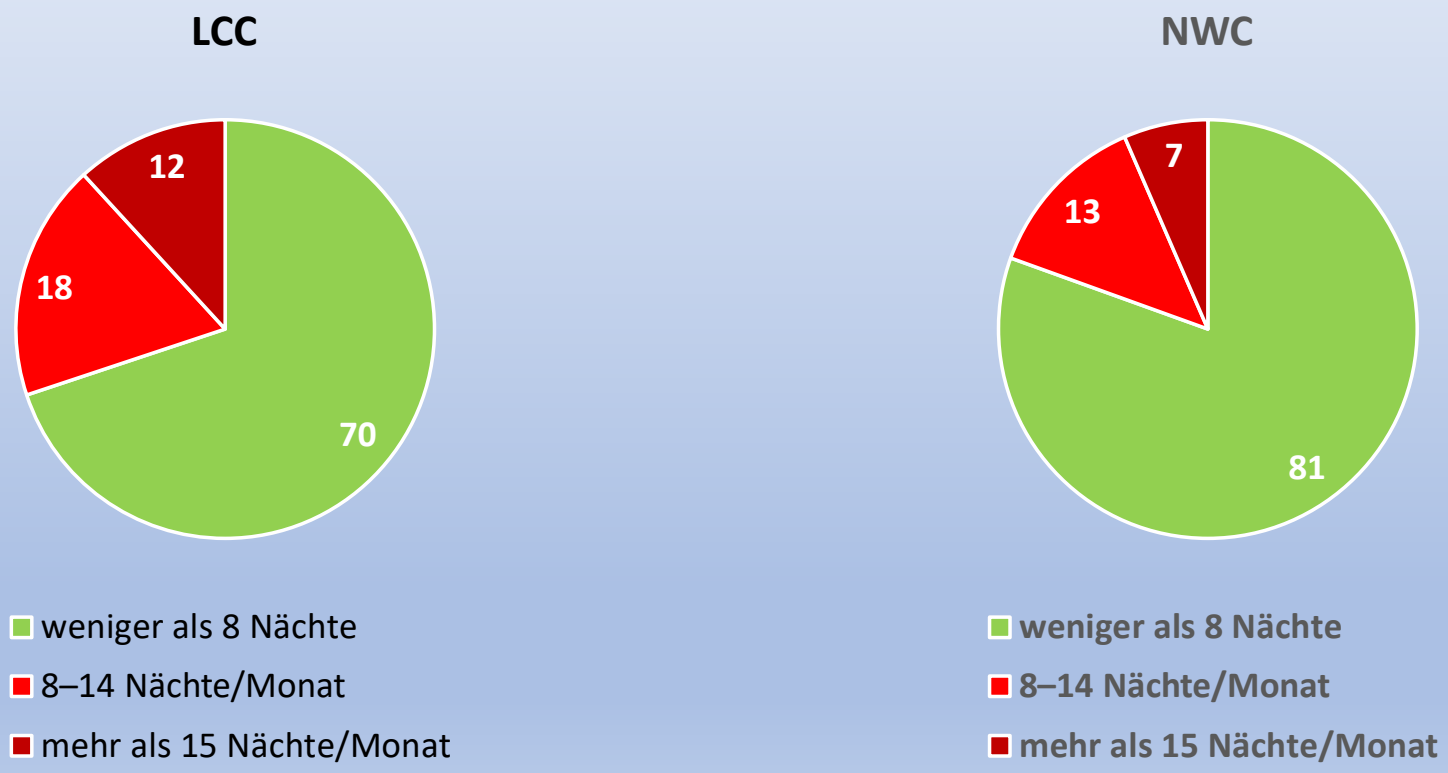


Fatigue (Übermüdung, chron. Erschöpfung)

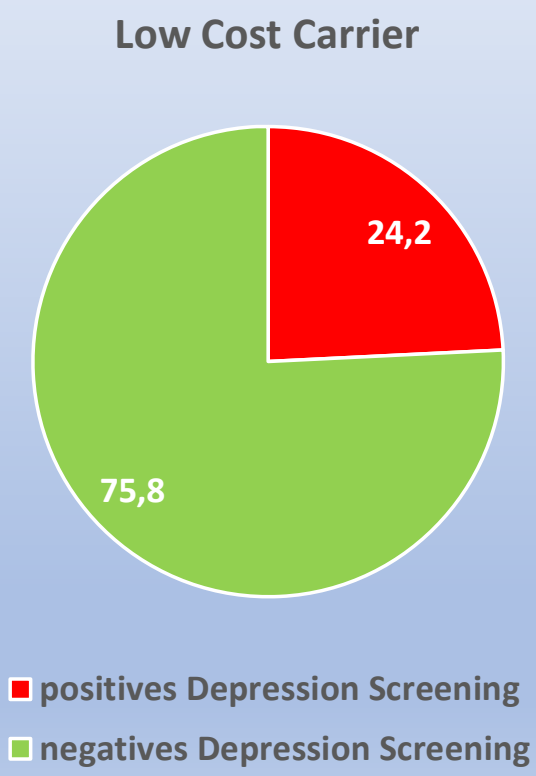


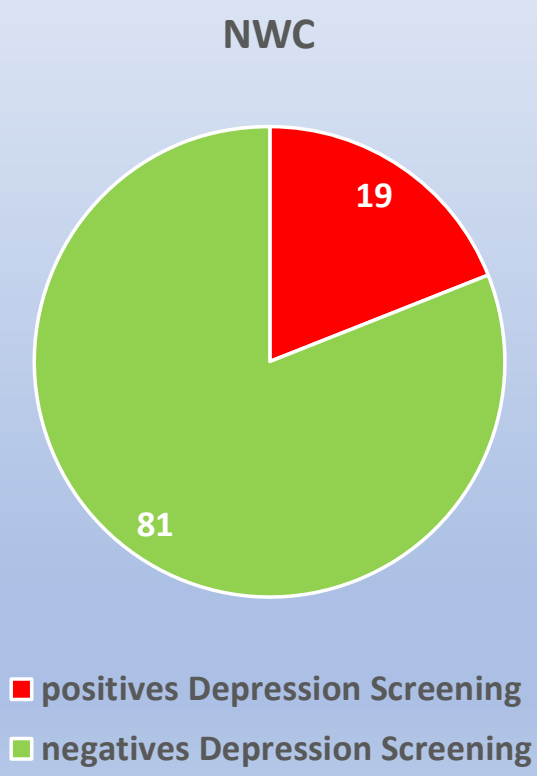


Schlafprobleme

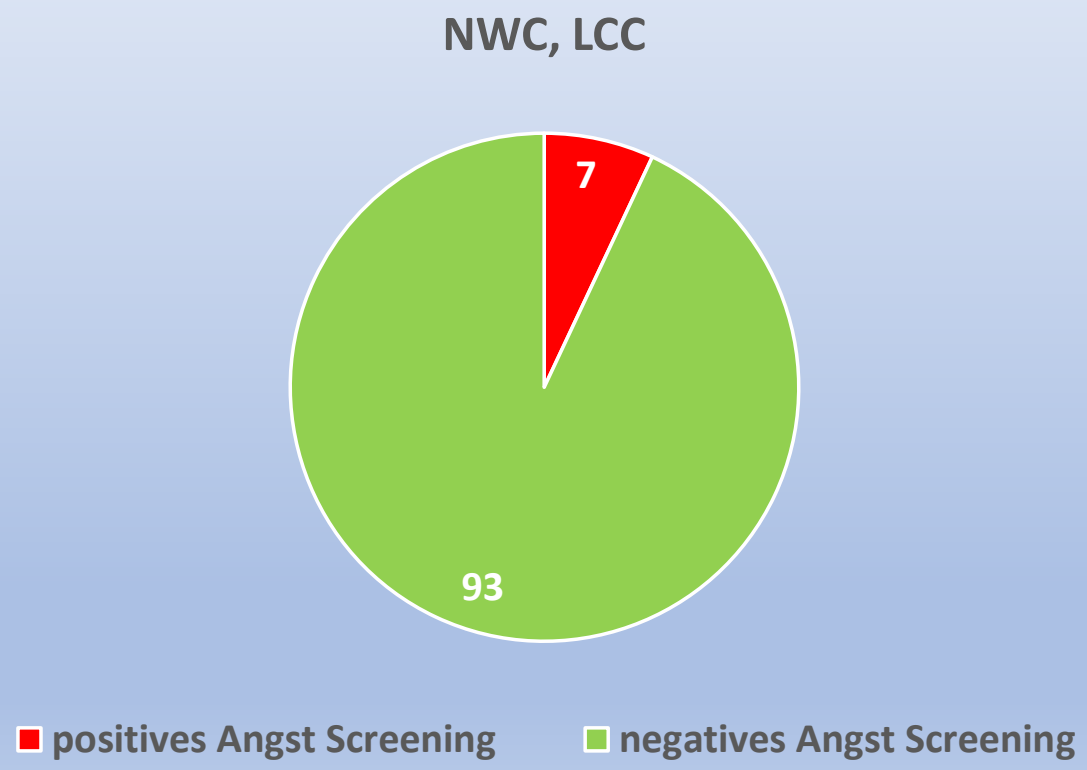


Depression Screening

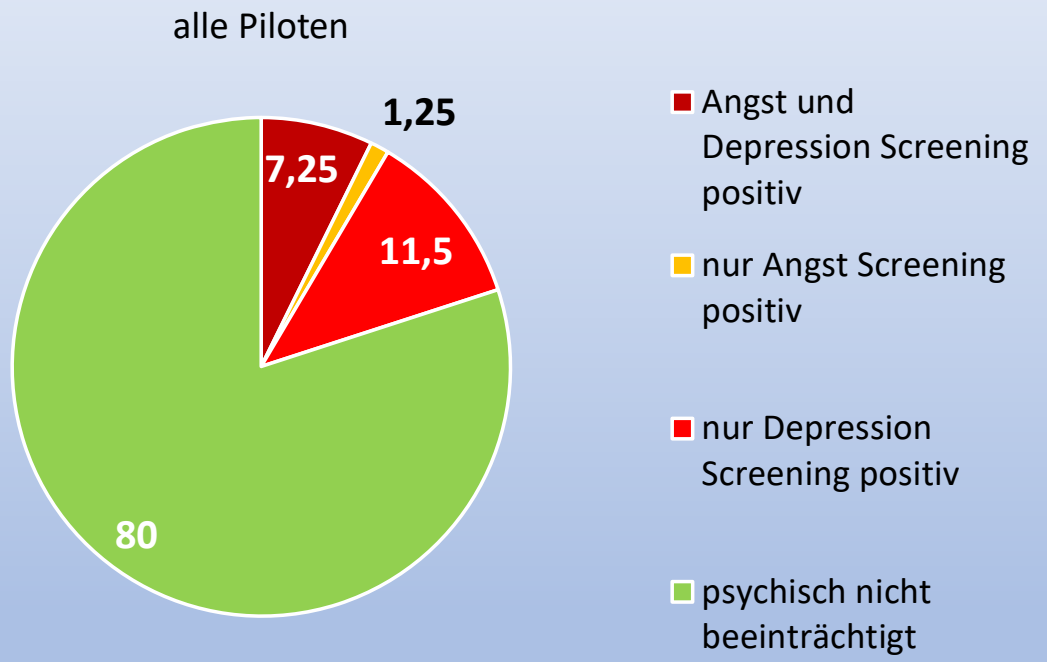


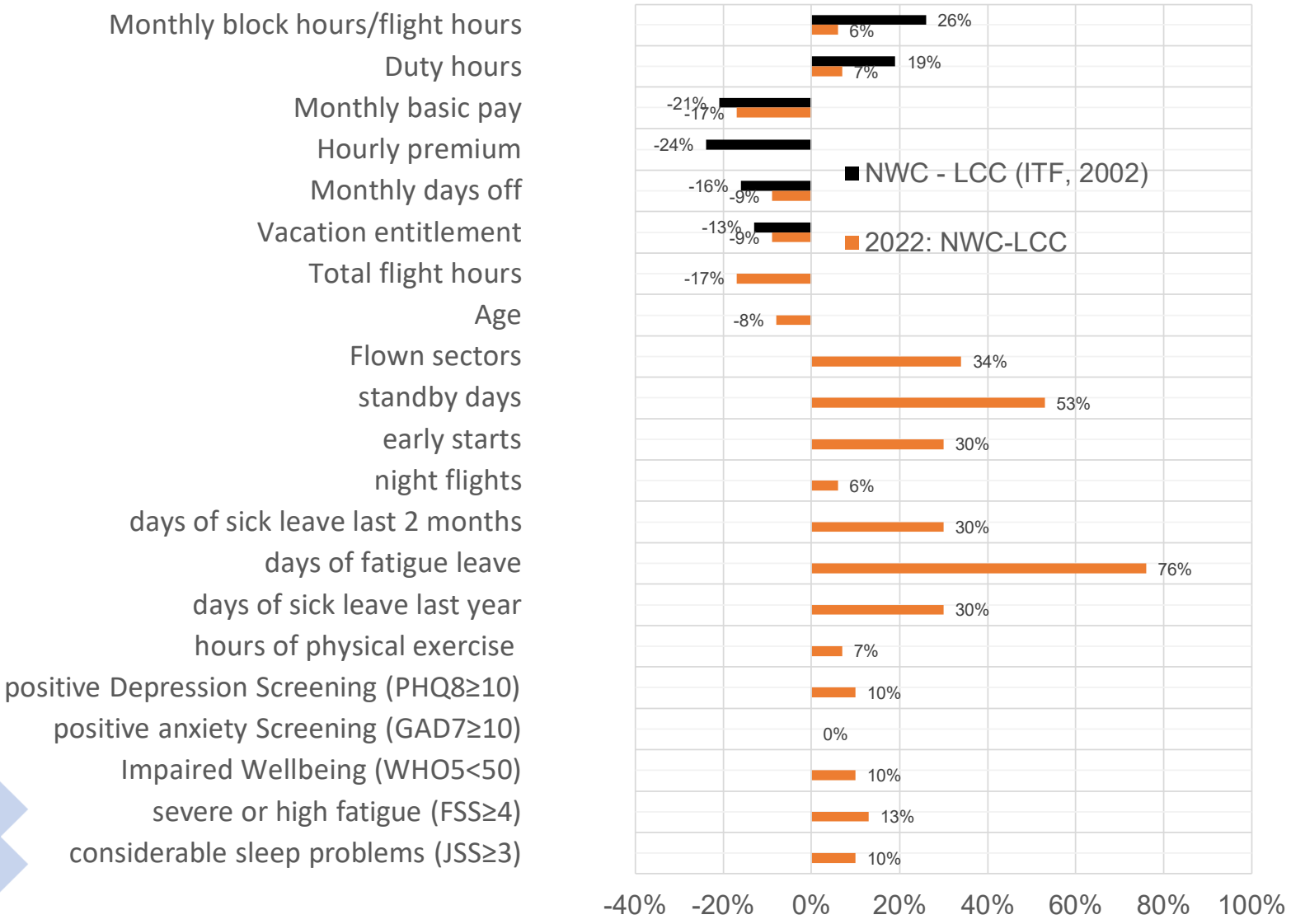


Angst Screening
(Sorgen, Irritierbarkeit, Unfähigkeit, sich zu entspannen)



Alle Piloten: psychische Beeinträchtigungen





Average differences between NWC and LCC pilots of the ITF study (2002) are represented by the **black** bars.

The mean differences in percent (%) between NWC and LCC of our present dataset are represented with the orange bars.

Generalized anxiety vs. realistic fear for life and livelihood

- „The FTL as they are, are a severe hazard to flight safety. **Major accidents and deaths directly attributed to fatigue and exhaustion are just a matter of time.“**

- “**To work in our environment for 11+ (Up to 16...) hours is dangerous** (unless long haul with augmented crew). […]
  Crap schedules, extreme duty times especially extremely early or late schedules (airports are often far from where people live...) **make life tough in this business**.
  Sleep deprivation for everyone in airlines. Really sad and quite frightening now.”

- “If today's path continues, we will in Europe see Colgan repeated, no doubt.”

An EASA-based Low-Cost Carrier pilot described the dire situation with his own words

- […] with the introduction of EASA FTL the everyday business of scheduling crew up to max FDP, associated
  high workload (multiple sectors, slot delays, pax issues, weather, complex airports, busy skies, tech issues, early starts, late finishes) followed by minimum rest is now more than ever

  taking its toll on crew wellbeing and cumulative fatigue levels.

  It frightens me to see that at the same time it's all still **business as usual** […] resulting fatigue levels going through the roof and **more absence due to fatigue than ever before** […] imho, the introduction of EASA FTL has been a massive mistake […]

  but it's the crew and the crew alone that have to deal with the burden of ruined sleep, destructed social and family lives and eventually - shattered careers.