

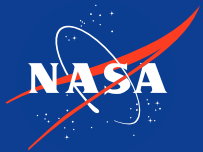
FATIGUE IN SHORT-HAUL OPERATIONS

Regulations and Research

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Objectives

- Develop the scope of the proposed SH study
- Interview US commercial SH pilots to identify fatigue factors
- Systematic, qualitative approach to capture experiences

ICAO definition of fatigue

Fatigue is defined as a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a crew member's alertness and ability to safely operate an aircraft or perform safety-related duties.

Methods

Focus Groups

- Pilots recruited through emails
- Focus groups held online
- Anonymous participation
 - Letter code, no cameras
- Transcription and note-taking
- Standardized script and questions
- Each participant responded to each question in random order

Methods

Questions

Q1. Are there any types of short-haul operations that you think lead to elevated fatigue?

Q2. Are there any types of short-haul operations that you think are **not** fatiguing?

Q3. What types of short-haul operations do you think are the most important for us to study?

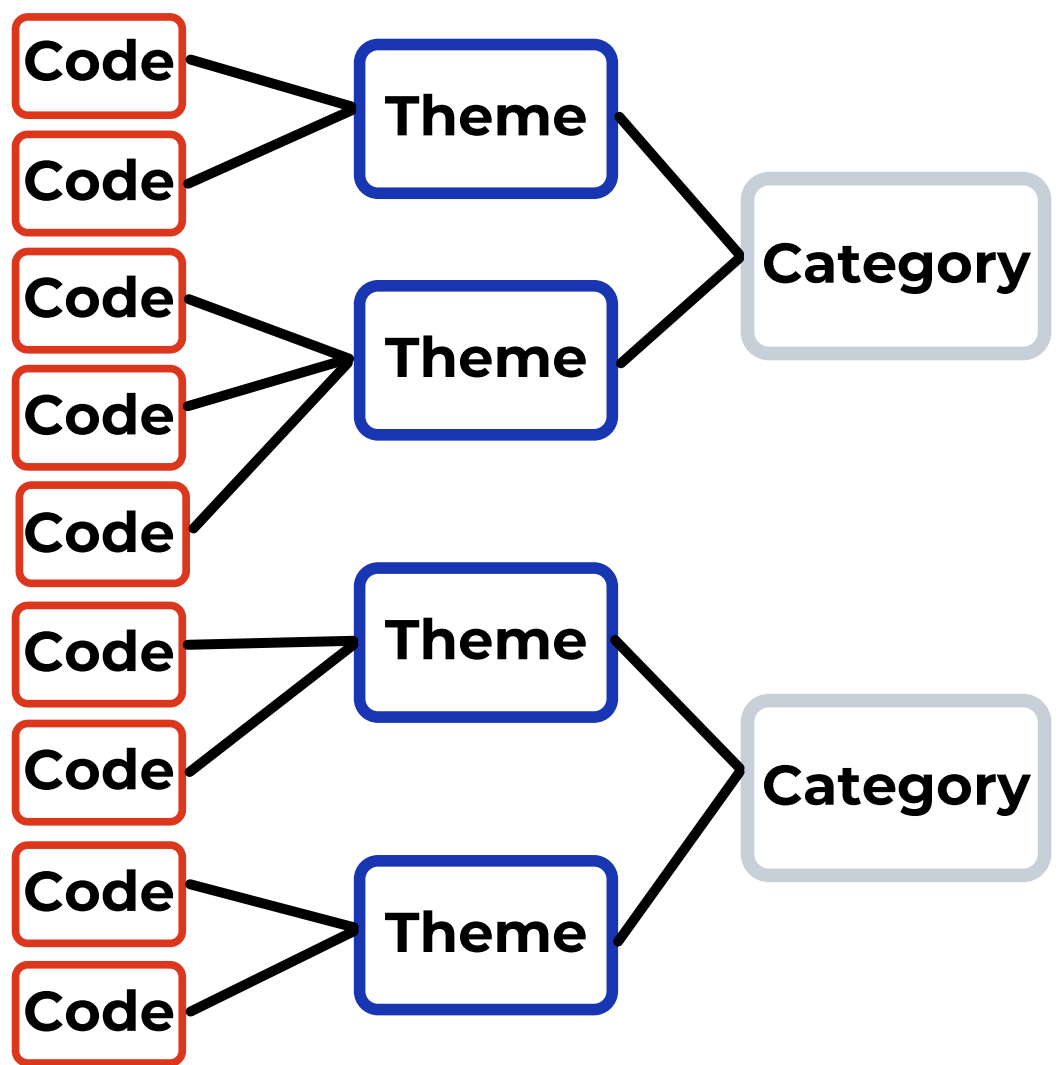
Methods

Analysis

- Cleaned transcripts
- Identified repeating ideas
- Developed code book
- Coded transcripts
- Reviewed and finalized codes
- Code frequencies counted
- Grouped codes into themes
- Themes ranked by frequency

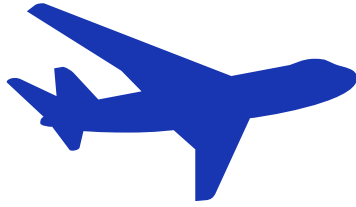
Methods

Analysis

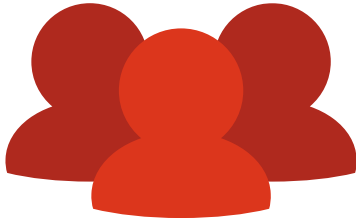


Results

Participants



4 airlines

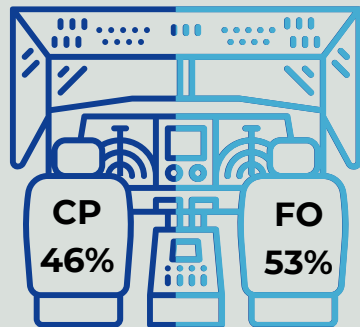


14 focus
groups

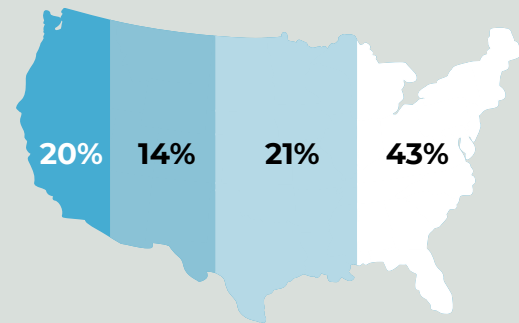


90 pilots

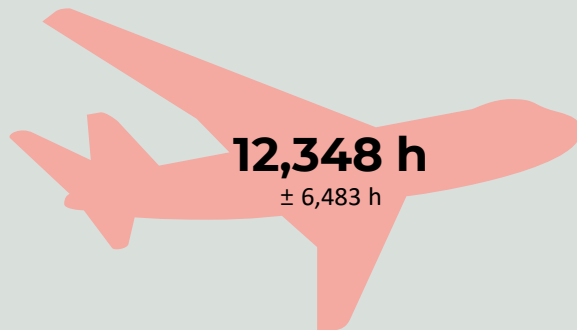
Seat position



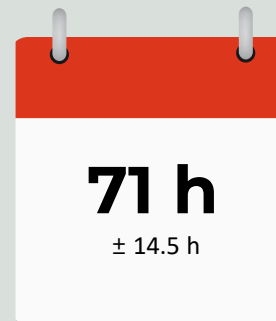
Base time zone



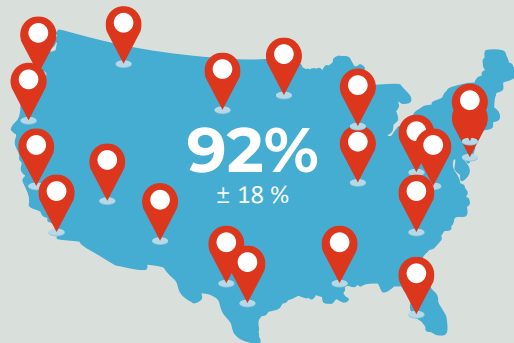
Lifetime flying hours



Monthly flying hours



Short-haul flying



Fatigue role



Results

Word Cloud



Results

Over-arching themes

Five broad fatigue categories identified:

- Circadian disruption
- High workload
- Rest opportunity
- Schedule changes
- Long sits

Results

Ranking themes

Theme	N	%
Circadian switches	171	10.5
Rest duration (layover)	153	9.4
High WL/ Hassle factors	151	9.3
Number of legs	121	7.4
FAR 117 issues	93	5.7
Long sits	85	5.2
Redeyes	83	5.1
Unpredictability	79	4.9
A/C & crew swaps	73	4.5
Rest timing	73	4.5
Out-of-hours	68	4.2
Earlies	64	3.9
Short turn time	53	3.3
Length of duty	46	2.8
Rest quality	45	2.8
Schedule design	38	2.3
Trip length	37	2.3
Lates	25	1.5
Fatigue calls	24	1.5
Length of legs	20	1.2
Rest - Circ disruption	20	1.2
Deadhead	14	0.9
Total	1625*	*incl. 'Other' theme

Theme



Circadian switches

- Circadian swaps (34%)
- Inconsistent duty times (25%)
- Switching time zones (18%)

“There’s a, you know, 9:00 AM show, and then a 2:00 PM show, and then a 5:00 AM show. That changing unwillingly is what I find to be most fatiguing because you just never catch up, like, your body doesn't know what it's doing.”

Results

Top 5 themes



Rest duration (layover)

- Short rest (42%)
- Personal factors (30%)
 - Time to eat, exercise
 - Time to wind down

“You know when they factor in, like, [a] 10- or 11-hour overnight, that doesn't factor in the time it takes to get up, get ready get for the van... all that stuff is not factored into your duty day... They kind of expect you're narcoleptic and then as soon as you get to the hotel you can dive into bed and be asleep. But you need that decompression time where you can get something to eat and then just a little bit of time to decompress. But on those really short ones you're just not allowed it.”

Results

Top 5 themes



Results

Top 5 themes

High workload / Hassle factors

- Weather (30%)
- Maintenance (19%)
- Ground Ops (18%)
- Busy airports (14%)

“You throw me an airplane with 4 MELs [minimum equipment list], one of which is done incorrectly, you throw in weather, de-icing - suddenly that one leg, 2-hour day becomes fatiguing.”



Number of flights

- >4 flights (41%)
- >2 flights (36%)
- >1 flight (23%)

“Multiple leg days as opposed to a one leg day for a long-haul: you have to get acquainted with the airplane, you have to work through the MELs [minimum equipment list] every single time on every single different airplane ... the weather issues, the deicing, all these little factors, you have to do multiple times in a day versus once, if that, in long-haul. And then the recoup time from those factors in long-haul is, you know, cruise flight, the lowest workload portion of the flight ... but there just isn't very much of that [in short-haul] ...”

Results

Top 5 themes



FAR 117 issues

- FAR limits as goal (37%)
- FAR revisions (24%)
- Computer scheduler (15%)

Results

Top 5 themes

“I think that the companies look at these restrictions in [FAR Part] 117 not so much as limits to stay away from, but scheduling goals to get close to.”



Results

Honorable mentions

- **Long sits**
- **Redeyes**
 - General (49%)
 - Tag leg (12%)
 - Mid trip (8%)
- **Unpredictability**
 - Schedule changes (43%)
 - Planned vs. ops (29%)
- **Aircraft & crew swaps**
- **Rest timing**
 - Redeye rest (44%)
 - Day rest (33%)
 - Two FDPs in calendar day (23%)



Next steps

Field data collection

Defining the scope of field study

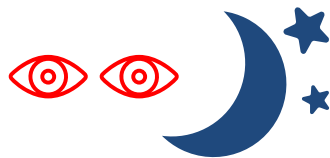
- **Circadian disruption**
- High workload
- Rest opportunity
- Schedule changes
- Long sits



Study design

Primary research question

Overnight FDP



Thru 0200-0559h

or

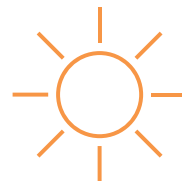
Circadian Switch



Start/end 0000-0659h

Vs.

“Daytime”



0700-2359h

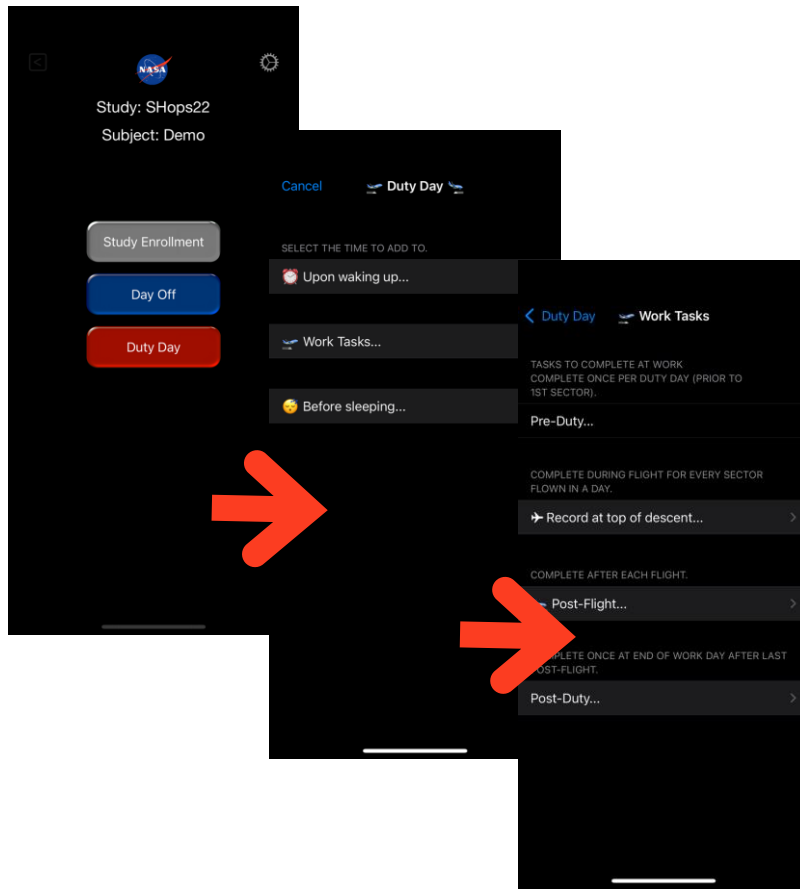
Actigraphy

Objective sleep measure



NASA PVT+

Freely available app



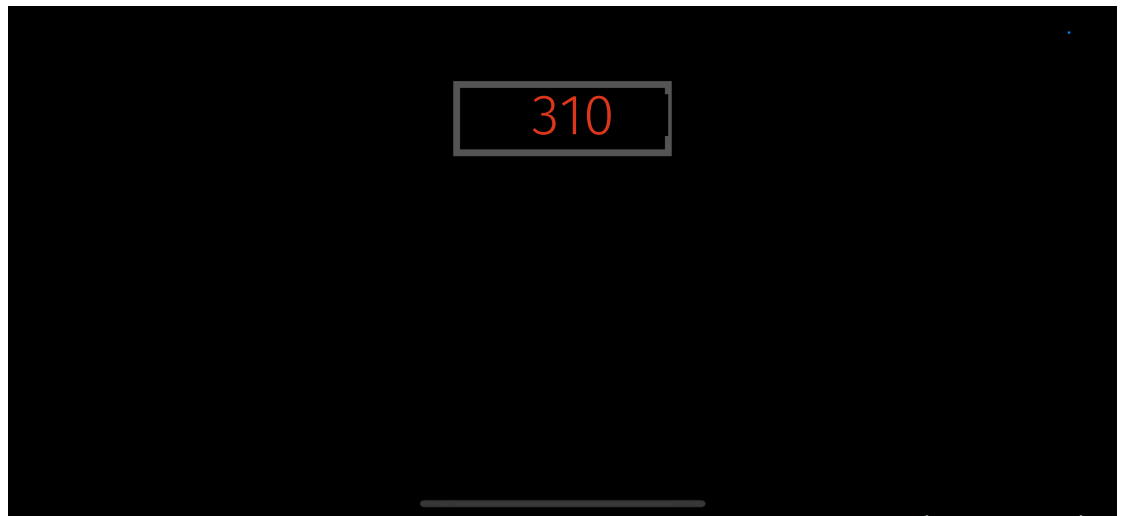
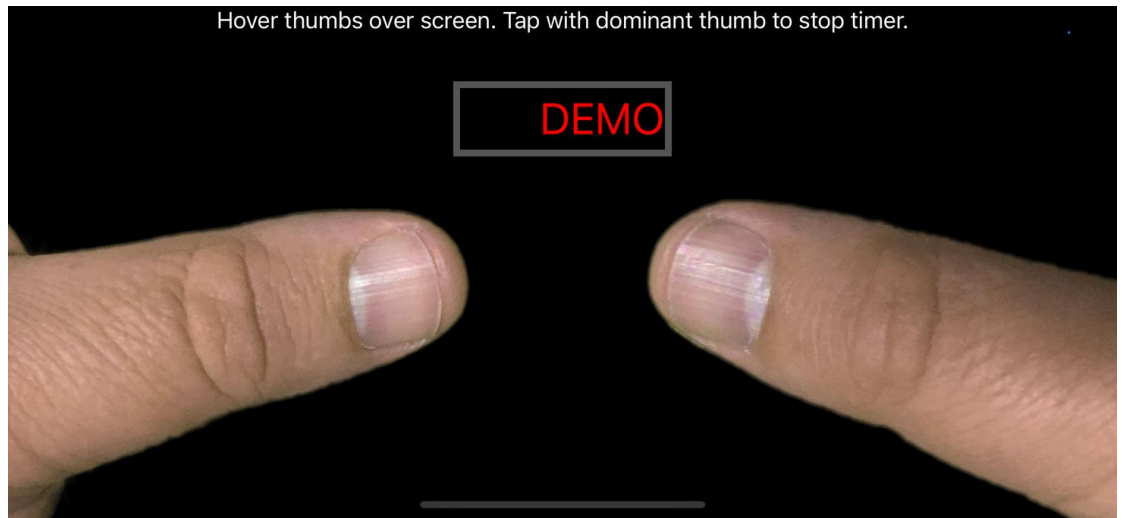
NASA PVT+

Designed for field data collection

- Baseline questionnaires
- Guides pilots through each activity at the appropriate time
- Includes objective and subjective measures
- Sleep logs
- Self-report scales
- Fatigue countermeasures
- Hassle factors
- Workload ratings
- *Rest opportunity*
- *Turn times*
- *Schedule changes*
- Psychomotor vigilance task (PVT)

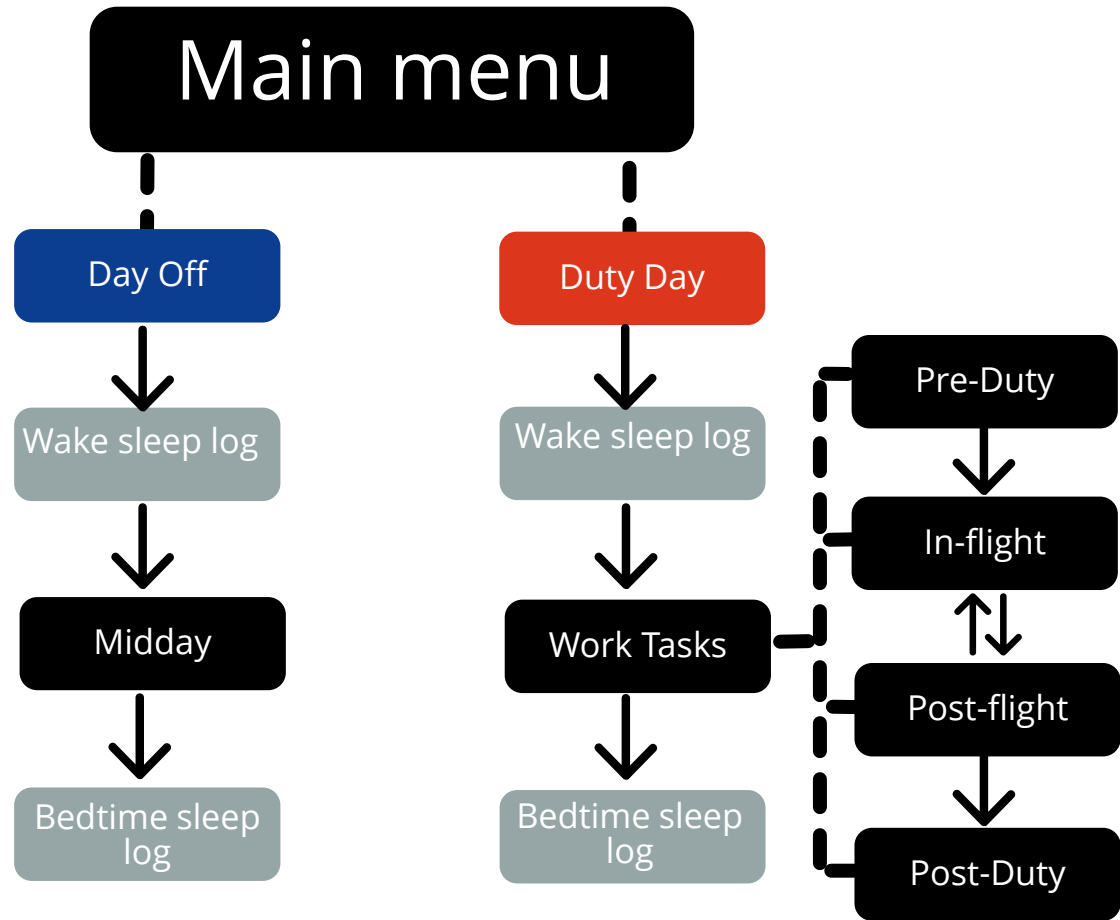
NASA PVT+

Reaction time test



NASA PVT+

App flowchart



Study Status

Ongoing

- Recruitment and data collection underway
 - Going well!
 - Great pilot interest
 - Positive feedback
- Regular meetings with collaborators and stakeholders

Thank you

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