

PREVALENCE OF SLEEP DISORDERS IN AIRCREW MEMBERS AND RISK OF IN-FLIGHT SLEEPINESS



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DISCLOSURE INFORMATION
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INTRODUCTION

In France, in adults :

- 27.7% with sleep debt
- 19% with excessive daytime sleepiness



- 13.1% with chronic insomnia
- 19% with symptoms of chronic insomnia

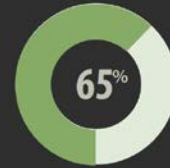
INTRODUCTION



In France, in civilian aircrews :

Excessive daytime sleepiness	25,9%
In-flight sleep	23,5%
Chronic insomnia	16,7%
Obstr sleep apnea syndrome	5,9%
Restless legs syndrome	10,6%

pilot fatigue in **France**



65% of the pilots
have felt quite tired
or exhausted in the
last working month



90% of those
experiencing
fatigue attribute it
to their profession

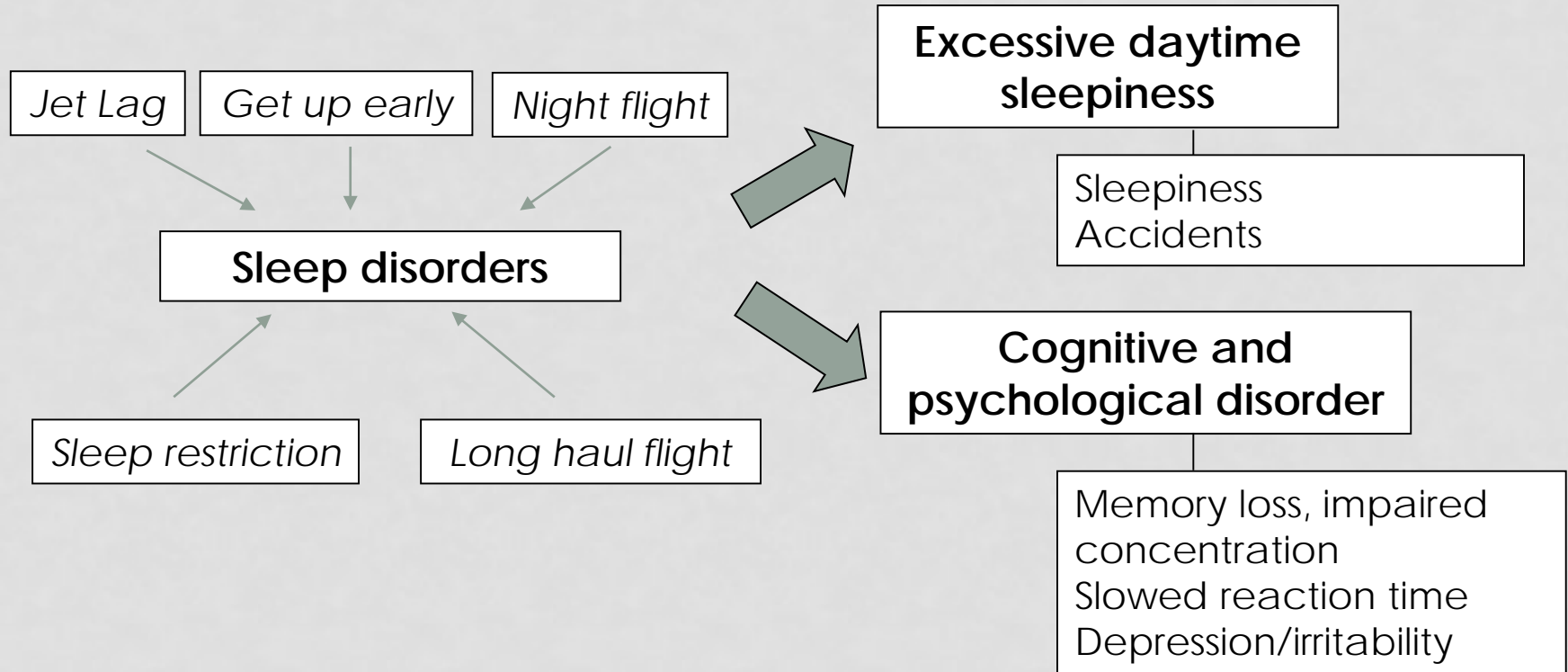


30% have often
and sometimes
experienced
moments of micro-
sleeps

Chaufton et al, Clin Neurophysiol, 2013

*European Cockpit Association,
Pilot Fatigue barometer, 2012*

RISK FOR FLIGHT SAFETY



AIMS OF THE SUTDY

- To evaluate the **prevalence of excessive sleepiness** and **sleep disorders** in AM:
 - Chronic insomnia
 - Obstructive Sleep Apnea Syndrome (OSAS)
 - Restless Legs syndrome (RLS)
- To evaluate risk factors and consequences of sleepiness
- To determine risk factors of falling asleep in flight

METHODS

Included population:

Aircrew members examined in the AeMC Percy (Paris) between 6th jan and 7th may 2021

Consent to join the study

Exclusion criteria:

Initial examination

Private pilots

Air traffic controllers



Observational cross-sectional descriptive study on questionnaires

Statistics:

Univariate: Chi², Student, Fisher

Multivariate: binomial logistic regression

QUESTIONNAIRE

Divided in several parts:

- Socio-demographic characteristics
- Lifestyle
- Sleep habits
- Work habits
- Epworth sleepiness scale
- Sleep disorders screening : OSAS, insomnia, RLS

QUESTIONNAIRE

Obstructive sleep apnea syndrome: Berlin questionnaire

- 10 questions about :
 - Snoring and cessation of breathing
 - Symptoms of excessive daytime sleepiness
 - BMI and hypertension

AHI threshold	Se	Spe
>5/h	69%	83%
>15/h	89%	63%

QUESTIONNAIRE

Chronic Insomnia: Insomnia Severity Index (ISI)

- 7 questions about nature, severity, and impact of insomnia (0: no problem – 4: very severe problem)

0 absence 8 mild 15 moderate 22 severe 28

Score threshold	Se	Spe
≥ 8	96%	78%
≥ 10	86%	88%
≥ 15	48%	98%

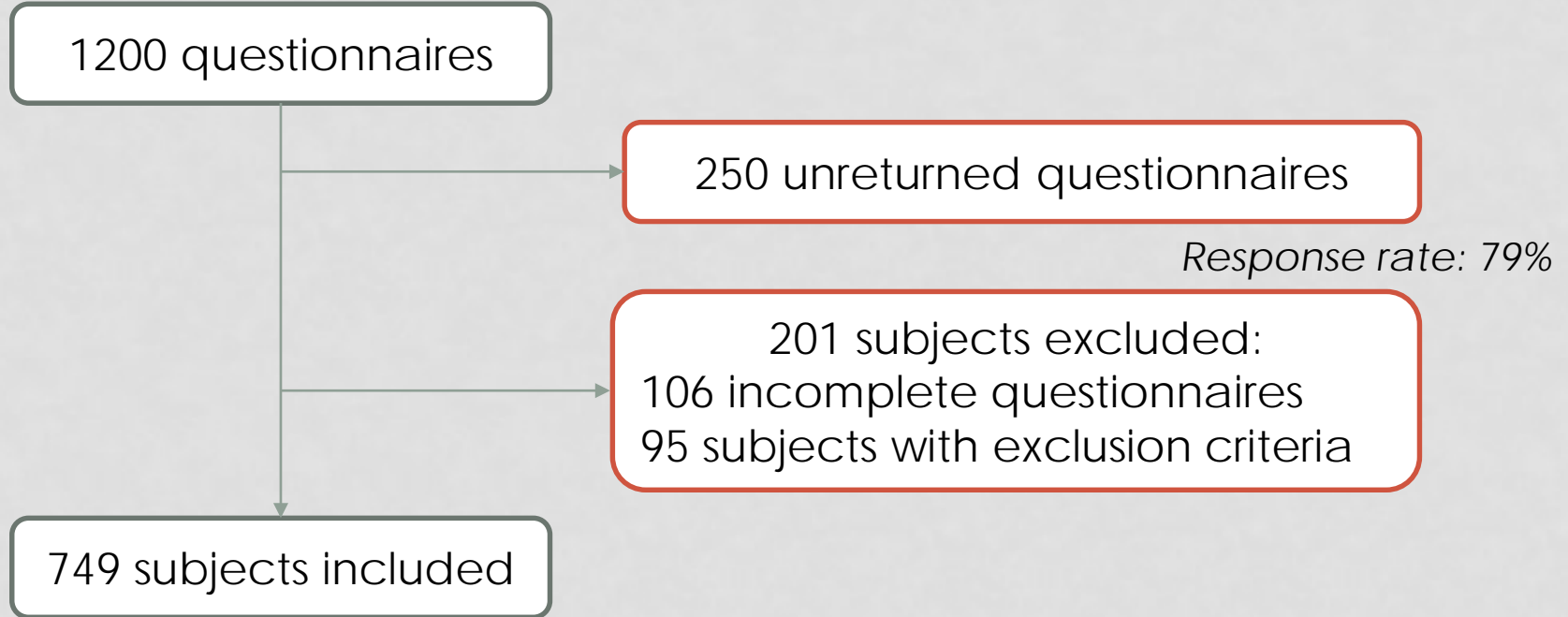
QUESTIONNAIRE

Restless legs syndrome: Cambridge-Hopkins

- 6 questions about legs discomfort
- 2 questions about muscle cramps

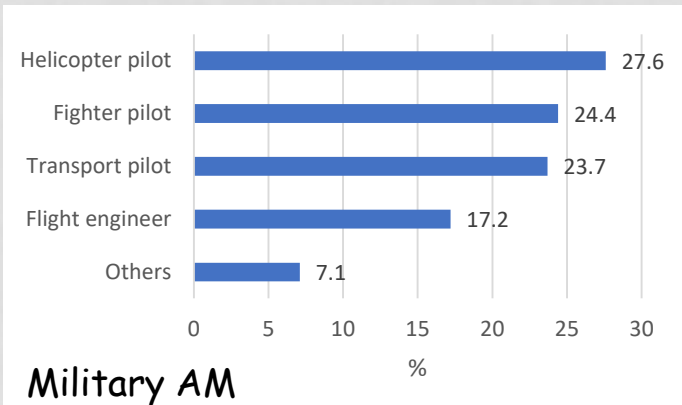
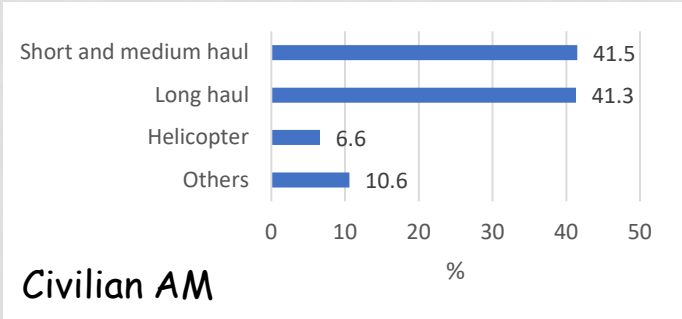
Se	Spe
87%	94%

RESULTS



RESULTS

	Total (n=749)	Civilian (n=441)	Military (n=308)	p-value
Gender : Male	646 (86,2%)	357 (81%)	289 (93,8%)	< 0,01
Female	103 (13,8%)	84 (19%)	19 (6,2%)	
Mean age (years)	43,4 +/- 9,6	46,8 +/- 8,8	38,5 +/- 8,6	< 0,01
Children <4 yo	1,29 +/- 0,6	1,26 +/- 0,58	1,34 +/- 0,61	0,03
Flight hours (last year)	214 +/- 171	254 +/- 186	157 +/- 128	< 0,01
Flight hours (total)	6316 +/- 5202	8821 +/- 5146	2728 +/- 2461	< 0,01
Night flights	481 (64,2%)	289 (65,5%)	192 (62,3%)	0,37



RESULTS

	Total (n=749)	Civilian (n=441)	Military (n=308)	<i>p</i>
Mean sleep time (h/night)	7,48 +/- 0,95	7,54 +/- 1,04	7,41 +/- 0,8	0,04
Feel refreshed after a night sleep	514 (68,6%)	320 (72,6%)	194 (63%)	0,01
Use of sleeping pills	22 (2,9%)	20 (4,5%)	2 (0,6%)	< 0,01
Sleepiness at the wheel	261 (34,9%)	147 (33,4%)	114 (37%)	0,31
In flight sleepiness	401 (53,5%)	282 (63,9%)	119 (38,6%)	< 0,01
Falling asleep in flight:				
Sometimes/rarely	173 (23,2%)	129 (29,4%)	44 (14,3%)	< 0,01
Often	11 (1,5%)	7 (1,6%)	4 (1,3%)	0,74
Inadequate recovery after a flight	191 (25,5%)	125 (28,3%)	66 (21,4%)	0,03

RESULTS

	Total (n=749)	Civilian (n=441)	Military (n=308)	p-value
Epworth Score > 10	116 (15,5%)	63 (14,3%)	53 (17,2%)	0,28
At least one sleep disorder	344 (45,9%)	210 (47,6%)	134 (43,5%)	0,27
Positive Berlin test (OSAS)	79 (10,5%)	54 (8,1%)	25 (12,2%)	0,07
<i>Insomnia Severity Index :</i>				
8-14 (mild insomnia)	244 (32,6%)	142 (32,2%)	102 (33,1%)	0,98
≥ 15 (moderate to severe insomnia)	52 (6,9%)	35 (7,9%)	17 (5,5%)	0,20
Positive Cambridge-Hopkins test (RLS)	31 (4,1%)	22 (5%)	9 (2,9%)	0,16
Medical follow-up for a sleep disorder	16 (2,1%)	9 (2%)	7 (2,3%)	0,83

RESULTS

Excessive sleepiness: 116 AM with Epworth score >10

Risk factors

	OR (CI95)	P-value
Male	0,55 [0,32-0,96]	0,032
Quiet bedroom	0,09 [0,02-0,39]	0,002
ISI	1,14 [1,09-1,19]	<0,001
Sex in bed	2,18 [1,39-3,4]	0,001

Consequences

	OR (CI95)	P-value
Feel refreshed after a night sleep	0,38 [0,25-0,59]	<0,001
Use of sleeping pills	3,19 [1,24-8,12]	0,015
Sleepiness at the wheel	3,75 [2,45-5,79]	<0,001
In flight sleepiness	1,76 [1,13-2,78]	0,015

RESULTS

Falling asleep in flight: 182 AM

	OR (CI95)	p-value
Male	0,61 [0,38-1]	0,046
Military	0,48 [0,32-0,7]	<0,001
Adequate recovery after a flight	0,37 [0,25-0,55]	<0,001
Use of sleeping pills	3,29 [1,32-8,74]	0,013
Chronic insomnia	1,53 [1,05-2,22]	0,025
Screen before bedtime	1,62 [1,12-2,39]	0,012

DISCUSSION

- **Strengths and limits of this study:**
 - 1st study about sleep disorders in both military and civilian AM
 - Monocentric study but representative sample of aircrews
 - Questionnaires :
 - risk of under/over estimating prevalence
 - Not a real diagnosis
 - AM in aeromedical examination: healthy worker effect
 - COVID-19 context

DISCUSSION

	This study	General French pop	French civilian Aircrews
Sleepiness Epworth>10	15,5%	18,5%	25,9%
OSAS	10,5% (Berlin)	4,8% (diagnosis) 20,9% (Berlin)	5,9% (Berlin)
Insomnia	39,5% (ISI)	13,1% (ICSD-3) 26,7% (CIDP def)	16,7% (pers def)
RLS	4,1%	8,5%	10,6% (pers def)

*Rambaud, HAL open sci, 2011
Gourier Frery et al, BEH, 2012
Chaufton et al, Clin Neurophysiol, 2013
Ghorayeh et al, Press Med, 2010*

DISCUSSION

- **45,9%** of AM with a high risk of **sleep disorder**
2,1% of AM with a diagnosis of **sleep disorder**
- **15,5%** of AM with **excessive daytime sleepiness**
- **24,7%** with a history of **unvoluntary sleep in flight**

⇒ Need for a **better screening** for sleep disorders

⇒ Improve **prevention**

DISCUSSION

Use of a questionnaire: what kind of question should we include?

- Epworth
- Quiet bedroom
- Feel refreshed after a night sleep
- Sleepiness at the wheel
- In flight sleepiness
- Use of sleeping pills
- ISI/ chronic insomnia
- Adequate recovery after a flight
- Screen before bedtime

Link with **excessive sleepiness**

Link with **falling asleep in flight**

And clinical examination: hypertension, BMI (risk of OSAS)

→ **Need for prevention**

DISCUSSION

- **Multiple points to consider:**
 - Questionnaire **duration**: compatibility with the examination
 - To study the **validity** of the questionnaire when used for screening
 - **Frequency**: each examination ? Every 2 years ? 3 years ?
 - Guidelines for an **homogeneous management** in case of suspicion of sleep disorder
- **Posters/flyers** about sleep hygiene tips in AM

CONCLUSION

- 45,9% of AM with a high risk of sleep disorder

With a risk of:

- Excessive daytime sleepiness
- Unvoluntary sleep in flight

⇒ But also cognitive disorders, errors and accidents

- Our roles:

- Efficient screening (to be continued)
- Prevention: sleep hygiene tips





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