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Effects of Light on Flight Crew Health and Alertness; Study Results Revealed

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Effects of Light on Flight Crew Health and Alertness; Study Results Revealed

WATS, Orlando, Florida April 2, 2014
Western Michigan University
Lori Brown, Toine Schoutens, Troy Booker, Travis Davis
Healthy Light for Passengers – Delta Light shower, mood lighting, Light therapy at CDG
The Effect of Light Exposure on Fight Crew Alertness
Funded by Western Michigan University FRACAA Grant

International Collaboration
Western Michigan University, College of Aviation, Nature Bright Company, Jeppesen a Boeing Company, and Novair Airlines

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Troy Booker & Travis Davis
Industry Consultants:
Toine Schoutens, Light Therapy Researcher
Sherry Saehlenou- CAtraining Solutions/Boeing Cabin Training
Captain John Gadzinski – Four Winds Consulting/Southwest Airlines
Do your crewmembers know that light affects more than Vision?
Tools for the study
Jeppesen crew Alert Application
CamNtech MotionWatch 8 wrist worn Actigraph with Light Sensor
Nature Bright square One Light Unit
Crewmember Training
Light enters the brain

Light particles enter the brain through the retina to the optical nerve.

They split into separate paths; one goes to the visual cortex (seeing) and the other to the biological clock. (SCN)

Image credit iGuzzini
Melatonin – The Signal for Darkness

- During darkness the pineal gland produces melatonin
- Light suppresses melatonin production
- Light controls the circadian rhythm
- Do you use an iPad or other device at night? This can suppress melatonin unless you have a blue blocking screen filter.

Image credit iGuzzini
Toine Schoutens Discussion
Crewmembers used the wake up function of portable Square One light for 30 minutes in the morning at home and layovers.
Within 1 hour after awakening Flight crew received light therapy before using the CrewAlert Application.
CrewAlert APP - Boeing Alertness Model (BAM) Fatigue Risk Management Tool

Developed by Jeppesen - A Boeing Company
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CrewAlert Lite  By Jeppesen Systems AB Available for download on itunes
KSS Scale  (Karolinska Sleepiness Scale)

1 - Extremely alert
2 - Very alert
3 - Alert
4 - Rather Alert
5 - Neither alert nor sleepy
6 - Some signs of sleepiness
7 - Sleepy, but no effort to keep awake
8 - Sleepy, some effort to keep awake
9 - Very sleepy, great effort to keep awake/ fighting sleep
1- Fully alert; wide awake; extremely energetic
2- Very lively; responsive; but not at peak
3- Okay; somewhat fresh
4- A little tired; less than fresh
5- Moderately tired; let down
6- Extremely tired; very difficult to concentrate
7- Completely exhausted; unable to function effectively
Decreased Self Assessed Crew Sleepiness with 30 minutes of Light

<table>
<thead>
<tr>
<th>Without Light</th>
<th>With Light</th>
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<tbody>
<tr>
<td>Cabin Crew</td>
<td>Rather Alert</td>
</tr>
<tr>
<td>Pilot</td>
<td>Alert</td>
</tr>
</tbody>
</table>

Some signs of sleepiness
Neither alert nor sleepy
Decreased self assessed Crew Fatigue with Light Use

- A little tired; less than fresh
- Okay; somewhat fresh
- Very lively; responsive; but not at peak

Estimated Marginal Means of SP

- Cabin Crew
- Pilot
Increased Psychomotor performance with Light

Number of lapses (failure to react within 500 milliseconds) during the psychomotor vigilance task is an objective measure of fatigue.
Actigraphy revealed increased sleep efficiency within subjects while using light therapy.
How you can integrate the effect of light into your fatigue risk management plan?
Healthy light in the Workplace
Healthy Light while traveling
Set up light stations in crew rooms, seek sunlight

Help educate crew about effects of light, and sleep disorders such as sleep apnea

Improve your fatigue risk management program with alertness models

No substitute for quality sleep

Empower your crewmembers to take a proactive approach to increased alertness, vigilance, and health
A sincere thank you to Anna Mellberg, Tomas Klemets, Jeppesen, Boeing (Alertness Model), Nature Bright, Joshua Chen, Toine Schoutens, Dr. Geoffrey Whitehurst, CamNtech, WMU, and most importantly all of the participants of this study who volunteered 30 days to contribute to better understand the effect of light on crew member health.

Thank You.

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