

# Predicting Total Sleep Time During Layovers

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## INTRODUCTION

- Circadian disruption and partial sleep loss due to erratic flight schedules have been a safety concern in aviation.
- Pilots typically cannot readjust their schedules once they have arrived in their layover city due to:
  - ❖ rapid turn-arounds.
  - ❖ light/dark cycles that are different than their home city.
- As a result, pilots' sleep may be disrupted due to early or late awakenings, difficulties initiating or terminating sleep and disrupted sleep.
- This survey study evaluated the sleep during layover of pilots from different countries.
- Additionally, it investigated:
  - ❖ the local zeitgebers to determine their effect on total sleep time during layovers.
  - ❖ the time spent on typical activities during layover to determine their effect on the total sleep time during layover.

## METHODS

### Survey

- 44-item anonymous survey.
- Developed to assess fatigue and scheduling factors associated with commercial airline flight schedules.
- Administered to different airlines' locations using either website or paper-and-pencil format.
- Completion was voluntary.
- 12 questions related to layover activity, specifically sleep patterns and climate factors.
- Data collected July 2002 - Jan 2004.

### Participants

- N = 448 (n = 425 male, 23 female) current air transport pilots.
- Aged 24-61yr (M = 43yr, SD = 8.56).
- Residence and crew base: Canada (n = 89); Spain (n = 181); Italy (n = 55); USA (n = 120); Unidentified (n = 3).
- Flight position: captain (n = 227), first officers (n = 202), flight engineers/ second officers (n = 15), unidentified (n = 4).
- n = 383 pilots with flight schedules including a layover.
- Type of layover reported: 43% reported their most frequent layover (n = 192), 31% reported their most challenging layover (n = 139), 9% described their most frequent layover also being the most challenging (n = 41), 2% other (n = 11), and 2% unidentified (n = 10).

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## FIGURES

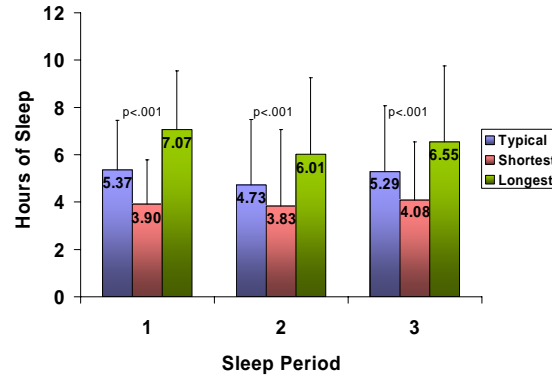


Figure 1. Reported hours of sleep for each sleep period over layovers up to three days.

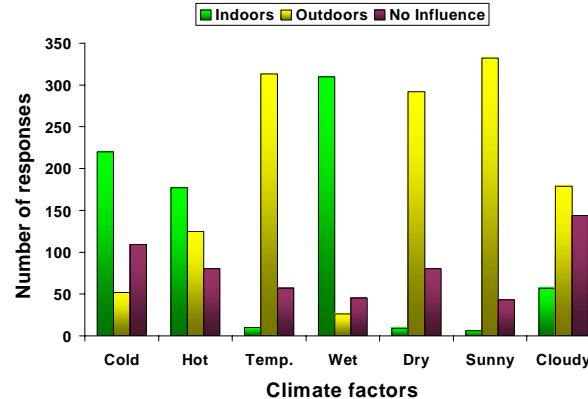


Figure 2. Climate factors that influence the pilots' preference of spending time indoors or outdoors

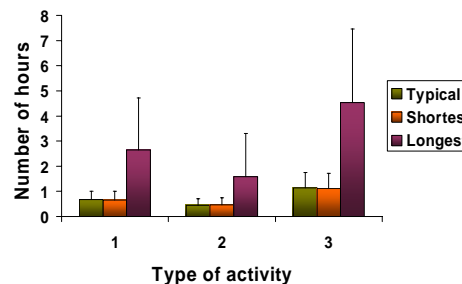


Figure 3. The time spent between blocking in and trying to sleep (1 = time between blocking in and leaving the airport; 2 = time taken to reach the accommodation; 3 = time spent between arriving at the accommodation and trying to sleep)

## RESULTS

### Number of Sleep Periods During Layover

- n = 368 reported 1; n = 236 reported 2; and n = 83 reported 3.

### Total Sleep Time During Layover

- Pilots reported 5.37 hrs of typical sleep (SD = 2.09) during 1st period, 4.73 hrs (SD = 2.09) during 2nd period and 5.29 hrs (SD = 2.79) during 3rd period over a layover up to 3 days (Figure 1).

### Climate Factors

- Climate factors (e.g., cold weather, hot weather, temperate, etc.) were evaluated to estimate the actual light exposure from pilots' preference of spending their time indoors or outdoors (Figure 2).
- There was a non-significant correlation between the climate factors that influenced pilots' preference to time spent indoors and outdoors and time spent sleeping during layover.

### Activities During Layover

- The times to perform the typical activities during layover were evaluated and they included: the time spent between blocking in and leaving the airport, the time spent to reach the accommodation, and the time spent between arriving at the accommodation and getting into bed to try to sleep (Figure 3.).
- There was a non-significant correlation between the time spent on typical layover activities and time spent on sleep during the layover.

## CONCLUSION

- The results revealed that climate factors cannot be used to estimate the sleeping time of pilots during layover.
- The results revealed that the time spent between blocking in and trying to sleep did not influence the time pilots spent sleeping.
- Obtaining the required sleep time under layover conditions may depend on the length of the duty rest period.
- Off duty time must be adequate to allow for at least 8 hrs. of sleep per night in order to recover from sleep debt. The number of hours of sleep obtained by pilots during layover is less than 8-8.25 hrs which are necessary to keep the performance at a high level (Wehr et al., 1993).

## REFERENCE

Wehr, T.A., Moul, D. E., Barbato, G., Giesen, H. A., Seidel, J. A., Barker, C., et al. (1993). Conservation of photoperiod-responsive mechanisms in humans. *American Journal of Physiology*, 265, R846-857.