



Jet lag

BACKGROUND: CIRCADIAN RHYTHMS

Our bodies have a natural fatigue cycle, a roughly 24 hour pattern known as the circadian rhythm, which is regulated by our bodies' internal clock. The circadian rhythm influences our being awake and active during the day, and asleep at night. This cycle is maintained by a balance between internal (e.g., production of the sleep hormone melatonin) and external (mainly light) stimuli but is also affected by activity and meal and sleep times. The circadian rhythm adjusts when we travel across time zones. However, the body clock is unable to adjust quickly to a new time zone. This means our body clock becomes out-of-sync with the environment in new locations, and will only gradually synchronise to the local time, adjusting by approximately 1h per day following travel to the east and 1.5h following travel to the west. During this period, individuals may experience a condition known as jet lag.

WHAT IS JET LAG?

Jet lag is the unpleasant experience of not adjusting quickly to a 'local' sleep cycle – this occurs when the circadian rhythms are out of alignment, both with the local pattern of day and night, and with each other, as different body rhythms adjust at different rates. We know from research that the 'master' body clock, located in the brain, responds most to light, while other parts of our bodies are more influenced by meal times. Jet lag might be made worse if the clocks in different parts of our bodies are out-of-sync with each other and with the local time.

Subjective symptoms of jet lag may include sleep loss, fatigue, loss of mental efficiency, increased irritability, elevated daytime sleepiness, and gastrointestinal disturbance. The duration and

severity of jet lag, and the recovery time required, depends largely on how many time zones have been crossed. Recovery is easier when travelling westwards (it is easier to delay sleep and wake up later) than travelling eastwards (when we have to fall asleep earlier and wake up earlier), but always more difficult when more time zones are crossed. Evidence also suggests that individuals who prefer later sleep times cope better with jet lag compared to morning types.

JET LAG VS 'TRAVEL FATIGUE'

Jet lag differs from simple 'travel fatigue'. When we are jet lagged, our body clocks are out-of-sync, while 'travel fatigue' is purely linked to the journey, and usually resolves after a good night's sleep.

Long flights, or long road journeys, can leave us feeling very tired – usually due to time spent in a cramped environment, with limited movement and poor sleep. In addition, when flying, we often don't drink enough water which can make things feel worse. This 'travel fatigue' will usually resolve once you have settled into your destination and had a good night's sleep, but can leave you at risk straight after the journey – for example the sleep deprivation can lead us to make poor decisions, and leave us more at risk of road accidents when driving. If you have less than five hours sleep, the data shows that the risk of being involved in a sleep related vehicle accident is three times higher. After long travel, exercise caution when deciding if you are able to go straight to work, or drive – in many cases, it is likely to be safer to check in to a hotel and start work or drive after a night of sleep.

As with any time when we have not had enough sleep, have been awake for a long time (e.g., longer than 16 hours), or are driving



during the dip in alertness that occurs between 0200-0600 body clock time, there may be a higher risk of being involved in a road accident when driving. The risk increases with a longer drive, or a journey on roads that are monotonous – e.g., major highways.

Elevated levels of sleepiness, for any reason – but potentially more likely after a long haul flight – can affect our driving performance. The exact impact may be different for each of us, depending on our individual circumstances, for example how much 'sleep debt' has been accumulated in the prior few days. Research shows we are good at assessing our levels of sleepiness in the short term, but employees need to be aware of the early signs that their performance might be degraded and that they maybe should not drive.

If you are experiencing early signs of sleepiness (yawning, postural changes/fidgeting, and frequent eye blinks), setting off for a long drive is not recommended. Before setting out for any drive, consider if you also have any of the risk factors outlined above (such as being awake for longer than 16 hours, or are driving during a dip in alertness). If you have any concerns about your sleepiness levels, it is better not to drive – alternatives are outlined below. If you are experiencing difficulty keeping your eyes open, long blinks, head nodding or a 'dreamlike state of consciousness' you are exhibiting signs of being extremely sleepy. These symptoms are strongly associated with sleep-related near misses, incidents, and accidents. If you are experiencing any of these signs, you should not drive at all. Instead, use company-approved transport, or stay at a hotel and rest overnight, before restarting your journey the next morning.

HOW DO I BEST ADAPT TO A NEW TIME ZONE?

Behaviour

If you are crossing multiple time zones and you will be in your new location for more than a few days, adapting to local time is the best policy. Everyone varies, but you may find it easier to adapt if you use one or more of the following strategies:

- Select your flight timing carefully – flights associated with the least amount of time between sleep opportunities (i.e., between time waking at home to time going to bed, in the evening, at destination) seem to help with quicker adaptation
- If possible, try to begin adjusting a couple of days before departure, e.g., by delaying sleep onset times before travelling west, or waking earlier and going to sleep earlier before travelling east
- When crossing up to 5 time zones, matching your behaviour to the new time zone (e.g., bedtimes, mealtimes, exercise etc. on local time), may help speed up adaptation and the synchronising of the different body clocks throughout your body

- Bright light is very powerful in helping our body clock adjust – but we must time it correctly. See the next section on light exposure for potential strategies
- Power naps (up to 20 minutes) can help if you are experiencing sleep disruption as a result of jet lag. However, avoid longer naps during the daytime at the new location as much as possible, since this will counteract your body's effort to adjust to new time zone. If you have travelled multiple time zones to the west, taking an afternoon power nap may help you extend your day, and delay your bedtime until local evening.

Light exposure

Light can help you adapt – but you have to time it right. This timing depends on the number of time zones you have crossed and the direction of travel:

Eastbound travel: Aim to get light exposure (either natural light or bright artificial light) between mid-morning and mid-afternoon in the new time zone. The more time zones that you cross will move the best time to seek light later (e.g., when crossing four time zones east, the best time to seek light is between 0900hr-1500hr local time, while when crossing eight time zones, the best time to seek light is between 1300hr-1900hr local time). For every extra time zone that you cross, move the start and end times of this window later by one hour.

You should also avoid light at specific times of day, to help adjustment. When travelling east, avoid light in a 'band' six hours wide that ends two hours before the 'light seeking' window begins – e.g., for travel four time zones east, the 'light seeking' window is between 0900hr-1500hr local time, so the light avoidance window is between 0100hr-0700hr local time.

Westbound travel: When travelling westbound, the same principles apply – but the local timing of the light exposure is different. If traveling four time zones west, the best time to seek light is between 1700hr-2300hr local time, while when crossing eight time zones west, the best time to seek light is between 1300hr-1900hr local time. For every extra time zone that you cross, move the start and end times of this window earlier by one hour.

When travelling west, avoid light in a 'band' too – also six hours wide – although this window begins two hours after the 'light seeking' window ends – e.g., for travel four time zones west, the 'light seeking' window is between 1700hr-2300hr local time, so the light avoidance window is between 0100hr-0700hr local time.

Electronic devices: Phones, tablets and computers also emit the same blue light that we find in daylight, and so disrupt your adaptation – avoid looking at them close to bedtime, or if you wake up in the night. You can further reduce the impact of these digital devices by installing blue-light reduction apps or using night mode.



WHAT ABOUT MELATONIN?

Melatonin is the hormone released by the body in darkness that prepares our body for sleep, and is one of the two main 'time-givers' for our body clock (the other being the light-dark cycle). It is also possible to buy artificial melatonin in tablet form, which some people use to speed up adaptation of the body clock to a new time zone. As with light exposure, when taking melatonin, getting the timing right is critical in order to help adaptation. The exact timing is very dependent on your own body clock's position, which can only be reliably assessed by a doctor specialised in circadian physiology. In addition, because melatonin can make you fall asleep (like hypnotics such as benzodiazepines), taking it before work may be banned under the Company Drug and Alcohol policy. Buying melatonin is illegal in some countries. Because of this, it is essential that you consult a doctor if you are considering taking melatonin.

WHAT CAN THE COMPANY DO?

Manage sleep loss and jet lag associated with company travel

- The Company Fatigue Management Plan should consider the impact of travelling
- The company should provide employees with the information to allow them to make an informed decision about whether they are safe to drive home following a long flight, and – if the employee is too tired to drive home safely – help employees to manage this decision. Examples include provision for discounted hotel rates near the airport, company provided hotel rooms, or the ability to reclaim the costs of taxis or taking public transport.
- Rather than fly workers in only for a meeting, or to go straight on-site, fly the day before, to allow for a night of sleep before work/meetings the next day. This will help reduce the effect of 'travel fatigue'. However, keep in mind that jet lag can affect performance for a few days in the new destination, so supervisors should be aware of potentially increased sleepiness levels among team members who have recently travelled, especially in high risk conditions

- Where a trip must involve stopping in multiple different destinations – particularly if they are in different time zones – try and schedule the trip to aid adaptation, i.e., always moving in the same direction, and getting further away from home. Ensure that adequate rest is planned into the trip, as stopping in multiple destinations may exacerbate jet lag symptoms, particularly if the destinations are in different directions – which should ideally be avoided.
- Develop a 'Recovery' policy for individuals returning home after long-haul travel – jet lag and sleep loss will impact people after trips too; recovery time before returning to work will reduce the chances of performance decrements and errors – this may be allowing workers an additional rest day after returning home, or by providing an option of an additional rest day for those who do not feel well rested enough to come in to work

Open culture

- In order for the company to collect information on elevated fatigue, and know where mitigations could be applied, the company should have a policy that encourages self-reporting of all fatigue issues. Issues may be related to shift work, jet lag, or could be due to personal reasons. An 'incident' does not necessarily have to have taken place, it may just be that the employee has need to take extra mitigations for their fatigue, for example changing tasks within their team, or drinking more coffee. Reporting can be as simple as informing the company of elevated fatigue where it interacts with work. The policy should be documented, for example within the company Fatigue Management Plan, and made available to the workforce – along with voluntary fatigue report forms for workers to complete, for example on the company intranet.
- Where workers are impacted by jet lag, in terms of being sleep deprived and feeling fatigued and therefore not fit to carry out their work safely, they should feel able – supported by the policy, and the company culture – to report that they are not fit to work, and the company should allow them the necessary recovery time before undertaking self-drive road journeys or any work

Key references

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