Reducing fatigue - a case study

People often nod off or fall asleep when not intending to - while sitting on the couch watching TV, during a long meeting, or reading a book or newspaper. No great harm is done if this happens.

But if it happens while driving - even for a couple of seconds - the car is out of control. At high speed, a crash is likely with a high risk of death or severe injury. If a driver falls asleep for just four seconds while travelling at a speed of 100 km/h the car will have gone 111 metres without a driver in control.

Fatigue is a major cause of crashes in Victoria resulting in more than 60 deaths and 300-400 serious injuries each year. Fatigue as a factor in road crashes can include a wide spectrum of conditions - from falling asleep at the wheel to inattention while driving.

Informing drivers about the dangers of fatigue and key avoidance strategies are high road safety priorities for the TAC, with the aim of helping to reduce road trauma on Victoria’s roads.

What does fatigue mean?

Everyone has experienced fatigue at some time. The term is used to describe a range of states or conditions - drowsiness, sleepiness, tiredness, inattention, or exhaustion. Fatigue is the body’s way of reacting to:

- lack of sleep;
- doing things like working (or driving) at usual sleep times;
- long periods of physical or mental exertion; and
- some medical conditions and medications.

Fatigue is a natural reaction to fairly common situations that people experience in their daily lives such as working under constant pressure, parents looking after young children, or young people missing out on sleep due to frequent late night activities.

While less likely, fatigue can also occur despite having adequate sleep or being rested. On a car trip this may be due to driving on long stretches of open road and becoming bored through lack of stimulation, the length of time spent at the wheel, and not taking adequate breaks during a long trip.

There is general agreement that three main factors contribute to fatigue:

- lack of sleep;
- time of day; and
- time spent performing a task.

There are also specific individual factors such as a person’s age, physical fitness and medical condition (eg sleep disorders) that contribute to fatigue.

Lack of Sleep

Without enough sleep an individual will build up a “sleep debt”. Sleep debt is the difference between the amount of sleep needed to maintain alertness and performance, and the actual amount of sleep one has.
As little as two hours sleep loss on one occasion can affect reaction time, mental functioning, memory, mood and alertness. A build-up of sleep debt has a much greater effect on reducing alertness and performance, especially on tasks that need constant attention such as driving.

**Time of Day**

Humans have a sleep-wake cycle, known as the ‘circadian rhythm’ or ‘body clock’. There are two periods during the 24 hour cycle where the level of sleepiness is high: during the night/early morning, and in the afternoon. During these periods of sleepiness, many functions such as alertness, performance and mood are affected.

The effect of the circadian rhythm on road crashes has been shown in a number of studies. These indicate that fatigue related crashes correspond to the 24 hour variation in sleepiness, with a major peak during the night and another peak during mid afternoon.

**Time Spent on a Task**

Long periods of activity without rest lead to muscular fatigue. In the same way, prolonged mental workloads without rest will lead to reduced alertness and reluctance to continue the effort.

Studies that have looked at driving tasks show that the length of time on a task affects the quality of performance. As more time is spent on a task, the level of fatigue increases, the time to react is slowed, attention and judgment are reduced and the chances of falling asleep during the task are increased.

**Source:** Derived from "Fatigue Related Crashes: an Analysis of Fatigue-related Crashes on Australian Roads using an Operational Definition of Fatigue", May 2002, Australian Transport Safety Bureau, Road Safety Research Report OR 23.

**How does fatigue affect safety?**

A person needs to be alert and focused in order to drive safely for long periods. Fatigue reduces driving skills for a number of reasons:

- reactions are much slower;
- the ability to concentrate is reduced; and
- it takes longer to interpret and understand the traffic situation.

Many of the effects are similar to those caused by alcohol. Getting behind the wheel after 17 hours without sleep has the same effect on a person’s driving as having a blood alcohol level of 0.05. Further, going without sleep for 24 hours has a similar effect on driving performance as having a blood alcohol concentration of 0.10. At this level the risk of a crash is seven times greater.

The most common effects of fatigue on actual driving behaviour include:

- difficulty in keeping the car within a lane;
- drifting off the road;
- more frequent and unnecessary changes in speed; and
- not reacting in time to avoid a dangerous situation (eg applying the brakes, or turning to avoid an obstacle or fixed roadside object).
These failures lead to a high number of single vehicle crashes involving the car striking a tree or other rigid object, and severe head-on collisions.

**Are some people more likely to be affected?**

While all drivers can experience fatigue to some degree, fatigue is more likely for people in the following groups, ultimately leading to a higher crash risk:

**Young People** - many young people have lifestyles that involve frequent late night activities, not getting enough sleep, taking risks, and being on the roads during night-time hours.

**Shift Workers** - shift workers are more likely to have disrupted sleep patterns which lead to fatigue more often. Night shift workers have the greatest risk of sleep disruption.

**People with Sleep Disorders** – if left untreated, some conditions such as sleep apnoea and insomnia can lead to disrupted sleep on a regular basis. Constantly feeling sleepy can impair the ability to drive safely.

Fatigue itself increases crash risk. The risk is much greater with alcohol as even small amounts of alcohol can affect alertness. Fatigue combined with alcohol severely degrades driving skills.

**Drivers' attitudes to fatigue**

The TAC’s fatigue campaigns have four main objectives:

- to raise awareness of fatigue as a high crash risk;
- to communicate the recognisable symptoms of fatigue;
- to educate the public about ways to prevent fatigue; and
- to illustrate to drivers ways to counteract fatigue after its initial onset.

To achieve these objectives requires an understanding of what drivers know about fatigue and the ways they deal with it. Information obtained from independent market research of motorists’ knowledge and behaviour shows that:

- many drivers experience the symptoms of fatigue - including during short trips - and acknowledge that they have been fortunate not to have been involved in a crash
- while drivers have become more aware of the need to avoid driving long distances when fatigue is more likely (eg. after working all day or during normal sleep times) they are likely to try to fight fatigue when symptoms appear with activities including winding down the window, turning the heater off, or turning the radio up). At best, these actions have only a limited and short-term effect;
- many drivers recognise that in addition to long distance and holiday period driving, general day-to-day activities such as work, social activities and parenting responsibilities can contribute to being tired/fatigued while driving; and
- drivers generally recognise several of the signs of fatigue such as yawning, heavy eyes, blurred vision and reduced concentration – and that by this time fatigue has already started to affect driving ability.
The fairly common reaction of trying to fight fatigue when symptoms appear or to try to delay the more serious symptoms and continue to drive is very dangerous. It can lead to the onset of the most critical stage of driving while fatigued - nodding off or falling asleep at the wheel - and consequently complete loss of car control.

Audience reaction to previous fatigue campaigns

The TAC engages an independent market research agency to undertake surveys of audience reaction to its campaigns. These gauge both the qualitative aspects of the campaign (ie. what does the target group think of the advertising style and content) and the quantitative aspects (ie. what proportion of the population recalled the advertisements, their content and the extent to which driving behaviour has been modified as a result). The responses can also inform and influence the style and messages to be communicated in future advertising campaigns.

The results of research on the recent campaigns are summarised below:

Powernap, 1999

- recall of the advertisement was consistently above 70%;
- the advertisement was effective in communicating its intended message;
- 80% of the audience identified with the contents of the advertisement or saw personal relevance in it; and
- around 25% claimed they had changed their driving behaviour as a direct result of exposure to Powernap. The changes included - “stopped the car and slept/walked around/had a meal”, “don’t drive when tired”, and “take breaks now.”

Black, 2002

- some 80% of the audience recalled seeing at least one of the advertisements in the series;
- the majority understood the intended meaning of the advertisements eg “don’t drive when tired”, “pull over/stop if you are tired”, “take a powernap/have a rest”, and “take a 15 minute break”;
- nearly 90% understood the intended meaning of the term ‘powernap’;
- the majority saw the advertisements as relevant to them with this identification being strongest in the younger age groups; and
- around 30% claimed they had changed their behaviour since seeing the series of advertisements with the main actions taken being “don’t drive when tired”, “slowed down”, “stopped the car and slept/walked around/had a meal.”

Development of the 2004 ‘Lost’ campaign

All major campaigns undertaken by the TAC are preceded by detailed and extensive market research into drivers’ awareness of the problem to be tackled and their reactions to a number of possible campaign messages and styles of presentation.
Development of specific campaign ideas

The TAC engaged an advertising agency during 2003 to identify five specific campaign ideas as part of the advertising and marketing program to tackle fatigue. The campaign objectives specified by the TAC were to:

- communicate the recognisable symptoms of fatigue;
- increase the perception of being involved in a fatigue related crash;
- educate the public about preventative measures such as resting well before driving and pre-planning trips; and
- provide methods to deal with fatigue after its initial onset, such as taking a powernap.

Several concepts were developed for evaluation by discussion sessions, consisting of a sample of motorists.

Evaluation of different advertising concepts

A consulting psychologist (Barry J Elliott) was engaged by the TAC during 2004 to evaluate driver reactions to the concepts developed. Reactions to five different advertisements were explored in eight discussion sessions with a sample of motorists. The aim was to identify the most clear and persuasive way to convey the intended message to the target audience. Participants in the discussion sessions were asked to respond to five key questions:

- what was the main message of the TV ad?
- were there any other messages?
- who is the message aimed at?
- how is the concept rated out of 10?
- which adjectives apply to the concept? (eg. believable, powerful, convincing etc).

The concept most favoured by participants featured the notion of ‘zoning out’ as a commonly experienced indicator of the more serious stages of fatigue. ‘Zoning out’ is a state in which the eyes remain open but the mind is completely blank far a few seconds with the driver paying no attention to the road and surrounding environment – in other words, ‘being awake but not really there’. It reflected the actual experience of most participants in the discussion groups.

"Lost"

The TAC launched a new fatigue campaign on 31 August 2004, with the objectives being to raise awareness and promote a change in behaviour in two main areas:

- highlighting “zoning out” as a symptom of fatigue that must not be ignored; and
- persuading drivers to pull over and take a 15 minute powernap.

Mass Communication Campaign

The campaign uses three main communication channels:

- television: featuring two advertisements:
  - A 30 second advertisement warns drivers about the dangers of ‘zoning out’, and features the tagline “Don’t push Fatigue. Pull over” and
  - a 15 second ‘solution’ advertisement which reminds the viewer that “A 15 minute powernap could save your life”.


The advertisements run as a top/tail during advertisement breaks.

- radio: comprising two 30 second advertisements
- outdoor: 24 mobile billboards and 9 fixed outdoor sites located across metropolitan and regional Victoria featuring two central messages - “Zoning out can be deadly” and “A 15 minute powernap could save your life”.

Reactions to ‘Lost’

- Aided recall of the new fatigue Lost commercial is 66% while that of the second one in the campaign, Lost Reprise 41%.
- The main messages of these two commercials are:
  - **Lost** – fatigue, with 38% of mentions.
  - **Lost Reprise** – Powernap (48%) and ‘stop and rest/rest if tired’ (27%).
- Therefore, the second TVC, despite the lower awareness level, imparted ways to deal with fatigue while the first merely raised the topic.
- Of those who recall either/both of these executions (78% of the total sample), three-quarters (76%) can personally relate to the campaign
- And around one in three (34%) say they have changed their behaviour as a result of their exposure to the campaign.

However, when asked how their behaviour had changed, we noted some mixed messages as there were several references to non-fatigue themes such as 'Slow down’, ‘More aware of the speed limit’ as well as relatively few mentions of stopping the car for a break.

References


