



Transport  
for NSW

# Problem Definition: Light Vehicle Driver Fatigue

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## INTRODUCTION

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This problem definition provides an outline of the issues associated with light vehicle driver fatigue to help inform and guide a new state-wide campaign. It also identifies the key communication objectives proposed and key target groups for messages about driver fatigue, based on a literature review, recent research with NSW drivers and crash data.

This problem definition focuses on light vehicle driver fatigue only. While driver fatigue is an issue for heavy vehicles, there are countermeasures in place specifically targeted at those road users, including legislation. Additionally, the research on which this document is based was conducted in relation to light vehicles only. This document is relevant to motorcyclists, however separate strategies are being developed to target those road users, which also focus on the experience of physical fatigue.

## COMMUNICATION CAMPAIGN CONSIDERATIONS

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### Objectives

The aim of the campaign will be to stop motorists driving fatigued:

1. *Change drivers' attitudes towards stopping for a break, particularly when close to their destination*
  - Encourage drivers to plan time in their journey for regular rest breaks\*.
    - Highlight to young drivers the benefit of planning breaks in relieving boredom and restlessness and swapping drivers.
    - Highlight the benefits of napping.
2. *Highlight the unpredictability of fatigue on driving performance*
  - Convince drivers of the dangers, and seriousness, of driving when fatigued due to the unpredictability of its effects and its impact on driving performance.
  - Inform drivers that their performance may deteriorate before they realise they're tired. Therefore they need to plan, and take, regular breaks rather than waiting until they experience signs of fatigue, or avoid a journey if they know they may be tired.
  - Convince drivers to stop as soon as they feel tired and respond early to any early warning signs of fatigue (especially as judgement of tiredness becomes impaired as fatigue sets in).
3. *Encourage drivers to consider the risks of fatigue before driving*
  - *Time of day*: Highlight the afternoon as a key time for experiencing fatigue (due to circadian rhythm lows), particularly for older drivers, and convince them to act on feelings of fatigue at this time.
    - Remind younger drivers of the dangers of fatigue when driving at night.
  - *Prior activities*: Educate drivers about the impact of pre-journey work and social activities, as well as sleep/rest, on fatigue levels.
    - Drivers need to plan their journey to avoid driving when they are at risk of fatigue (e.g. after a big night out or when sleep deprived)

### Target Audience

#### Core target:

Male drivers 17-49 years: particularly those 17-30 years as they display the most risky attitudes and behaviours in relation to fatigue and are involved in the greatest number of fatal and non-fatal fatigue-related crashes.

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\* Note that stopping every 2 hours should not be a communicated message (see p10) – drivers should stop regularly and whenever they are tired

### Secondary target:

Older male drivers aged 50+: Although this group generally displays safer attitudes and behaviours in relation to fatigue, they are involved in a large number of fatal fatigue-related crashes. They also tend to experience, and dismiss, fatigue in the afternoon - a time when they are also having fatigue related crashes.

### Other groups to target:

Females: Although they may do so less frequently, females also admit to driving fatigued, and are represented in fatigue-related crashes.

Passengers: To decrease the social acceptability of driving while tired it will be important to target passengers as well as drivers (who might be able to influence the behaviour of these drivers).

Other at-risk groups, including: shift workers, taxi drivers, commercial light vehicle drivers and those with sleep disorders such as sleep apnoea.

### **Execution**

As the main at-risk group for driver fatigue is males, in particular younger males, the campaign needs to be innovative, and engage and involve young people if it is to achieve a shift in thinking and subsequent behaviour. Young people recognise the risks of driving when fatigued, but believe they are invincible, so solely increasing their knowledge of fatigue or warning signs, or showing them the consequences of driving while fatigued, is not likely to be effective.

In the recent research by Woolcott Research (2012), commissioned by the Centre for Road Safety<sup>1</sup> (CRS), the 'Pinkie' speeding campaign was mentioned by young males to have involved young people socially, with the 'pinkie' action adopted by many. Given the target group for this campaign, various innovative media should be considered such as online or mobile, as well as a similar innovative approach.

Consideration should also be given to developing communications in various community languages to ensure the messages are also understood by the non-English speaking communities in NSW.

### **Timing / points of difference from current campaign**

The campaign should be released in time for the Christmas and school holiday period 2013/2014. A high number of driver fatigue crashes occur during holiday periods, and drivers often drive longer distances to visit family, or holiday over the Christmas/New Year period.

The current 'Wake up to the Signs' campaign outlines the symptoms of fatigue and informs drivers to take a break. However, it does not:

- tell drivers at what point, when experiencing these signs, they should stop driving
- take into account that drivers are unable to accurately assess their tiredness
- highlight that fatigue impacts their driving performance
- address the issue of planning for breaks or highlight factors prior to the journey (such as social activities, work or sleep) that impact on fatigue levels.

The Dr Owl / Don't Rush campaign usually runs during the Christmas/New Year holiday period. While it is focussed on speeding, the campaign also has a secondary fatigue message, forcing drivers to think again about pushing on. However, without addressing the objectives highlighted above through a specific fatigue campaign, drivers will see little reason to adopt Dr Owl's advice.

### **CRS campaign support**

#### Stakeholders

The Stakeholder and Community Engagement section within CRS will manage stakeholder support for this campaign, including:

- liaising closely with Roads and Maritime Services
- organising promotional support by the NRMA and other interested stakeholders

- investigating the feasibility of incorporating campaign messages into Google maps / GPS trip information
- other actions to be developed once the creative campaign is completed.

### Campaign content

The Safer Systems section within CRS will provide expert advice on the causes of driver fatigue, fatigue-related crash types, and driver attitudes.

## **TOP 5 KEY POINTS TO REMEMBER FROM THE RESEARCH**

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<p><b>1. Drivers want to ‘push on’ and fail to respond to early warning signs</b></p>	<ul style="list-style-type: none"> <li>• Do not want to stop if close to reaching destination, no matter how tired.</li> <li>• Only likely to stop when close, if they have a microsleep, almost crash or need a toilet break.</li> <li>• <i>Most relevant to: Younger males</i></li> </ul>
<p><b>2. Few drivers plan trips to avoid fatigue</b></p>	<ul style="list-style-type: none"> <li>• Younger drivers fail to plan breaks (or time for breaks) in journey, and don’t plan to avoid starting a journey when fatigue may be an issue (e.g. when sleep deprived).</li> <li>• Planning mainly for car (oil, tyres etc.) or kids (snacks, entertainment etc.).</li> <li>• <i>Most relevant to: Younger drivers, especially males</i></li> </ul>
<p><b>3. Driving performance is unpredictable when fatigued</b></p>	<ul style="list-style-type: none"> <li>• Fatigue causes temporary lapses in attention.</li> <li>• This instability &amp; unpredictability impacts driving performance.</li> <li>• <i>Most relevant to: All drivers</i></li> </ul>
<p><b>4. Drivers are unable to accurately assess their own fatigue</b></p>	<ul style="list-style-type: none"> <li>• Can tell getting drowsy, but can’t judge when need to stop driving.</li> <li>• Unsure how tired is too tired, and at a dangerous level.</li> <li>• <i>Most relevant to: All drivers</i></li> </ul>
<p><b>5. Fatigue in the afternoon is common but dismissed</b></p>	<ul style="list-style-type: none"> <li>• Afternoon is a peak time for experiencing fatigue, particularly for older drivers.</li> <li>• Afternoon fatigue often dismissed.</li> <li>• <i>Most relevant to: Older drivers, especially males</i></li> </ul>

## **WHAT IS DRIVER FATIGUE?**

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Fatigue is the experience of being ‘sleepy’, ‘tired’ or ‘exhausted’, and is both a physiological and a psychological experience. It is an issue when driving as perception, alertness to dangers, cognitive processing and movements may all be affected by fatigue<sup>2</sup>.

Fatigue affects performance due to temporary lapses in attention and microsleeps<sup>3</sup>. Fatigue makes driving performance very variable and unstable due to periods of good attention interspersed with periods where attention wanes<sup>4</sup>. It has been argued this instability and unpredictability of fatigue is most important as these effects occur much earlier than microsleeps and have adverse consequences for driving performance<sup>5</sup>.

### **Causes**

Research has shown that risk factors that increase the likelihood driver fatigue include<sup>6</sup>:

- Sleep loss/sleep deprivation
- Long hours of wakefulness
- Driving during normal sleeping hours (disrupting circadian rhythms)
- Sleep disorders
- Time spent driving without rest
- Alcohol consumption.

The Woolcott research (2012) suggests that drivers perceive the most common causes of fatigue to be a lack of sleep and driving for too long without a stop, however drivers also highlight stress/busy lifestyle/over-work as a main cause.

Despite this, people often drive regardless of prior sleep (duration or quality), prior work and/or social activities, period awake or time of day.

### **Early warning signs**

There are many early warning signs of driver fatigue:

- Yawning
- Poor concentration
- Tired eyes
- Restfulness
- Drowsiness
- Slow reactions
- Boredom
- Oversteering

Those which drivers are most aware of and experience most are yawning, sore/tired eyes and difficulty concentrating<sup>1</sup>.

A person with fatigue may also fall asleep – have a ‘microsleep’, while driving and may be unaware that they were asleep.

However, research shows that drivers tend not to respond to many of the early warning signs, particularly if they occur in isolation. The signs that are most likely to cause drivers to stop driving immediately are a microsleep (86%), oversteering (52%) and drowsiness (50%). It is important that drivers stop driving before they have a microsleep as by that point it can be too late.

### **Detecting driver fatigue**

Drivers are often advised that they should respond to the early warning signs of fatigue while driving by taking a break. Although drivers can tell their fatigue or drowsiness is increasing, there is doubt if they can judge when they should stop driving – they cannot always accurately assess their tiredness. Additionally, it is not clear if drivers can detect their changing performance independently of their drowsiness, or if they only notice their level of fatigue when they experience performance errors<sup>4</sup>.

It is not simply enough for drivers to be aware of changes in their alertness or feelings of fatigue. They need to be able to detect and, importantly, respond to changes that affect their capacity to drive safely, before that capacity is compromised - particularly as the ability to judge tiredness declines as fatigue sets in<sup>4</sup>.

### **Crash risk**

Several studies have found a positive relationship between driver fatigue and crash risk, suggesting a crash risk of between three and fourteen times higher when a driver is fatigued<sup>7,8,9</sup>.

Additionally, research has found that driving when fatigued has similar effects on performance as driving with an illegal Blood Alcohol Concentration (BAC). After around 17 hours without sleep, driving performance can be equivalent to, or worse than, that at 0.05 BAC<sup>10</sup>, and after 24 hours without sleep, performance can decrease to a level equivalent to a BAC of 0.1 – 0.15<sup>11,12</sup>.

### **Planning to avoid the risk of fatigue**

As drivers tend not to respond to many of the early warning signs but simply ‘push on’, and cannot always accurately assess their tiredness, it is not only important to address these issues, but it is also critical to encourage drivers to plan their journey to avoid driving when at risk of fatigue. If drivers have difficulty detecting or responding to fatigue when they are already driving, they need to learn to assess the risk of fatigue *prior* to driving, and plan their journey to avoid this risk.

## NSW CRASH STATISTICS

Fatigue is one of the top three behavioural factors involved in road deaths in NSW. In 2012 alone (preliminary data), fatigue was a factor in 17% of all fatalities and 9% injuries on NSW roads, which equated to 64 deaths and 2,166 injuries. In 2011 there was an estimated cost to the community of \$710 million attributed to fatigue related crashes<sup>13</sup>.

In the reporting period from 2007–2011 there were 17,681 crashes where fatigue was involved, resulting in 356 fatalities and 10,021 injuries. Fatigue-related crashes are twice as likely to be fatal compared to all crashes<sup>13</sup>.

The Woolcott research (2012) revealed around a third of drivers had experienced fatigue in the last 12 months. Additionally, 12% of drivers had a microsleep while driving in the last 12 months, and 13% of drivers admitting to having had a crash as a result of driving fatigued. Those who admitted having a microsleep were more likely to be male aged 30-49 years (19%).

The following profiles fatigue-related crashes and includes crash data from the five year reporting period 2007-2011<sup>13</sup>.

### Who?

- **Males** – involved in 64% all fatigue-related crashes and 79% of fatal fatigue-related crashes
- **Males 17-29 years** – significantly over-represented as involved in 29% of fatigue-related crashes and 21% of fatal fatigue-related crashes, but account for only 11% of licensed drivers in NSW.
- **Males 30-49 years** – involved in 24% of all fatigue related crashes and 26% of fatal fatigue-related crashes
- **Males 50+ years** – involved in 31% of fatal fatigue-related crashes.
- Females are less likely to be involved in fatigue-related crashes, but those most at risk are 17-25 years.

Figure 1: Age and gender of fatigued motor vehicle controllers involved in *injury* crashes

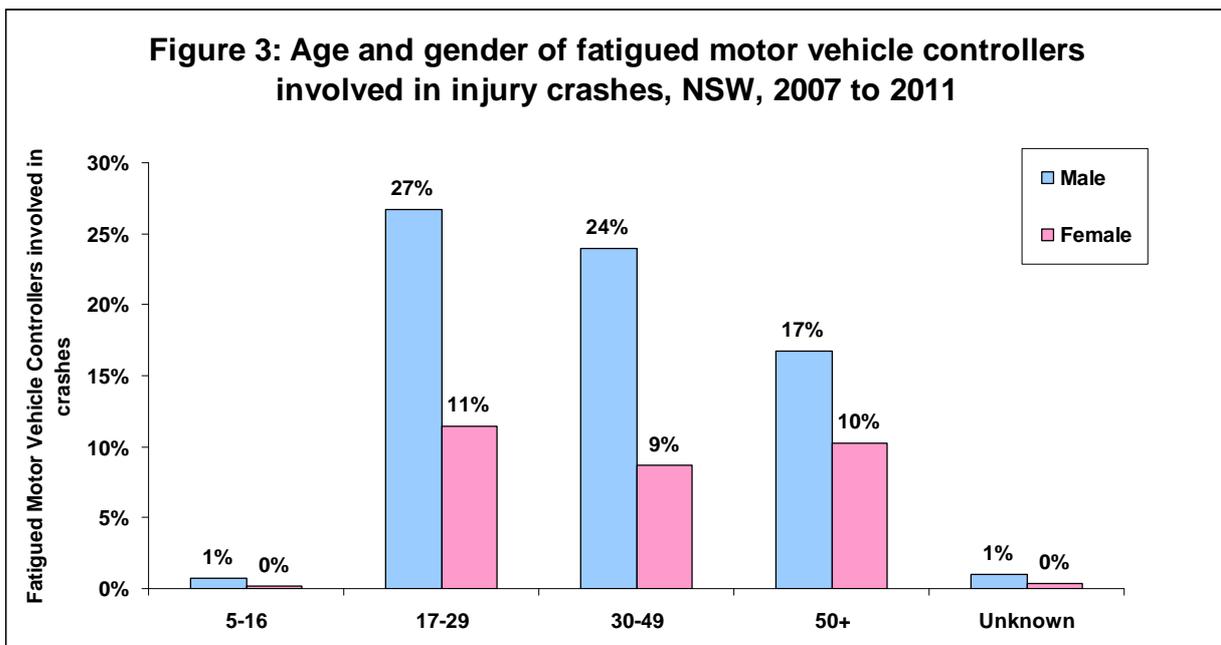
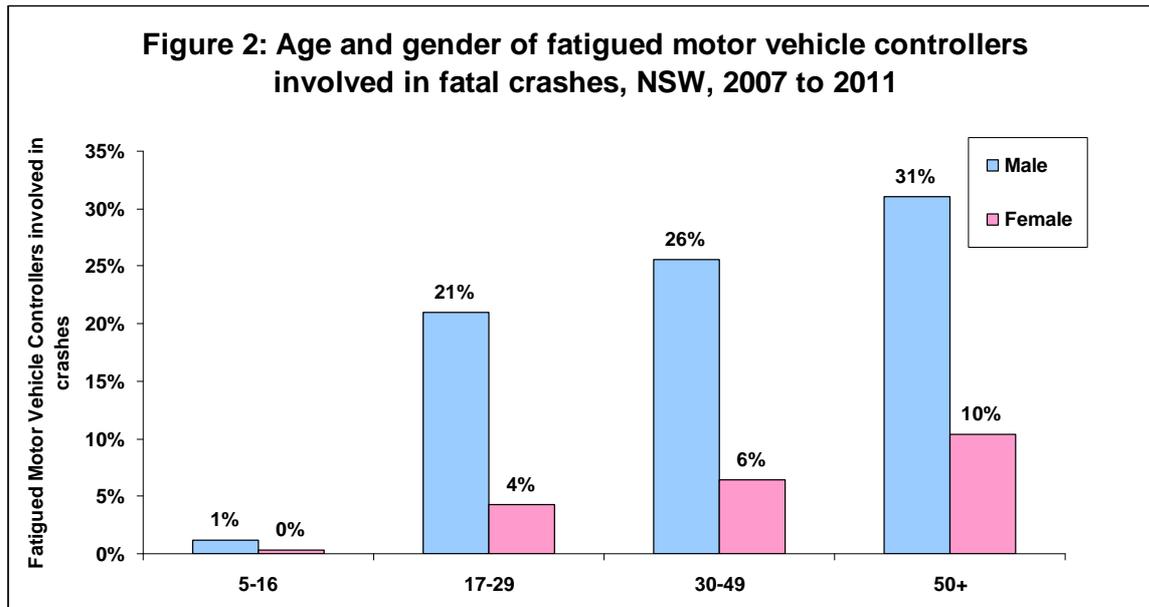


Figure 2: Age and gender of fatigued motor vehicle controllers involved in **fatal** crashes



### Where?

- Fatigue-related crashes (both fatal & non-fatal) are twice as likely to occur on **country rural roads** compared to non-fatigue related crashes.
- The majority of drivers involved in fatal fatigue related crashes on country roads are country residents, with 43% from the local government area in which they crashed.
- More likely to occur in **100 & 110km/h zones**, especially fatal fatigue-related crashes, typically because of the consequences of crashing at this speed.
- The majority of fatal fatigue-related crashes occur on **State highways**.

### When?

- During **darkness** – almost twice as many compared non-fatigue related crashes
  - Over-represented late evening and during the midnight to dawn period.
- More likely to occur on **weekends** – night-time crashes peak heavily on Friday and Saturday nights and into the early hours of the morning.
- In the **afternoon** – fatigue-related crashes peak everyday during the afternoon, especially for older drivers, although non-fatigue related crashes also peak during this time.
- More likely during **public and school holidays**.

### How?

- Most common manoeuvre is the vehicle **leaving the road and hitting an object** (90% of all fatigue-related crashes and 72% of fatal fatigue-related crashes).
- Mostly **single vehicle incidents** (61%).

## REASONS FOR DRIVING WHEN TIRED

The Woolcott research (2012) revealed that while drivers use the phrase ‘feeling tired’ rather than ‘fatigued’, the concept is recognised as a potential danger when driving. However it is only really associated with longer trips – those over 2-3 hours<sup>1</sup>.

Still, on these longer journeys, drivers are aware of the risks. So why do they drive when tired?<sup>1†</sup>

<sup>†</sup> Key reasons from the research only. Note they are not listed in order of importance

### 1. Because many do not plan breaks in their trip

*Most relevant to: Younger drivers, especially males*

Younger drivers: More spontaneous	Families: Planning based on kids	Older drivers: More planned
<ul style="list-style-type: none"> <li>• Don't plan stops – like to be spontaneous</li> <li>• Preparation mainly focussed on car (e.g. oil, tyres etc)</li> <li>• Few plan time in the trip for breaks</li> <li>• Just drive and stop if/when need to – adds to sense of adventure</li> </ul>	<ul style="list-style-type: none"> <li>• Planning focuses on snacks and entertainment to keep kids quiet – a necessity</li> <li>• Plan to stop regularly to prevent kids' boredom, but on a needs basis                             <ul style="list-style-type: none"> <li>○ avoid stopping if kids are asleep</li> <li>○ make unplanned stops for kids' needs</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Plan all stop locations</li> <li>• Take enjoyment from whole journey – plan stops around meal/snack times                             <ul style="list-style-type: none"> <li>○ opportunity to visit favourite cafes/restaurants</li> </ul> </li> </ul>

### 2. Because prior activities and sleep are not always considered

*Most relevant to: Male drivers, especially younger and mid-age*

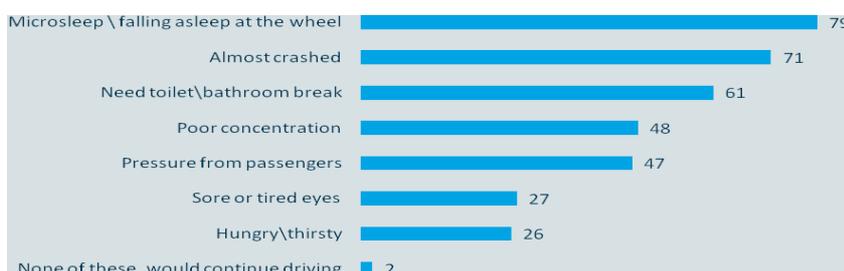
- Prior work, social, and sleep/rest do not always impact on the decision to drive a long trip.
- People have places to be and will drive whenever they can to get there on time– even if that means getting up at 4am to begin the journey.
- While starting a trip with sleep debt is considered dangerous by most, beginning a trip very early in the morning is not (only 28% consider it dangerous).
- The perceived danger of 'beginning a trip after working all day' dropped in 2012 with 76% considering it to be dangerous compared to 91% in 2001.
- While young females tend to plan an early, alcohol free night before the trip, young males do not like to miss out on doing something they enjoy the night before.

### 3. Because they want to 'push on', particularly when close to destination

*Most relevant to: All drivers, especially younger males*

- Time stopped is considered time lost – drivers want to 'push on'.
  - For younger drivers, even if that means driving late into the night.
- Time is precious to drivers and many do not want to 'waste' time by stopping. An unplanned 5 minute stop is seen to quickly turn into a 20-25 minute break.
- Even if no specific deadline exists, drivers set themselves an arrival time based on expectations/GPS/Google maps and strive to achieve it – and feel a sense of failure if they arrive later.
  - Whatever duration Google maps calculates the journey to take, younger drivers in particular use that as their ETA and add on little (if any) time for breaks.
- Particularly for younger age groups, the journey is simply a job that needs to get finished (at whatever time of night) and there is great anticipation about what lies at the end – even if it's just bed.
- If drivers are close to reaching their destination, the main reasons for stopping would be a microsleep (79% would stop if they experienced this) or if they almost crashed (71%). Many would not stop if they experienced signs of fatigue, with just 48% stating they would stop if they had poor concentration and 27% sore/tired eyes.

Figure 3: Reasons for stopping on a long trip even if close to destination. Values are percentages



#### 4. Because they think there is nowhere to stop

*Most relevant to: All drivers*

- Although most drivers admit there are many places, not all possible stops have the desired combination of amenities such as petrol stations, bathrooms and restaurants.
- However many also feel there are long stretches of road without places to stop, and safety concerns prevent drivers pulling over at the side of the road, or at some rest areas.
- Additionally, the lack of planning among younger drivers can result in the perception that there isn't anywhere to stop when they do decide they want to.

#### 5. Because they cannot accurately assess their tiredness

*Most relevant to: All drivers*

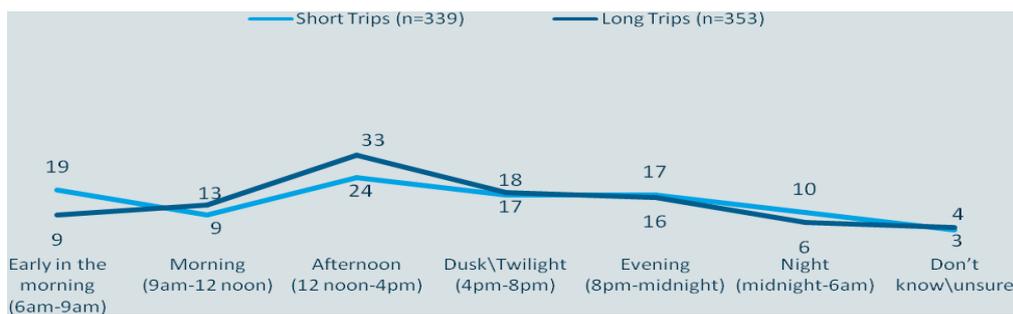
- Drivers are unlikely to take immediate action for many early warning signs of fatigue.
- Although drivers can tell their fatigue or drowsiness is increasing, there is doubt if they can judge when they should stop driving<sup>4</sup>.
- Drivers are unsure how tired is too tired – when their tiredness is at a dangerous level, and many fail to associate early warning signs with a microsleep.
- Some drivers, particularly those that are younger, are unsure what a microsleep feels like so are unaware how tired they will be feeling when it occurs.

#### 6. Because they dismiss fatigue in the afternoon

*Most relevant to: All drivers, especially older males*

- The afternoon appears to be the peak time for experiencing fatigue, particularly for older drivers.
- However drivers are more likely to dismiss signs of fatigue during the daytime.
- Drivers pay more attention to the signs of fatigue at night due to awareness of circadian rhythm lows at this time (likely due to the Dr Karl Circadian Rhythms campaign).
- Driving after lunch when likely to be sleepy was considered much less dangerous than other prompted situations – just 49% drivers considered it dangerous.

Figure 4: Time of day when last experienced fatigue when driving on long and short trips. Values are percentages



#### 7. Because young drivers feel invincible

*Most relevant to: Younger drivers, especially males*

- Young drivers admit they think they are invincible and are yet to learn that they're not.
- Minor crashes or near misses due to fatigue may have occurred but have not resulted in behaviour change.
- They possess a 'what's there to lose' attitude believing death and serious injury 'won't happen to me' and there are no penalties or fines for continuing to drive.

- Males 17-29 years particularly display more risky attitudes and behaviours in relation to driver fatigue.
  - More likely to agree with ‘denial’ statements such as ‘if I’m within an hour of home and feel tired, I won’t take a break and will just push on to get there!’ ‘on a long trip I try to have as few stops as possible’, and less likely to agree with ‘compliance’ statements such as ‘I would be prepared to miss out on doing something I like in order to get a good night’s sleep!’ ‘I plan where I will stop for breaks on a long trip’.
  - Likely to perceive fatigue situations as less dangerous than other drivers.
  - Less likely to stop driving straight away if they experience a microsleep or signs such as drowsiness and oversteering than other drivers. However, they are more likely than other drivers to stop driving straight away if they experience restlessness, yawning and boredom. This ties in with their craving for adventure and suggests a desire to be continually entertained.

### 8. Because males are too proud to pull over

*Most relevant to: Male drivers, especially younger males*

- Pride prevents many young males from stopping for a break as they may continue to drive even when tired for fear of looking weak in front of their mates.
- Similarly, research conducted in 2007 revealed that males feel they can push on and are able to ‘tough it out’. They want to be ‘a man’ and meet the expectations of their family or friends<sup>14</sup>.

## CURRENT COUNTERMEASURES

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Driver fatigue is a complex and difficult road safety issue to address. Unlike drink driving and speeding, there is no legislation or enforcement in NSW to specifically regulate behaviour to address light vehicle driver fatigue.

### Personal Strategies

The main behavioural strategies to avoid driver fatigue can fall into two broad groups:

- Preventing fatigue (pro-active)
- Reducing the effects of fatigue while driving (reactive).

The specific key behavioural strategies for each of these are outlined in the table below<sup>4</sup>:

<i>Preventing fatigue</i>	<i>Reducing the short term or immediate effects of fatigue</i>
<ul style="list-style-type: none"> <li>- Plan trips, the start time, the rest breaks and driver sharing for the trip</li> <li>- Get a good night’s sleep before commencing a long trip</li> <li>- Do not drive if you are tired (even on a short trip)</li> <li>- Do not drive at times when you would normally be asleep</li> <li>- Avoid long drives after work</li> <li>- Ensure effective diagnosis and treatment of sleep and other disorders</li> </ul>	<ul style="list-style-type: none"> <li>- Take regular breaks from driving – stop and rest (use rest areas)</li> <li>- Swap drivers (when possible)</li> <li>- Pull over and rest when drowsiness, discomfort or loss of concentration occurs</li> <li>- Have a short nap (4-20 mins)</li> <li>- Consume caffeine</li> </ul>

This shows that a range of driver fatigue marketing initiatives should be used to target behavioural change both before and during the journey. Many strategies presented in the table above are consistent with current key TfNSW messages, including stopping driving to take regular breaks.

In addition, research has suggested that naps are effective short term countermeasures during breaks. A 15-min nap has shown to produce a 2 hour performance benefit<sup>15</sup>, and that a nap between 4–20 minutes is the ideal length. Any less has little benefit, and any longer can be harder to wake from and cause sleep inertia<sup>16</sup>. Further, a short nap in combination with caffeine has been shown to be more effective than either countermeasure alone in terms of benefits for driving performance and the duration of these benefits<sup>17,18</sup>. However, caffeine can have an impact on subsequent sleep, and can contribute to sleep debt if it is relied on regularly<sup>4</sup>.

Importantly, some strategies continually used by drivers to combat fatigue are not supported by strong evidence. For example, research suggests that listening to the radio/music, opening a window or doing exercise during breaks has little impact on fatigue levels<sup>19</sup>. Exercise is shown to only enhance alertness for a very short period and should be discouraged as it can result in drivers feeling less sleepy without performance being improved<sup>20,21</sup>.

In addition, one of TfNSW's previously communicated messages was to stop driving every 2 hours. This was to ensure drivers took regular breaks. However, drivers need to recognise the need to stop driving if they are tired – even if they haven't been driving for 2 hours. Therefore this message should not be communicated in any future campaign.

## **Public Education**

TfNSW's current public education strategy for fatigue focuses on educating drivers about the physiological and psychological symptoms of fatigue. The current campaign 'Wake up to the Signs' outlines the symptoms and instructions for addressing driver fatigue - tired eyes, drowsiness, yawning, and loss of concentration, and to take a break.

Additional key driver fatigue messages from TfNSW are 'Take regular breaks, change drivers if you can' and 'Stop.Revive.Survive.'. Research of the campaign has shown that it was effective in reaching drivers and creating awareness, and the overall message was considered easy to understand, believable, important and informative. However, it was also considered 'nothing new'.

The previous campaigns 'Microsleep' (2001) and 'Circadian Rhythms' (2003), featuring Dr Karl, encouraged drivers to recognise the early warning signs of fatigue, with the latter also highlighting the danger of driving late at night and at dawn as the body's circadian rhythms are programming you to sleep. Research shows high praise for these advertisements, and that they were considered educational and informative – increasing awareness and knowledge of both issues, especially microsleeps. There was also an overwhelmingly positive reaction to Dr Karl, who was seen as credible, authoritative, likeable and personable, and who delivered the messages scientifically yet simply. The recent Woolcott research (2012) found that these positive perceptions of Dr Karl still appear to exist, even among young drivers 17-25 years.

## **CONCLUSION**

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Light vehicle driver fatigue remains a major road safety issue in NSW. With no direct legislation for driving fatigued, public education plays a major role in changing drivers' attitudes and behaviours. This problem definition shows that fatigue is a complex issue and it is important that the campaign highlights the dangers of both starting a trip when tired and continuing to drive when tired. Males, particularly younger age groups, are the key target group and innovative ideas are necessary to ensure this group are engaged. Given the high cost to the community attributed to fatigue-related crashes, a large scale campaign and supporting strategy is warranted.

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