

## **Quantitative and qualitative study of NSW drivers' knowledge, attitudes and behaviours in relation to fatigue**

Parnell<sup>a</sup>, H., Withaneachi<sup>a</sup>, D., Walker<sup>b</sup>, D., & Wong<sup>b</sup>, K.

<sup>a</sup> Centre for Road Safety, Transport for NSW, <sup>b</sup> Woolcott Research Pty Ltd

### **Abstract**

Driver fatigue is a complex physiological and psychological state that cannot be quantified by external instrumentation at the roadside like speed or blood alcohol concentration. As such, there is currently no direct legislation for driver fatigue among light vehicles in NSW. With limited alternative countermeasures available to road safety practitioners to influence driver fatigue, understanding community attitudes and behaviours is critical in the development of effective public education campaigns. A quantitative and qualitative research study involving an online survey of 1000 NSW drivers and eight focus groups was conducted in 2012 to understand drivers' knowledge, attitudes and behaviours in relation to fatigue. Results indicate that drivers would rather 'push on' than stop for a break even though many have experienced a microsleep when driving or had a crash due to fatigue. While drivers recognise that driving fatigued is a crash risk, they identified numerous factors which influence their desire to continue driving; including an uncertainty about when their level of tiredness becomes a danger. Younger drivers in particular displayed risky fatigue related attitudes and behaviours and appear less likely to plan breaks in their journey than other drivers. Research from literature about driver fatigue was also reviewed and will be discussed, with consideration given to how the research will help future NSW countermeasures for driver fatigue.

### **Introduction**

Driver fatigue is a major contribution to the NSW road toll. Preliminary data shows that in 2012 fatigue was a contributing factor in 17% of all fatalities and 9% of injuries on NSW roads, resulting in 64 people killed and 2,166 injured. In 2011 there was an estimated cost to the community of \$710 million attributed to fatigue related crashes<sup>1</sup>.

Fatigue is a term commonly used to describe the experience of being 'sleepy', 'tired' or 'exhausted', and is both a physiological and a psychological experience. There are many early warning signs of driver fatigue including yawning, poor concentration, tired eyes, restlessness, drowsiness, slow reactions, boredom and oversteering. A person with fatigue may also fall asleep while driving, and it is not unusual for a person experiencing a microsleep to be unaware that they were asleep.

Driver fatigue can occur in any driver; however research from literature shows that there are a number of clear risk factors that increase the likelihood of driver fatigue, including sleep deprivation, long hours of wakefulness, driving during normal sleeping hours (disrupting circadian rhythms), and time spent driving without rest, as well as sleep disorders and alcohol<sup>2</sup>.

Driver fatigue is a complex and difficult road safety issue to address. Unlike other road safety issues such as drink driving and speeding, fatigue cannot be objectively measured easily, which makes regulation and enforcement difficult in the general driving population. Indeed there is no legislation or enforcement in NSW to specifically regulate driver fatigue except that applied to heavy vehicle drivers for whom fatigue is a recognised occupational hazard and for whom complex work regulation and checking systems exist.

Public education is therefore the key behavioural countermeasure currently available in NSW to address driver fatigue. Transport for NSW (TfNSW)'s current public education campaign '*Wake up to the signs*' focuses on educating drivers about the physiological and psychological symptoms of fatigue, and the need to take a break. Additional driver fatigue messages from TfNSW are 'Take regular breaks, change drivers if you can' and 'Stop. Revive. Survive.'. The previous Dr Karl Campaigns '*Microsleep*' (2001) and '*Circadian Rhythms*' (2003), 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.

In 2012, TfNSW conducted quantitative and qualitative research to gain an up to date understanding of the knowledge, attitudes and self-reported behaviours of NSW drivers in relation to fatigue, to help guide and inform future countermeasures to address the issue<sup>3</sup>. Previous quantitative surveys to understand these attitudes and behaviours were undertaken in both 2001<sup>4</sup> and 2006<sup>5</sup>, as well as qualitative focus groups in 2007<sup>6</sup>.

This paper summarises the results of the 2012 research which was conducted on behalf of the Centre for Road Safety (CRS), TfNSW by Woolcott Research, and compares results to those from the previous surveys. The findings of the research provide insights into drivers' attitudes and behaviours that will guide policy makers in developing countermeasures to address the issue of fatigue, and sets a benchmark for future research that can be used to measure shifts in drivers' attitudes. In addition, this paper draws upon findings from a literature review of light vehicle driver fatigue conducted by Transport and Road Safety (TARS) Research<sup>7</sup>.

## Methods

The quantitative component consisted of an online survey of 1,002 NSW licence holders that reside across metro and regional areas of NSW. The panel provider Research Now was used to provide a random sample. The average duration of questionnaire completion was just under 23 minutes and the data collection was carried out between 9 and 22 May 2012. The survey asked questions about current driving behaviours, attitudes towards driving, and experiences of, as well as attitudes towards, driving fatigued.

The next stage of research was qualitative research involving a series of eight mini-group discussions with male and female drivers between 17 and 79 years. These took place across Sydney CBD, Parramatta, Newcastle and Wagga Wagga. The purpose of the qualitative research was to explore the key areas of interest resulting from the online survey. Each focus group consisted of 4-6 participants who were recruited at random by recruitment company Alta Research, using a specific recruitment screener. Participants had to have been the driver on more than one 'long trip' (of 2 hours or more) in the last 6 months, drive more than twice a week for personal reasons, and felt a sense of fatigue while driving in the last 6 months. The focus groups ran for an hour and a half and took place on 25 and 26 June 2012. Participants were provided \$70 for taking part in the session. Prior to attending the group discussion, participants were asked to complete a short 'homework' task which asked about details of their last long distance trip including distance travelled, frequency, length and purpose of stops taken and how they felt at various points along the way. This ensured that participants had pre-established trip details and were not tempted to provide more socially acceptable details of their driving behaviour in the group discussions.

Prior to the quantitative and qualitative research, the CRS commissioned TARS to conduct a literature review into light vehicle driver fatigue to guide the development of the survey. The literature review outlined current knowledge from published and grey literature about fatigue and effective countermeasures. It also highlighted relevant strategies, legislation, policies, programs and campaigns implemented in Australia, the United Kingdom (UK) and the United States of America

(US), and their effectiveness where available, as well as any gaps in knowledge where further research is needed to inform policy programs. The review took place in February and March 2012.

## **Results**

The sample of survey participants was representative of the profile of NSW driver licence holders. In terms of location, 73% of the sample was from metropolitan areas and 27% from non-metropolitan areas. The sample was relatively equal on gender with males 49% and females 51%. In terms of age, 20% were aged 17-29 years, 39% aged 30-49 years and 41% aged 50 years or more. The majority of the sample was unrestricted licence holders with only 6% holding a provisional licence. The sample included 13% with a motorcycle licence and 12% with a heavy vehicle licence.

### ***Current Driving Behaviour***

The majority of drivers (68%) drive their vehicle every day, typically more than three hours a week, with two thirds of those occasions being for personal reasons.

Within the group discussions, long trips were defined by participants as more than 2-3 hours in duration, usually to a destination outside of their home city or town. The survey showed that 63% of drivers had taken three or more long trips (defined as 2 or more hours, outside of their home city/town) in the last 12 months, with the likelihood of taking a long trip higher amongst males 30-49 years (74%).

As far as breaks were concerned, most drivers (81%) did not take a break on their most recent short trip (defined in the survey as less than 2 hours in duration, within their home city/town), and the group discussions revealed little consideration went into planning or preparing for these trips. While there were frequent suggestions in the focus groups that a long trip required some forethought and trip preparation, this preparation did not tend to involve formalised route selection and pre-planning of potential stops or breaks along the way, but simply getting the car ready, perhaps getting a good night's sleep or printing out maps.

The group discussions showed that young males were less inclined to prepare for a long trip, and some indicated they were happy to have a big night out and little sleep before setting off. This group were unlikely to plan breaks and instead made decisions when on the move, desiring a spontaneous lifestyle, and adding to the sense of adventure. While families may plan for breaks, this was based around the children and their needs, and they would avoid a break if the kids were asleep. Older drivers however, enjoy taking breaks and tend to plan them around mealtimes and their favourite cafes and restaurants, making the trip an enjoyable part of their overall outing.

On a typical 2-3 hour trip, most survey respondents reported either stopping only once (55%) or not at all (31%). Those who had driven longer distances (more than 6 hours) indicated that they had taken a break on average every 3-4 hours (34%).

When asking drivers why they stop for a break when driving, 66% cited a toilet break as the most common reason (Figure 1). Hunger and petrol were also toward the top of the list mentioned by 53% and 43% of all respondents respectively.

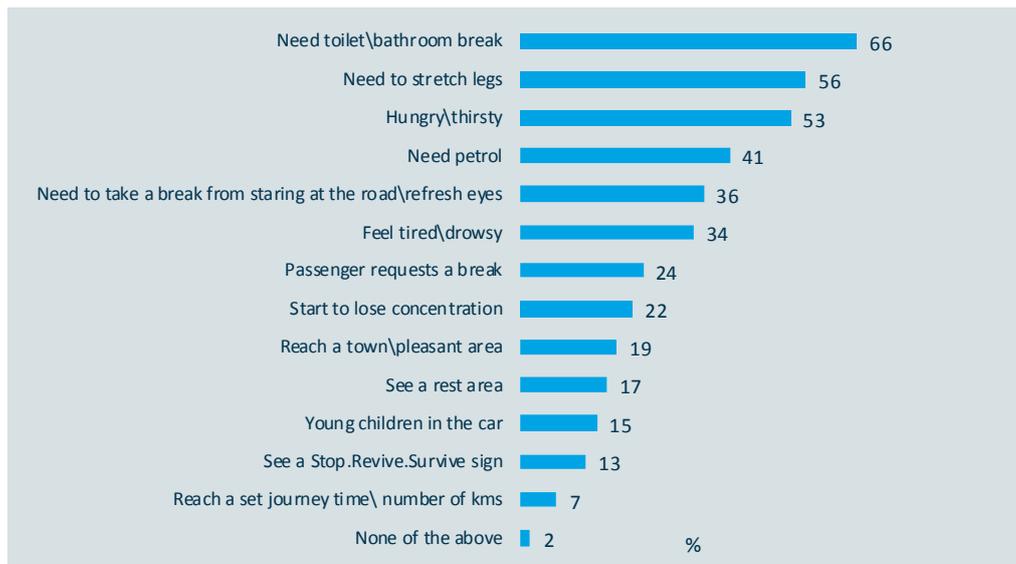
A break from driving was a relatively common reason for stopping with many mentioning 'the need to stretch legs' (56%), as well as 'taking a break from staring at the road' (36%), due to feeling 'tired or drowsy' (34%), 'starting to lose concentration' (22%), 'seeing a rest area' (17%), and seeing a 'Stop. Revive. Survive' sign (13%). Focus group participants also cited food, toilet and petrol as the primary reasons for stopping, as opposed to any real desire to remain fresh and awake while driving. In some

of the discussions aspects such as wanting to swap drivers only appeared after more probing on the issue had taken place.

This may explain why the most common places for stopping on long trips were petrol stations (40%), fast food restaurants (42%), or places where there were both service stations and restaurants (34%). While not featuring at the top of the list, stops made specifically at rest locations were also mentioned – with 23% stopping in a rest area, and 8% at a Driver Reviver site.

**Figure 1. Reasons for taking a break.**

(Base: All survey respondents (n=1002). Q5 Thinking about driving on a long trip, what prompts you to take a break? (Prompted))



### ***Experiences and Understanding of Driver Fatigue***

The literature review highlighted that fatigue affects performance due to temporary lapses in attention and microsleeps<sup>8</sup>. Fatigue makes driving performance very variable and unstable due to periods of good attention interspersed with period where attention wanes. It has been argued that this instability and unpredictability of fatigue is most important as these effects occur much earlier than microsleeps and have adverse consequences for driving performance.

Fatigue was recognised in the qualitative research as an issue on long trips and was one that drivers showed a degree of concern about, however not on short trips. Despite some concern for fatigue, it was not seen to have the same air of seriousness surrounding it as driving under the influence of alcohol, or to some extent speeding.

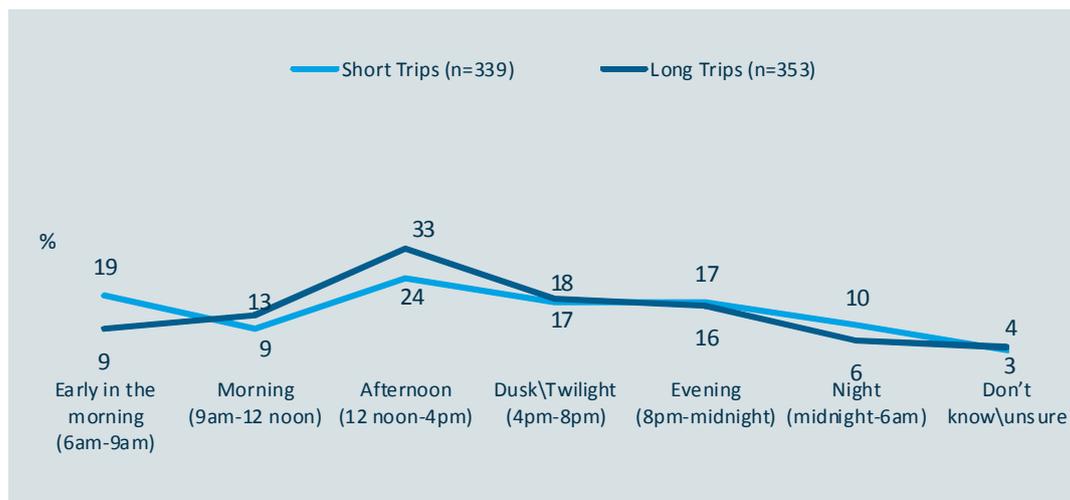
In terms of its seriousness, 75% of survey respondents scored driver fatigue a 9 or 10 out of ten, compared to 86% giving drink driving a 9 or 10 out of 10. Additionally, 63% of drivers perceived driver fatigue to be morally wrong, compared to 86% for drink driving. However, these measures have increased for fatigue compared to previous studies, with the per cent of drivers giving fatigue 9 or 10 out of ten in terms of its seriousness up from 47% in 2001 and 63% in 2006, as well as those deeming it morally wrong having increased from 56% in 2006.

Around a third of survey respondents had experienced driver fatigue on both long (35%) and short trips (34%), particularly males aged 30-49 years (48% on long trips and 42% on short trips). The afternoon (12noon-4pm) was a peak time for experiencing driver fatigue on long (33%) and short (24%) trips. In particular, older drivers aged 50 years or over tended to experience fatigue more in

the afternoon (38%). The next most common time mentioned by drivers for feeling tired while driving was early in the morning (6am-9am) for shorter trips (19%), but dusk/twilight (18%) or evening (8pm-midnight, 17%) in the case of long trips (Figure 2). While this data is likely to be heavily influenced by the time of day people are actually driving, it does highlight that drivers are experiencing fatigue during the afternoon, not only during darkness.

**Figure 2: Experiences of Fatigue by Time of Day**

(Base: Survey respondents who experienced driver fatigue on: short trips (n=339), long trips (n=353) Q9c. Thinking about the last time you were driving but felt quite tired on a long trip, what time of day was it? Q10c. Thinking about the last time you were driving but felt quite tired on a short trip, what time of day was it?)



Although the majority of survey respondents (67%) reported doing very little or no driving between 10pm and 6am, 40% of males 17-29 years indicated that more than 20% of their driving was done at this time of night. Drivers in the group discussions felt that they needed to be fully alert when driving at night and the onset of a microsleep was more strongly associated with night time driving than driving during the day – possibly due to the Dr Karl ‘Circadian Rhythms’ public education campaign as this was referenced in the discussions. However, this meant that any signs of fatigue occurring in the daytime were more likely to be dismissed.

The early warning signs of fatigue appear to be well known, however their link to microsleeps was not as well recognised amongst group participants, particularly if only one sign is experienced. In the group discussions, drivers noted that they were unsure how tired is too tired and when their tiredness is at a dangerous level for driving. Indeed, the literature review advised that 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. This issue is exacerbated due to the ability to judge tiredness declining as fatigue sets in.

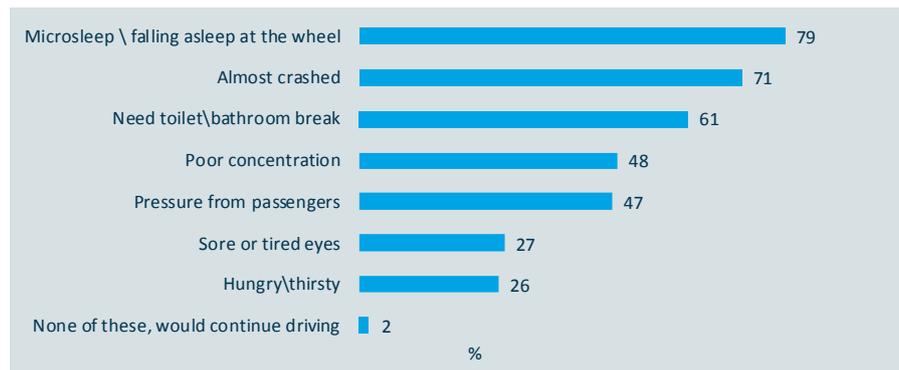
The top three recognised early warning signs of driver fatigue were yawning (45%); difficulty focussing (40%); and tired or sore eyes (25%). Males 17-29 years were particularly more likely to have experienced ‘boredom’ (49%), while 30-49 year old males were more likely to have experienced ‘microsleeps’ (19%). The warning signs that would cause drivers to stop straight away were a microsleep (86%); oversteering (52%); and drowsiness (50%).

Over one in ten drivers (12%) had experienced a microsleep while driving in the last 12 months, and 13% of drivers admitted to having had a crash as a result of driving fatigued. Those who had experienced a near miss admitted it had shaken them, however many suggested they would still be

willing to drive with someone who they knew to be a little tired. Drivers want to push on, particularly when close to their destination. 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).

**Figure 3: Reasons for Stopping - Long Trip (Prompted)**

(Base: All survey respondents (n=1002) Q17b. What would make you stop if you were feeling tired on a long trip even if you were X hours and X Minutes [insert from 17a\*] from your destination? (Prompted))



When asked what drivers had done before a journey to avoid driving fatigued, the vast majority of respondents had ensured that they ‘had a good night’s sleep’ (72%). Males aged 17-29 years were less likely to prepare themselves by ‘having a good night’s sleep’ (57%) than the other age groups, and were more likely to rely on ‘drinking coffee/energy drinks’ before setting off (20%) as were the 17-29 year old females (30%).

The most frequently mentioned strategy to avoid fatigue during a trip was having a ‘break/stop/rest’ (51%). However, younger drivers, both males and females were significantly less likely to use this as a strategy (34% and 35% respectively), and females were more likely to ‘listen to the radio’ (46%) or ‘talk to other passengers’ (26%).

### **Attitudes and Barriers to Stopping when Fatigued**

A range of 23 attitudinal statements about fatigue related behaviours were provided to survey respondents, and during analysis were grouped into three main categories based on how positive or negative they were:

- Denial (more negative attitudes and avoidance behaviours)

Overall, there was a lower level of agreement with the majority of these statements. There was strongest overall agreement with ‘if there are other people in the car I’m more likely to stop’ (63%). Agreement with statements such as ‘when tired on a long trip I try to make it to the next town before I stop’ was particularly strong amongst 17-29 year old respondents (48%) and ‘when I have to get somewhere by a certain time, I know I can keep driving on a long trip without stopping’ with young males aged 17-29 years (37%).

- Compromise (statements which were neither extreme positive or negative)

\* Q17a If you recognised that you were tired while driving on a long trip, how close would you have to be to your destination to ‘push on’ rather than take a break?

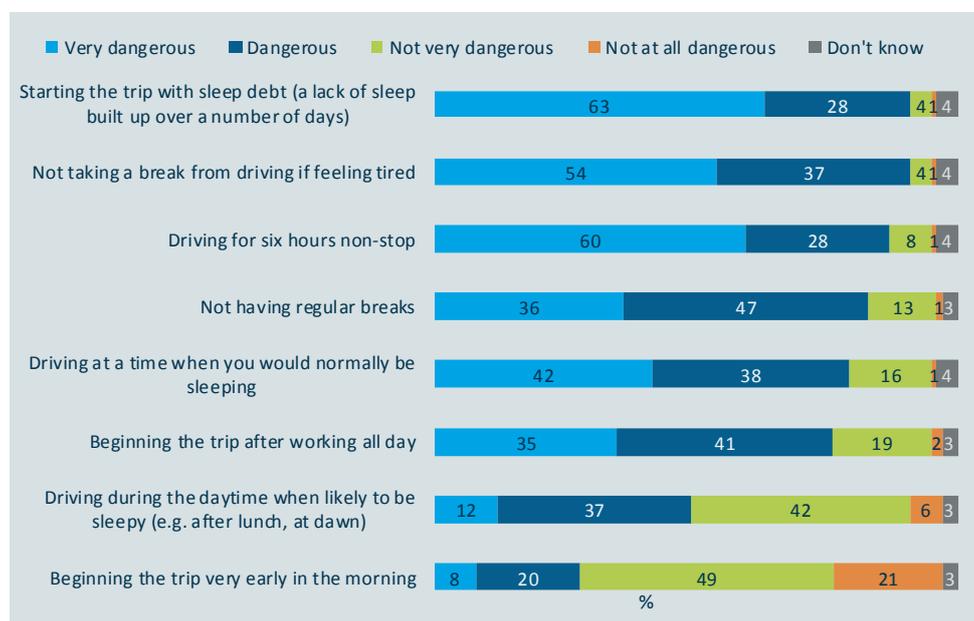
Overall, there was relatively low level agreement with most of the attitudinal statements where compromise was evident, meaning drivers appear less likely to put themselves at risk. However, amongst males both 17-29 and 30-49 years there was stronger agreement with statements such as ‘my driving is not affected by missing a few hours sleep the night before’ (34% and 30% respectively) and ‘being tired doesn’t change my ability to drive’ (26% amongst 17-29 year old males).

- Compliance (more positive attitudes and behaviours)

Older drivers (over 50 years) tended to be more compliant and were more likely to agree with statements such as ‘when I feel really tired on a short trip I would be prepared to pull over’ (85%) and ‘I plan where I will stop for breaks on a long trip’ (72%). Young males aged 17-29 years on the other hand, tended to agree less strongly with all the compliance statements put to them, including ‘I’d be prepared to miss out on doing something I like in order to get a good night’s sleep’ (55% compared to 74% total).

In terms of the perceived danger of fatigue behaviours, the majority of respondents indicated from a list of statements that ‘starting the trip with sleep debt’, ‘not taking a break from driving when feeling tired’ and ‘driving for 6 hours non-stop’ were ‘very dangerous’ (63%, 54% and 60% respectively) when taking a long trip of two hours or more (Figure 4).

**Figure 4: Perceived Danger of Prompted Situations on a Long Trip**  
 (Base: All survey respondents (n=1002) Q20. If you had to take a long trip (more than 2 hours, outside of your home city/town), how dangerous do you think each of the following situations would be?)



‘Driving at a time when you would normally be sleeping’, ‘not having regular breaks’, and ‘beginning a trip after working all day’ were seen to be ‘very dangerous’ by over a third of drivers (42%, 36% and 35% respectively), whilst a further third or so rated these situations as ‘dangerous’. The perceived overall danger of ‘beginning a trip after working all day’ dropped in 2012 with 76% considering it to be dangerous compared to 91% in 2001.

‘Beginning a trip very early in the morning’ and ‘driving during the daytime when likely to be sleepy’ were more likely to be considered to be ‘not very dangerous’ (49% and 42% respectively) or ‘not at all dangerous’ (21% and 6% respectively).

Potentially as a result of their sense of invincibility revealed in the focus groups, overall younger male respondents (17-29 years), were less likely to perceive the listed situations as dangerous, particularly when it came to 'driving after working all day' (49% considered it dangerous), or 'driving during the daytime when likely to be sleepy' (40%).

The reasons for continuing to drive whilst tired, or starting a trip when tired, tended to be varied. Reasons from the survey and group discussions reveal drivers do so because:

- They do not plan breaks in their trip – or time for breaks, and are subsequently not stopping frequently (with the exception of older drivers).
- Prior activities and sleep are not always considered – Drivers have places to be and will drive when they can to get there, even if that means beginning a journey at 4am after limited sleep, or 11pm after working all day.
- They want to push on, particularly when close to their destination – They may need to meet deadlines or adhere to commitments; they do not want to 'waste' time, and strive to achieve their estimated arrival time based on expectations, GPS or Google maps; they may believe they will become more awake in due course; or simply have the anticipation of getting home.
- They think there is nowhere to stop – or the options provided do not have their desired combination of amenities. Safety concerns also prevent drivers from pulling over at the side of the road, or in some cases, rest areas.
- They cannot accurately assess their tiredness – Drivers are unsure how tired is too tired and at what point when experiencing warning signs they should stop driving. Younger drivers may have inexperience with the signs of fatigue and be unaware of how they would be feeling if a microsleep is likely to occur.
- They dismiss fatigue in the afternoon – particularly older drivers over 50 years. Drivers pay more attention to the signs of fatigue at night due to awareness of circadian rhythm lows at this time, and are more likely to dismiss the warning signs during the daytime.
- Young drivers feel invincible – and possess a 'what's there to lose' attitude, believing death and serious injury won't happen to them, and knowing there are no penalties or fines if they continue to drive.
- Males are too proud to pull over – and may continue to drive even when tired for fear of looking weak in front of their mates.

### ***Legislation for Driver Fatigue***

Approximately half of all survey respondents (52%) supported the idea of making it illegal to drive while fatigued. Greatest support came from those over 50 years (59%), and support was lowest among respondents aged 17-29 years, particularly males (35%). Respondents residing in regional areas were also more likely to be in support of the idea compared with metropolitan respondents (58% versus 50% for metro).

Respondents in support of making driver fatigue illegal were presented with two ideas for potential definitions of 'fatigued': 'driving after being awake for 17 hours' and 'driving having not slept in the last 24 hours'. Overall there was not a great deal of difference between preference levels for the two definitions, although there was a slightly higher preference for the former (48% vs. 44%).

For respondents that did not support making 'driving when fatigued' illegal in principle, the main reason was because it was felt to be too hard to police, judge or define (54%). Further reasons were because it was felt that there are too many fines or rules already (10%); that people have different tolerances to fatigue (10%); and because sometimes you just need to keep driving (9%).

When group participants were asked what measures could be undertaken to encourage people not to drive when fatigued, in almost all groups, without any prompting the suggestion was made to introduce some form of legal enforcement measure. While participants weren't too sure if or how this could ever be policed, they suggested that if it was achievable it would help to raise the profile of the issue and reinforce its importance.

## Conclusions

This research revealed that while fatigue is being increasingly perceived as dangerous, and a serious road safety issue, it still does not have the same air of seriousness about it as other road safety issues such as drink driving, and to some extent speeding. This may be due to subjective nature of fatigue as well as the lack of legislation for driving when fatigued. While there is some support for legislation for driving when fatigued, and its potential introduction thought to lift the seriousness of fatigue, how this could be defined and enforced currently remains a difficulty. This highlights the important role public education campaigns currently have in raising the awareness of fatigue as an issue, and its seriousness in terms of the road toll.

While the definition of a short trip had some ambiguity in the research, drivers do not consider fatigue when driving short journeys and therefore do not deem them to require a break of any kind. It is important that drivers are made aware that fatigue can happen on any length of journey, not just longer journeys that are more than 2-3 hours.

There appeared to be little pre-planning in terms of formalised selection of stops or breaks along the way in the case of long trips, or even time factored into the length of trip for a rest break. In addition younger drivers, particularly those 17-29 years, are generally of the mindset that they are somewhat invincible and capable of 'pushing on', even when they do experience signs of fatigue. Although some young drivers might be resistant to trip planning because they prefer a more spontaneous or adventurous experience, nonetheless, it is important that young drivers be persuaded to allow time in their journey for breaks, and change their perception of stopping as a 'waste of time', perhaps by highlighting the benefit of breaks in relieving boredom.

A further, but key, challenge will be to reduce the social acceptability of driving when tired, and encouraging drivers to speak up if they are tired, particularly younger males who may be too proud to stop for a break.

A key issue emerging is the inability of drivers to accurately assess their level of fatigue, and to know when they should stop driving, as well as the lack of motivation to take action to reduce fatigue early enough in the process of becoming fatigued. Less severe symptoms of fatigue tend to be ignored, particularly if only one symptom is experienced, and drivers often fail to associate the signs with a microsleep. This is a particular issue as the ability to judge fatigue declines as fatigue sets in. Drivers need to be made aware of the unstable effects of fatigue on driving performance, and the dangers of driving when tired. It is essential therefore that drivers respond early to the signs of fatigue, and do not wait until they experience a microsleep before they stop driving.

This research suggests that signs of fatigue might also be dismissed during the daytime. While drivers are aware of circadian rhythm lows at night and the risk of fatigue at this time, the group discussions revealed they are less aware of circadian lows during the afternoon and as a result pay less attention to early warning signs at this time. Certainly, drivers only tended to associate

microsleeps with night-time driving. However, the research shows that the afternoon is a key time for experiencing fatigue, particularly for older drivers. While this may be due to the increased likelihood of driving during this time compared to during darkness, NSW crash data shows that older drivers are having more fatigue related crashes at this time of day compared to crashes involving other factors<sup>9</sup>. Therefore it will be important to highlight the risk of fatigue during the daytime, in addition to night-time, and encourage drivers to consider this before setting out.

As well as to continuing to drive when tired, some drivers are beginning a journey when already fatigued – primarily due to prior work, social activities and sleep/rest not being considered. Indeed, the perception of ‘beginning a journey after working all day’ as dangerous has declined since previous research and ‘beginning a trip very early in the morning’ was not considered dangerous by the majority of drivers surveyed. Many younger males would not be prepared to miss out on something they like in order to get a good nights sleep prior to driving. Drivers are aware of the need to ‘Stop. Revive. Survive.’, but they need to be educated on the impact of pre-journey work and social activities, as well as sleep/rest on fatigue levels, and should be encouraged to plan their journey to avoid driving when they are at risk of fatigue.

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