Australian Automobile Association

RSRP

FATIGUED DRIVING RESEARCH FORUM

DISCUSSION PAPER

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NRMA RACV RACQ RAA RAC RACT

Introduction

AAA Road Safety Research Program

Every month 100 Australians die on our roads, and every day the same number are hospitalised for road crash-related injuries. Every year road trauma costs the national economy almost $30 billion[1] and brings tragedy into the lives of thousands of Australians. Road safety is a national crisis that demands real leadership, collaboration and solutions.

In September 2019, Australia's motoring clubs, as represented by the Australian Automobile Association, launched the AAA Road Safety Research Program (the Program) in response to this national crisis. The Program will make significant investments and commitments to long term research and solutions that will focus on addressing road safety issues. The Program supports research and translation activities that will deliver tangible benefits for road users and the wider community and have a strong potential to prevent road fatalities and injuries on Australian roads.

The Program aims to:

- Foster a collaborative approach to identifying and tackling road safety challenges across a wide range of sectors and disciplines
- Identify and prioritise the most pressing problems contributing to poor road safety in Australia
- Design, select and fund important road safety research projects that will ultimately deliver practical safety benefits for road users and the wider community
- Deliver research that aligns with the latest road safety research strategies and initiatives
- Help build Australia's road safety research capacity and capability
- Help raise awareness and create a shared understanding of road safety challenges, research priorities and activities in Australia and internationally.

The Program is overseen by two separate committees who will guide the strategic direction for the Program and advancement of the research funded as a part of the Program. The Club Advisory Group consists of representatives from each of Australia's motoring clubs, and an Expert Advisory Panel consists of independent experts in the areas of road safety, academia, and policy. These committees also provide recommendations to the AAA Board as to which research projects are viable and meet the Program's objectives and assessment criteria. The AAA Board determines which projects will be funded.

The Program will identify an annual priority area for road safety research each year. For the inaugural year (2019-2020) the Program is focussed on the issue of ***Fatigued Driving***.

Stakeholder Engagement

A key component of the Program is to undertake stakeholder engagement and consultations with a wide range of stakeholders interested in improving road safety and who are working to address some of Australia's critical road safety issues. This engagement will enable the AAA to select the most appropriate road safety research projects that are aligned with the Program's desired outcome to reduce fatalities and injuries on Australian roads.

Since the Program's launch, the staff of the AAA have undertaken extensive one-on-one stakeholder meetings with key experts in the area of fatigued driving, including representatives from both industry and academia (in the areas of road safety and sleep). This consultation has been complemented with a dedicated webpage on the AAA website whereby interested parties can submit ideas for future research (research concepts) and provide contact details to keep informed about the Program developments.

Each year the AAA will convene a face-to-face stakeholder forum. These forums will be invitation-only and bring together key stakeholders and experts in the identified annual priority road safety research area. The goal is to identify the most appropriate road safety research topics and provide experts with an avenue to discuss potential ideas (including any potential limitations).

The inaugural forum, focused on ***Fatigued Driving***, was held on the 25th of November 2019 in Sydney. The forum was attended by industry, state and federal government, emergency services, road safety experts and academe. The forum enabled participants to have in-depth discussions and form collaborations which resulted in the development of several well considered areas for research into fatigued driving.

The forum focused on five key themes that had emerged from the extensive AAA stakeholder consultations held prior to the forum.

The 5 Key Research themes

- legal and regulatory frameworks
- human factors
- vehicles
- technology and infrastructure; and
- data and meta-analysis.

The stakeholder engagement before the forum also resulted in a clear view that while there is a multitude of research into the area of fatigued driving, particularly related to the themes above, a consolidated and systematic overview of the research is currently missing. There would be benefit to both industry and academia if a systematic literature review (such as a Campbell Systematic Review) was undertaken to provide a consolidated view of the research and current gaps in relation to fatigued driving. The Program would be well placed to consider this piece of work which will support ongoing research in the area of fatigued driving, including those projects funded under the Program.

This paper captures the key discussions, issues and the variety of perspectives that were considered at the inaugural forum, which contributed to the development of the research concepts detailed at the back of this document.

Why Fatigued Driving?

In this inaugural year the AAA Road Safety Research Program is focusing on ***fatigued driving.***

We recognise that fatigue is a major cause of road crashes and related injuries and fatalities worldwide.[2] While estimates vary, in Australia approximately 20-30% of all car crashes are thought to be attributable to fatigue.[3] Research indicates that 'the need for transport managers to understand and tackle fatigue for the purposes of safety is greater than ever'.[4]

Fatigue is a more complex concept than just being "sleepy".[5] Defining fatigue is multifaceted and while the effects of sleep (or lack of) are a key component, fatigue is a more expansive concept that can be influenced by a person's rest and sleep habits and cycles, their physiological and psychological traits as well as their environmental conditions.[6]

Fatigue can reduce attentiveness, slow a driver's reaction times and affect their judgement, all of which can result in catastrophic consequences. In fact, research has shown after 17-19 hours without sleep, driver performance is equivalent to or worse than that of a driver with a blood alcohol concentration (BAC) level of 0.05 percent.[7] If a driver falls asleep for just 4 seconds while travelling at 100 km/h, the car will have travelled 111 meters without driver control.[8]

Fatigue can affect all types and levels of drivers and fatigue-related crashes can happen on any trip - no matter how long or short the trip is or what time of day it is. Addressing fatigued driving is a major challenge when considering road safety and the AAA Road Safety Research Program will support research projects that aim to reduce injuries and fatalities related to fatigued driving.

Fatigued Driving Research Forum

As mentioned in the introduction, to further consolidate the stakeholder engagement, the Program convened the "Fatigued Driving Research Forum" as a mechanism to bring together the experts in a face-to-face workshop environment. The forum was designed to encourage open discussions and collaboration across the various sectors and had the following objectives:

- Help raise awareness and create a shared understanding of road safety challenges and research opportunities focused on fatigued driving
- Foster relationships across sectors and disciplines that can help to tackle these contemporary road safety challenges
- Collaboratively develop a small number of research concepts to address the road safety challenge of fatigued driving.

The forum was facilitated by Mr Chris Nightingale (Chris Nightingale Consulting) and commenced with presentations from industry experts who provided the participants with several perspectives on a range of issues associated with fatigued driving. The following topics were presented:

- An overview of current road safety research related to fatigued driving, an outline of gaps in fatigued driving research and potential areas for focus including prevention, detection, and monitoring, intervention and enforcement (Associate Professor Kerry Armstrong and Dr. Christopher Watling, University of Sunshine Coast and CARRS-Q).
- A summary of the importance of sleep and a breakdown of the effects sleep has on the maintenance of our physical and mental health, including the changing nature of our working environments and the impacts across society (Dr. Ian Dunican, Melius Consulting and Sleep4Performance).
- The importance of managing fatigue from a business perspective and a best practice look at how it can be achieved, noting the complexities and external factors that can make the management of fatigued driving challenging for both the employer and the drivers (Dr. Sarah Jones, Toll Group).
- An update on ANCAP testing techniques and the future technologies that will be included in their testing regime, including technologies related to fatigue management (Mr James Goodwin, ANCAP).

Throughout the forum, the participants worked in small groups to delve further into each of the overarching fatigued driving research themes (as allocated by the facilitator). This was broken into 3 phases. The first two phases focused on a general discussions about the appropriateness of the five themes and brainstorming potential projects for each of the areas. Phase 3 saw the participants work in groups to narrow the options down to one key research concept for each theme.

While the participants generally agreed that the five themes identified during the stakeholder consultations captured the major issues with regards to fatigued driving, a number of the groups believed there were other key considerations that should be taken into account when designing research in the area of fatigued driving, including:

- Ensuring a "Safe System" approach to the projects
- Running projects across various population bases
- Consideration of climate and thermal factors on fatigue
- Inclusion of motorcyclists in the research projects
- Ensuring non-occupant road users are considered (pedestrians and cyclists)
- How the outcomes of the projects can be used to affect change with decision-makers
- Consideration to post-crash trauma and its impact on society
- Using the learnings from other wide-scale social interventions – such as the introduction of random breath testing to change behaviour with regards to drink driving
- Ensuring projects are of an appropriate scale to show valid and statistically significant outcomes
- Consideration is given to the role Governments have in enforcing change in this area, particularly national approaches to solutions (federal laws vs state laws).

During the initial discussions the participants were tasked with considering what research might be undertaken in these areas. The discussions remained relatively high level, focusing on additional factors that would have potential impact on research undertaken in the area of fatigued driving and any potential implementation activities. While these additional factors generally would fit within one of the five overarching themes, a few key observations were made by the groups.

Safety Culture

The safety culture within an organisation has an impact on the implementation of new and updated work practices. The groups questioned what is the best way to create and grow a company's safety culture and how do companies balance work performance and safety considerations?

The group noted that vehicles are effectively workplaces and should be treated as such in terms of safe practices and policies but the safety culture of an organisation can impact how this is incorporated. The group felt that companies can be social leaders with regards to this issue and set the framework for what good practice should look like. It was also noted that companies should give consideration to the commuting time for their employees (particularly when looking at shift workers and driving outside the most optimal time for the human body) and the growing use of "grey fleets".

The participants also felt it was important to remember, when looking at solutions, that sole traders and small companies represent a large percentage of drivers on the road. Solutions need to be simple, practical and cost effective.

Influencing behaviour

The group noted that influencing change in behaviour needs to focus on demystifying the problem and providing clear explanations for the facts around fatigued driving (time of day, sleep health etc.). Establishing a clear criterion for "deemed impairment" related to fatigue (including the development of an effective test) will also help with education, along with providing realistic countermeasures that are safe and simple.

Influencing behaviour should also extend to providing information about the overall health and wellbeing of drivers. Good health is a key contributor to good fatigue management and education could be considered around healthy lifestyle choices for drivers, particularly professional drivers.

The role of the GP was also questioned in terms of influencing safe practices amongst individuals – particularly given GPs have access to medical histories. The group noted that GPs should be consulted as a part of research in this space.

Technology

Participants noted that there is a need to ensure the technology available to both business and consumers is scientifically validated (including wearable technology to detect fatigue such as Fitbits). The group also noted that users need to be able to make clear comparisons between the key features of different technology to make the choice simpler. Consumers, including businesses, need to trust the technology they are using and have appropriate education to ensure optimal use.


Let's get started
RSRP

Forum Outcomes

The issue of fatigued driving is multi-faceted and complex and will require solutions that are both collaborative and holistic. Considerations should be given to the prevention of fatigue, the prediction of onset of fatigue and impairment thresholds and offer effective methods for counteracting fatigue.

With this in mind, participants used the last session of the day to work in groups (self-selected as to add the most benefit to the discussion based on their expertise) focussing on one of the five themes in order to answer:

- What is the biggest question we cannot answer?
- With unlimited funds how we would tackle this question?

The Forum participants worked together collaboratively, sharing ideas, different perspectives and various opinions resulting in the identification of six fatigued driving research projects (the group developed two concepts for the human factor theme due to the broad nature of this area). Participants developed broad project overviews, noting potential project limitations and potential stakeholders to be included in the project for consideration by the Program's two committees and ultimately at the AAA Board meeting (March 2020).

RESEARCH PROJECT 1

A comparison of driver monitoring systems (TECHNOLOGY)

This project will independently validate and compare the various driver monitoring systems / fatigued monitoring technology available to the market – looking at the product features, accuracy, sensitivity and effectiveness with the view that this information can be used to increase awareness, uptake and potential development of industry standards.

Key Stakeholders

- Technology companies
- Regulatory agencies
- Fleet managers
- Research organisations
- Road users / drivers

Potential limitations

- There are no standards for anti-fatigued driving systems which may result in varying user experiences and outcomes (potentially poor experiences)
- There is no scientifically defined alarm interval – there are some that use a 4-hour interval but there would need to be evidence to support what is used for this type of intervention
- User misconceptions of using anti-fatigued technology - potentially still driving when they know they are tired, but they are relying on the driver monitoring system to intervene
- Price of the driver monitor systems may not be feasible for all businesses or for personal users
- Technology systems can be confidential – access issues for testing

RESEARCH PROJECT 2

A naturalistic driving study to measure the prevalence of fatigue using the new and emerging technology (DATA AND META-ANALYSIS)

The project will create a baseline data set that can be used to evaluate interventions and will include various groups (such as metropolitan vs rural / regional, commercial fleets vs non-commercial fleets, various age groups and high-risk groups).

Key Stakeholders

- Experienced research partners
- Transport agencies
- Fleet managers
- Road users / drivers
- Unions
- CTP schemes and Workcover
- Insurance companies

Potential limitations

- Potential drop out of participants
- Obtaining a large enough sample size
- Keeping up with the speed of the technology development (if doing a large-scale long-term naturalistic driving project)
- How will the information from the project be used to educate drivers / influence behaviour?
- Capture of data to measure impact needs to be done at two levels: hospitals and enforcement (need consistency in this data)

RESEARCH PROJECT 3

A study to determine the correct amount of sleep to reduce impairment (and drive safely) with a view to develop legislation around fatigued driving levels (LEGAL AND REGULATORY)

This project would undertake a literature review, experiments using dose response (simulators and naturalistic) and evaluate implementation in the field (post legislation implementation i.e. reduction in fatigue crashes).

Key Stakeholders

- Local, state and federal politicians
- Police agencies
- Transport agencies
- Road users and drivers
- Health and medical communities
- Researchers (universities / sleep experts)

Potential limitations

- Setting a clear definition for "fatigued impairment" will be challenging
- Getting public buy-in or approval for the concept of an enforceable level of fatigue
- Consideration of 24/7 shift industries – such as emergency services, public transport
- Lack of political will to enact enforcement in this space
- Should individual variances (such as age or health status) be considered in relation to fatigued driving noting they are not considered for drink driving or other WHS standards presently
- Likelihood of enforcement would be low
- There needs to be a consistent definition of a fatigue related crash as reported by police – across states etc.

RESEARCH PROJECT 4

To what extend do drivers understand fatigue warning technology and use of the technology? (VEHICLE)

This project would look at the effectiveness of the technology and would be linked to the human factor stream (behaviour modification). Secondary to the above project consideration can be given to the learnings from the heavy vehicle space and whether elements of the heavy vehicle legislation could be utilised more broadly for general road users.

Key Stakeholders

- Vehicle Manufacturers
- Technology companies (driver monitoring systems)
- ANCAP (advisory role)
- Road users / vehicle owners
- Fleet owners / managers
- Insurance companies

Potential limitations

- Ownership of the data could be challenging and gaining agreement to use the data by vehicle owners – confidentially and privacy must be enforced by the research teams
- Volume of cars with the technology available – companies remove the tech to make them cheaper
- Defining the parameters of the research – there will be a need to set clear boundaries
- Consideration needs to be given to current and past research in this area (for example Austroad projects)
- Will workplaces and employers support their staff to change their behaviour and make it socially acceptable to stop when they are fatigued
- To what extent do the heavy vehicle regulations work in the trucking industry?
- Consideration of impact or use by wider industries – for example rental car companies who provide keys to people who come off very long flights and may be fatigued
- If the technology detects a fatigued driver within the project will the car stop or just offer an alarm – consideration to safety for the project participants
- What interventions would be used if the drivers ignore the alarms?

RESEARCH PROJECT 5

How do people know they are too fatigued to drive and why don't people stop driving when they know they are fatigued? (HUMAN FACTORS)

A project to build personal fatigue profiles using a wearable technology and look at motivational factors with a view to change human behavior related to fatigued driving.

Key Stakeholders

- Road users / drivers
- Employers
- Technology companies – wearable devices
- Insurance companies
- CTP companies

Potential limitations

- The technology needs to be validated
- Will there be issues accessing data in wearable devices such as Fitbits?
- Do people understand basic information about what is causing them to be fatigued
- Need to ascertain if there is a perception that there is no choice but to drive tired?
- Will people believe the evidence when it is presented to them? Will there be an impact on behavioural changes if evidence is presented to road users/drivers?
- Employers will need to support and sustain the behavioural change in their employees and look after their safety and well being

RESEARCH PROJECT 6

A wide scale project to understand the individual influences and external factors that contribute to driver fatigue (HUMAN FACTORS)

The project would undertake stakeholder surveys / focus groups across various groups (individual drivers, mobile sales teams, emergency services, community services, shift workers and the public) with a view to develop individual profiles. This would require an environmental scan of the existing research.

Key Stakeholders

- Road users / drivers (including private sector)
- Emergency Services
- Mobile sales teams
- Community services
- Shift workers
- Automobile Clubs
- Universities
- Transport authorities
- Insurance companies

Potential limitations

- There is a lack of alternatives to encourage people to stop driving and a multitude of pressures to keep driving (such as collecting the kids from school). Until there are viable and trustworthy alternatives available people will continue to risk driving when fatigued – and this is compounded in rural and remote areas of Australia
- Do we need to incentivise or use enforcement to change behaviour?
- Will employers take responsibility in protecting and supporting their employees to make safe and informed decisions regarding driving when fatigued or if they are at risk of fatigue – there needs to be a safe culture in the workplace
- There needs to be a clear definition of fatigue levels that would constitute "deemed impairment" such as we have with drink driving or speeding – and would the public understand and accept the level?

Next Steps

The AAA will provide a short-list of research concepts to the AAA Board in March 2020. In order to develop the short list, the submission of research concepts and ideas will remain open through to 31 January 2020.

Concepts can be submitted online at https://www.aaa.asn.au/research/ or via email to research@aaa.asn.au.

Post January, the AAA will develop a paper outlining all viable research concepts to be considered by the Program's two governing committees; the Club Advisory Group and the Expert Advisory Panel. These two groups will consider the research concepts and develop a recommended list of projects to be provided to the AAA Board for consideration and approval.

The AAA Board will consider the short-list and provide their approval for the preferred ideas to proceed to the second stage of the program, which will involve the development of a fully costed research proposal.

Depending on the agreed research priorities progressing to the next stage, the AAA may use one of the following mechanisms to obtain the fully costed proposal:

- Open application rounds
- Select application rounds
- Direct negotiation with identified applicants.

Thank you

The AAA would like to express its thanks to all participants for their contributions to the discussion around fatigued driving as a part of the forum and the broader consultation process.

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