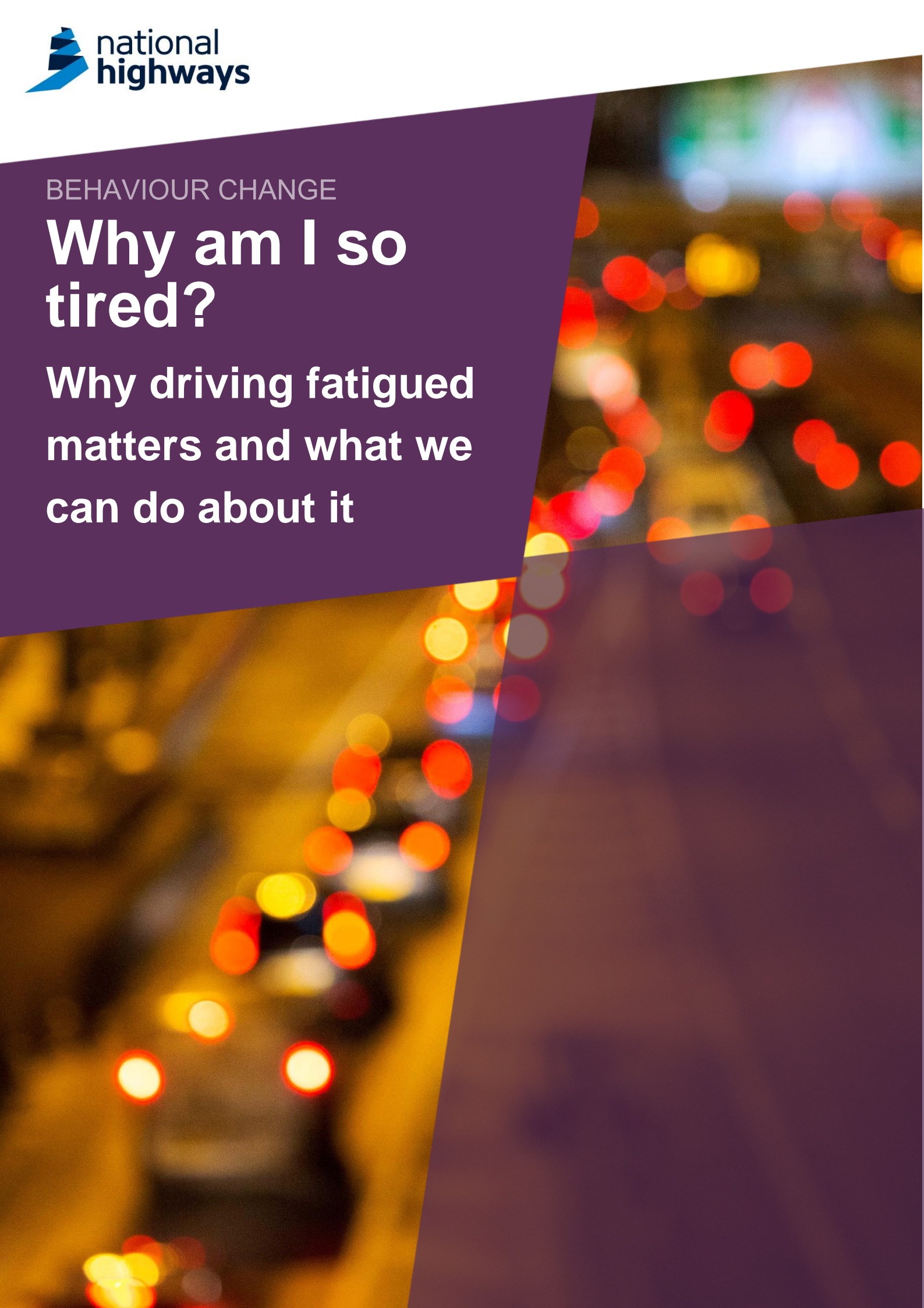


BEHAVIOUR CHANGE

Why am I so tired?

Why driving fatigued matters and what we can do about it



Why does fatigue matter to National Highways?

Driving is one of the most complex tasks we do in everyday life. It requires attention, decision-making, situational awareness and physical coordination. Several factors can impact on our ability to perform at our best when we are driving. One of these factors is fatigue.

When we think about fatigue, we may think of the rare events of people falling asleep at the wheel. However, fatigue is defined as “a physiological state of reduced mental or physical performance”^{*}. Driving while fatigued is therefore much more common than these rare falling asleep incidents. It is likely that we have all experienced fatigue at some point, as there are several factors that can contribute to it – not just poor sleep!

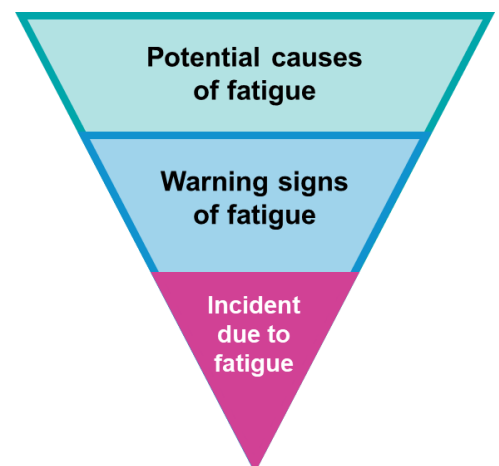
Fatigue can impair our ability to make safe decisions, slow our responses and affect our physical driving behaviours – for example, making zigzagging within a lane more likely. Tired drivers may also experience microsleeps. While these may last only two seconds, this can equate to 50 metres of unconscious travel when moving at 56mph [3][†]. Therefore, fatigue can have serious safety implications for the affected individual and also for other drivers on the network. Delays caused by incidents related to fatigue can also negatively impact on customer experience, as well as lead to economic and environmental costs.



The good news is that fatigue does not happen suddenly – there are preventative actions and also warning signs which, if heeded, can reduce the chance of people driving while fatigued.

So, how can we make it as easy as possible for our customers to take preventative action, notice if they are becoming fatigued and respond well if they are?

The first step is to understand the science and what the evidence says about fatigue on the Strategic Road Network (SRN)...



^{*} ICAO, Annex 6, Part 1, 2011 (HE Fatigue Workshop)

[†] Links to further information and the references in [] can be found in the 'Fatigue – supporting evidence' document.

What do we know about fatigue?

There are a number of standardised ways to measure fatigue and its progression.

For example, subjective levels of fatigue can be measured using the Karolinska Sleepiness Scale [1][‡]. This scale asks people their 'sleepiness' state in the last 10 minutes (from 1 – Extremely alert to 9 – Very sleepy). Where people are on the scale can vary throughout the day and regular responses can help track that. Try it for yourself...



How fatigued do you currently feel? What is contributing to your current level of fatigue?

The Karolinska Sleepiness Scale	
1	Extremely alert
2	Very alert
3	Alert
4	Rather alert
5	Neither alert nor sleepy
6	Some signs of sleepiness
7	Sleepy, but no effort to keep awake
8	Sleepy, some effort to keep awake
9	Very sleepy, great effort keeping awake, fighting sleep

Fatigue levels can also be monitored using biometrics, such as eye movements, heart rate and oxygen levels. However, many of these techniques are not currently amenable to widescale use on the SRN. So, to understand levels of fatigue and its impact on the SRN, we have two key sources of evidence:

- Self-report surveys with representative samples that ask drivers to answer questions about attitudes to and experiences of fatigue.
- Data collected by the police (STATS19) about collisions on the network that result in injury or fatalities.

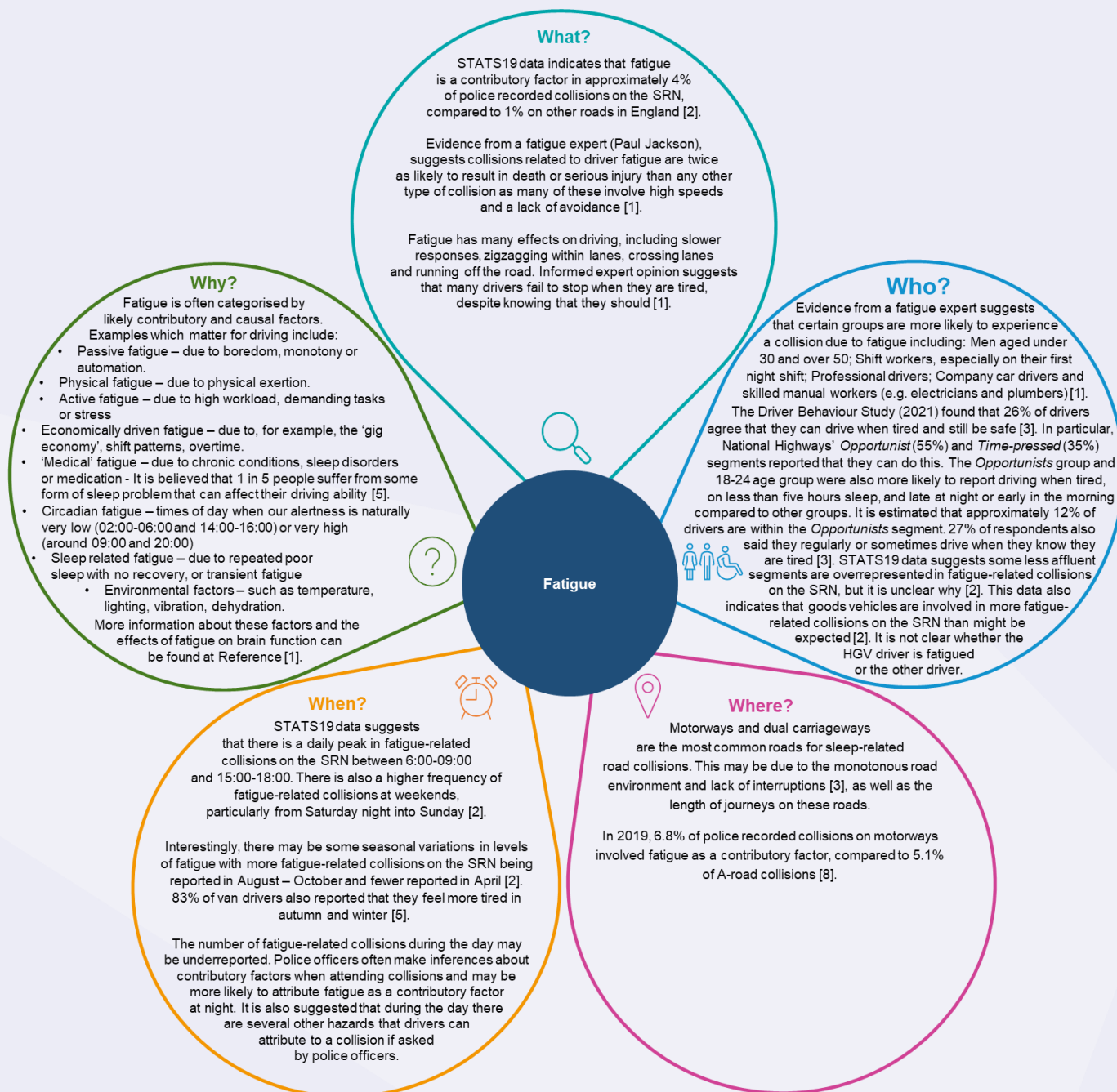
The extent of fatigue on the SRN is likely to be underestimated, as these methods for collecting evidence are limited. For example, fatigue may play a role in non-injury collisions that are not recorded within police data. Moreover, STATS19 data collected by the police is reported as an absolute number, which can be used to understand

[‡] Links to further information and the references in [] can be found in the 'Fatigue – supporting evidence' document.

patterns in police reporting of fatigue as a contributory factor but does not take into account traffic levels or levels of collisions on the SRN.

Nevertheless, these sources provide us with some insight about who experiences fatigue when driving; when and where it is more likely to affect driving; and the reasons why people drive while fatigued – this evidence is summarised in Figure 1§.

Figure 1 - Patterns in fatigue on the SRN



§Some of the potential challenges involved with existing fatigue evidence is highlighted within Figure 1 through the use of the 'data icons'.

Getting to grips with Fatigue – the behavioural science bit!

To help our customers avoid driving while fatigued and reduce the potential consequences involved, we need to understand what drivers do (or don't do!) in relation to fatigue. What we do (our behaviour) is influenced by our Capability, Opportunity and Motivation to complete an action. This approach can help us to explore why people become fatigued and continue to drive in this state. It can also give us insight into how the factors affecting levels of fatigue vary across different groups. Once we understand what people do and why, we can design and deliver effective interventions that support the behaviours we want.

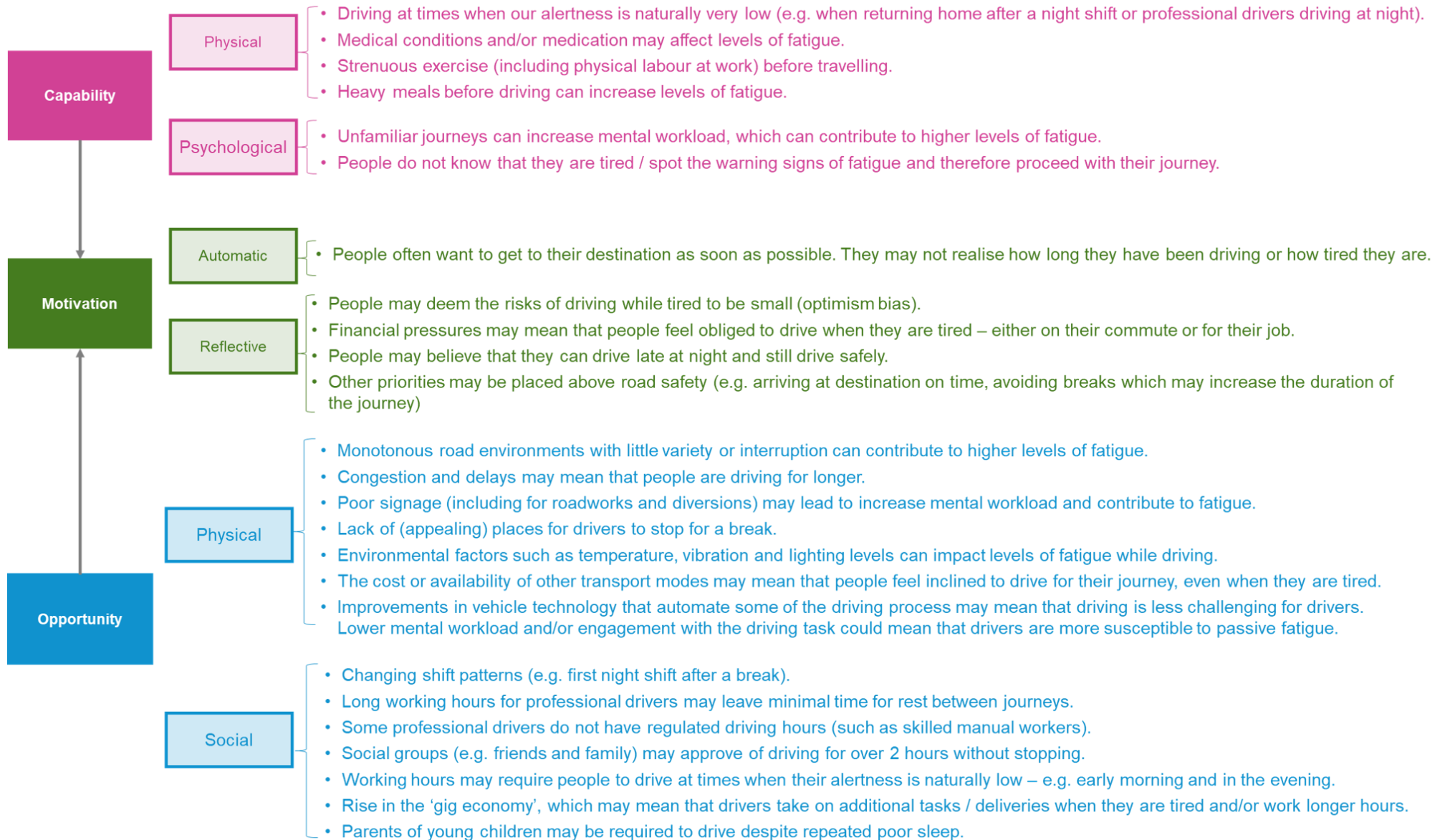
Figure 2 below outlines some of the ways that capability, opportunity and motivation may influence whether people drive when they are fatigued.



When reviewing the factors below, consider the following questions:

- What other potential factors can you think of?
- Are any of these relevant to you or your family and friends?
- What do you think we could do about these factors to encourage a shift in behaviour?

Figure 2 - Factors that may influence driving behaviours when fatigued**



** Factors in **bold** are supported by existing evidence and more information can be found in the 'Fatigue – supporting evidence' document. The other factors presented are not currently supported by evidence but may influence these behaviours.

Read about the experiences of fatigued driving shared by the Taylor family below.

Think about how these stories demonstrate some of the things that influence people's capability, opportunity and motivation to behave in a certain way.

Amina and Phil's story



I've been an HGV driver for just under ten years now and am currently working three nights a week. Phil and I decided this was the best time for me to work as it means that we can look after the girls between us and don't have to pay for extra childcare. I appreciate being able to see my girls in the day, but I must admit it is pretty tiring – especially swapping between the night shifts and being awake on the days I'm not working. When I'm feeling particularly tired, I do take breaks but there isn't always a nice place to stop. I take coffee with me too as the service stations are so expensive!



I think I have it easier than Phil though as I'm forced to take breaks during my shift. He's a self-employed plumber so drives a lot to get to different jobs and works long hours. When our daughters were babies, he insisted on getting up for some of the night-time feeds, so wasn't sleeping well and was still working all week as we needed the money. I remember one time we were driving to my parents when I noticed that Phil's head kept bobbing. I made him stop so I could drive instead, but it made me worry about what he is like when I'm not there to keep an eye on him.

Pop's story

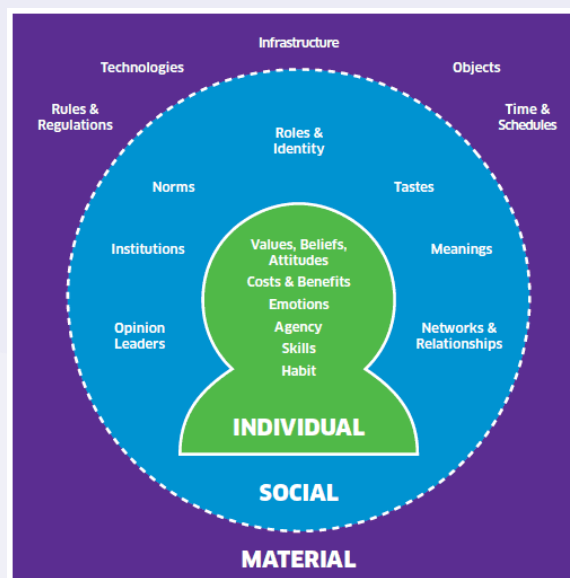


I am fairly safety conscious, even more so as I get older, but I can remember times when I was probably too tired to be driving if I am being very honest. One particular incident that sticks in my mind is a family trip when Eileen and Barry were only youngins. We were driving from Manchester to Cornwall for our family holiday and the traffic was dreadful. We had been in the car for hours, but I was adamant not to stop because the traffic had already delayed us so much. My wife had made sandwiches for the trip and the children were quiet so I thought we could just keep going. When we were moving at speed again I must have zoned out for a while as I nearly ploughed into the back of another car when it braked suddenly. I only noticed when my wife shouted at me! I swerved into the other lane, so we didn't hit the car, but I was lucky that there were no other cars around as I didn't really check before I turned the wheel. Safe to say that I stopped at the next available place for a rest. My wife never let me live it down either – maybe that's why I was so strict with the children about driving!

Tackling fatigue

To tackle fatigue successfully, our interventions need to target specific groups and behaviours that have been identified. When designing these interventions, we need to make use of existing evidence and what we know from behavioural science. In other words, we need to use the right tool for the job! **When tackling fatigue, interventions that reduce the likelihood of people driving when they are tired may be different to interventions that support people to assess their level of fatigue and take appropriate action.**

To maximise the effectiveness of interventions and support long lasting change, it is often useful to **intervene at different levels**. One way to think about this is how we can make changes at the Individual, Social and Material level. It is also beneficial to use a combination of interventions to target different aspects of a behaviour.



ISM Model

There are some examples of interventions that have been used by National Highways to address fatigue, such as the 'Have-a-Kip' campaign and guidance within the 'Biker Safety' campaign. Of those identified, few have been evaluated due to the challenges involved with measuring the direct impact of campaigns on road casualties. However, behavioural science, knowledge about fatigue and lessons learned from these campaigns can help us to consider what interventions *could* be used.

Examples of interventions that may prevent people from driving when tired



Individual

- Work with employers and other organisations to increase awareness of the risks associated with driving when tired (costs and benefits / values, beliefs and attitudes)
- Campaigns to educate drivers about the importance of getting sufficient sleep



Social

- Undertake communications campaigns that highlight the risks involved with driving while tired, with the aim of changing public acceptability of this behaviour (norms)
- Encourage organisations to adopt Fatigue Risk Management approaches, in addition to limits on working hours. This approach involves measuring an individual's fatigue risk rather than relying on prescribed limits for all employees



Material

- Implement legislation to regulate driving hours for currently unregulated professions (rules and regulations). Professions that already have regulated driving hours include goods vehicle drivers and passenger-carrying vehicle drivers (e.g. taxi drivers)^{††}. However, regulations do not apply to company car drivers, emergency services or people who are driving on private roads
- Use journey planning apps to encourage drivers to plan breaks before they start driving and account for this time within the duration of their journey (technologies)

Examples of interventions that support people to assess their level of fatigue and take appropriate action the correct procedures if a breakdown is unavoidable



Individual

- Raise public understanding of the warning signs of fatigue and encourage people to consider which signs are most relevant to them as an individual – such as the Biker Safety campaign (skills)
- Use easy-to-remember slogans or acronyms to help people remember the warning signs of fatigue and the risks involved with continuing their journey (skills / costs and benefits)



Social

- Undertake a campaign that promotes stopping to take a nap as acceptable – such as the 'Have-A-Kip' campaign that was implemented in Thames Valley in 2010 (norms)
- Encourage passengers to monitor the fatigue levels of their friends / family members that are driving and suggest that they

^{††} Gov.uk (no date). Drivers' hours. <https://www.gov.uk/drivers-hours>



Material

take a break rather than continuing their journey (networks and relationships)

- In-vehicle technology that can monitor the warning signs of fatigue and alert drivers if required (e.g. monitoring heart-rate, steering, eye-tracking, length of journey without a break) (technologies).
- Ensure that there are appropriate places for drivers to stop for breaks, which are appealing and not expensive (infrastructure)
- Adding rumble strips to the side of the road to alert drivers if they are drifting out of their lane and prompt them to assess their level of fatigue (Infrastructure)



A note about... evidence^{‡‡}

We build insight by gathering robust evidence...and the quality of our insight will depend on the quality of this evidence. There are six ways the quality of the evidence might be challenged. The PROMPT framework can help to ask good questions of the evidence:



Presentation Is the information presented and communicated clearly?



Relevance Is the work relevant to the question we are asking and the work we are doing? For example, geographically or the level of detail provided.



Objectivity Is the work biased, or motivated by a particular agenda?
Is the language emotive?



Method Is it clear how the data was collected? Were the methods appropriate?



Provenance Is it clear where the information has come from? Are they trustworthy sources?



Timeliness How up to date is the material? Could things have changed?

For more information and help see: The Open University (2014). Advanced evaluation using PROMPT.

^{‡‡} The Open University (2014). Advanced evaluation using PROMPT.
<https://www.open.ac.uk/libraryservices/documents/advanced-evaluation-using-prompt.pdf>

If you only remember three things...

1. There is no silver bullet for tackling fatigue among drivers on our network

Our customer base is extremely diverse – from regular commuters and professional drivers to people that rarely use the network, tourists and leisure drivers. As a result, the reasons why people drive when fatigued and the context in which they do so are also varied. When developing interventions to tackle fatigue, it is important to ensure that we understand the reasons why people drive in this state so that we can intervene at the right level or time, often with multiple rather than single interventions.

2. Bespoke, targeted interventions are likely to bring about greater change

While general communications campaigns can help, bespoke, targeted behavioural interventions, are likely to be more effective at changing behaviours. For example, working with organisations and businesses may be an effective way of targeting professional drivers and those whose fatigue is related to work patterns. Life events may also be key points to target specific customer groups who may be more susceptible to experiencing fatigue – such as new parents and young people who are learning to drive or leisure travellers on their way to vacation. Having the right evidence is essential to ensure that our interventions are targeted appropriately.

3. We don't have all the data

It is challenging to measure the scale of fatigue on the network as many of the scientific techniques used to understand levels of fatigue cannot be implemented on a large scale. We are reliant on self-reported surveys and data collected by the police about collisions that resulted in injury or death. In self-reported surveys, there is a risk that people are not honest about their behaviours and instead give the answers that they think they should provide (social desirability bias). Fatigue may also play a role in non-injury collisions, which are not recorded by the police – or people may be driving in a state of fatigue but be lucky enough to not have an accident. Therefore, overall levels of fatigue may be underreported – or our data may be missing part of the overall picture. For example:

- The extent to which sleep disorders contribute to fatigue-related collisions in the UK is currently unknown.
- Commuter journeys are excluded from the definition of work-related driving, meaning that it is not possible to gauge the true contribution of work-related fatigue to road collisions in the UK.

Additional research may be required with specific groups to gain a better understanding of the factors impacting on fatigue before implementing effective interventions.



How fatigued do you feel now? Has this changed since earlier?

The Karolinska Sleepiness Scale	
1	Extremely alert
2	Very alert
3	Alert
4	Rather alert
5	Neither alert nor sleepy
6	Some signs of sleepiness
7	Sleepy, but no effort to keep awake
8	Sleepy, some effort to keep awake
9	Very sleepy, great effort keeping awake, fighting sleep



Appendix A

A note about... the COM-B model

The COM-B model of behaviour (Michie et al, 2011)^{§§} proposes that individuals need *three* things to enact any behaviour: the capability, the opportunity, and the motivation (see Figure 4 below). These three do not act in isolation, as the arrows in Figure 3 indicate: a person's motivation to do something is affected by the other two: their capability and their opportunity to do it. All three are also affected by the behaviour itself.

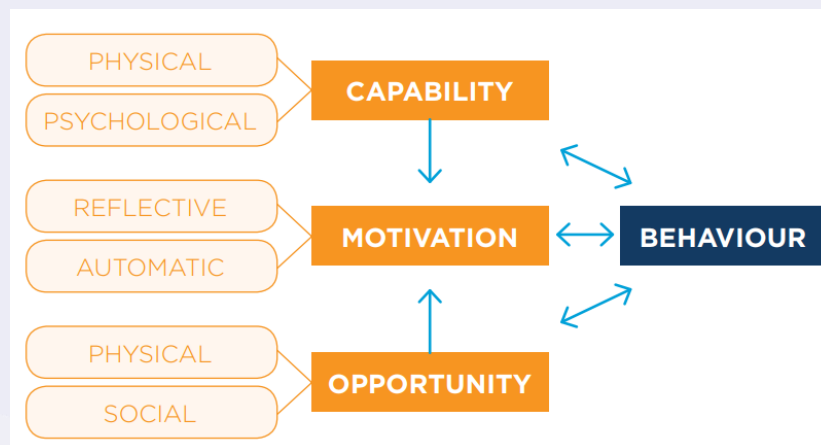


Figure 3 - The COM-B Model

Each part of capability, motivation and opportunity can be further split into two, explaining a little more about these drivers of behaviour:

- *Capability* – can be divided into the *physical* (skill and strength) and the *psychological* ('know how'). Having the capability to e.g. undertake vehicle maintenance activities and follow guidance during a breakdown is all about having the right skills and 'know how'.
- *Opportunity* – can be viewed in *physical* terms (the set-up of the environment, resources etc) and in *social* terms (people who matter to me behave like this or want me to). Having the opportunity to e.g. undertake vehicle maintenance activities and follow guidance during a breakdown is all about having the right context and conditions – resources, support and the like.
- *Motivation* – is split into *reflective* (my considered response) and *automatic* (my reflexes). Having the motivation to e.g. undertake vehicle maintenance activities and follow guidance during a breakdown is all about first having the right context and conditions (opportunity) and the right skills and know-how (capability), and then having the right identity, beliefs, intentions and goals to make it happen. It is hard and largely fruitless to try and impact an individual's motivation if the capability and opportunity is not already there.

^{§§} Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implementation science*, 6, 42. <https://doi.org/10.1186/1748-5908-6-42>

Find out more:

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