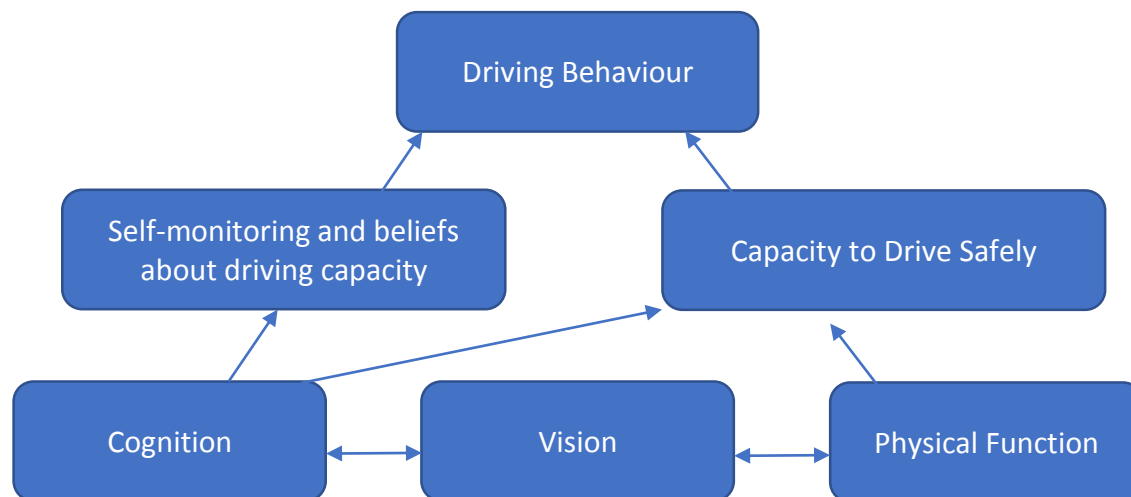


Understanding the Important Link Between Cognition and Road Safety:

To understand the important link between cognition and road safety, a great place to start is Anstey's model¹ of the factors enabling safe driving behaviour.

Anstey et al 2005



Cognition is a cornerstone of driving safety. Cognition cuts across vision as well, for whilst it's the eye that is the lens for capturing visual information, it's the brain which makes sense of the images².

There are two different types of cognition in Anstey's model, 1/ The self-monitoring and beliefs about driving capacity, and 2/ the capacity to drive safely.

Today we will be primarily focusing on skills capacity. The driver's ability to rapidly perceive, interpret and respond to information. Important skills when it comes Identifying a traffic hazard and executing a safety manoeuvre quickly enough to avoid a crash³.

The capacity to drive safely broadly comes down to four major cognitive domains; Attention, Visuo-spatial, Memory and Executive function⁴.

By attention we mean a quick perception of the environment; Encompassing skills such as focus & concentration, visual perception, and peripheral vision, attention skills are vital to a driver's awareness of what's going on around them.

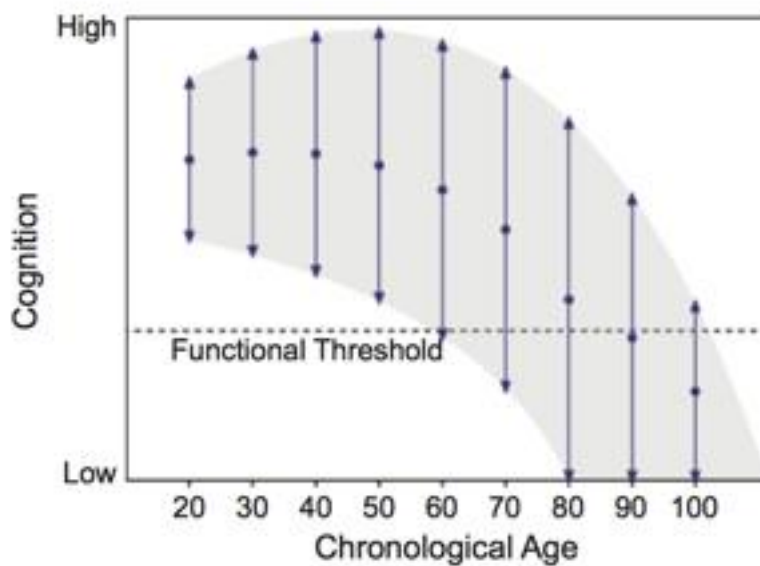
Visuo-spatial refers to skills such as the driver's ability to position the vehicle accurately on the road, manoeuvre the vehicle correctly, judge distances and predict the development of traffic situations.

Memory skills are important for journey planning and adapting behaviour.

Executive function refers to the ability to make sense of multiple simultaneous environmental cues and make rapid, accurate and safe decisions. The prefrontal cortex is central to executive function.

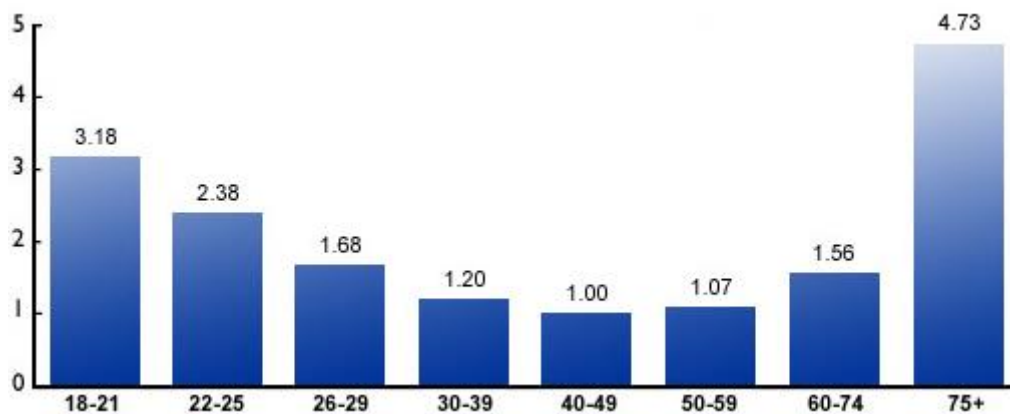
Cognition changes over the lifespan⁵. Gradual decline generally starts occurring from about 50 onwards, before beginning to steepen past the age of 60. There is however great variance across the population, so it's possible to find a 60-year old who may be slipping below the functional threshold, and 90-year old that is still functioning well above it. So, remember here that we're looking at generalisations, everyone's cognition should still be taken on their individual performance levels.

Hertzog et al 2009



However, when looking at the stats, there is a link between driver age risk relative to the lowest group⁶.

Driver age risk relative to lowest group



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Young drivers and older drivers are more at risk. Young drivers face the dual-challenge of driving inexperience and cognitive immaturity. The brain is not fully mature until the 30s and 40's. The prefrontal cortex – the important region of the brain in terms of information processing and decision-making⁷ - undergoes the longest period of development. The frontal lobes help inhibit impulsive behaviour and control executive functions which could otherwise result in higher risk taking propensity, impulsivity and reduced cognitive function which may lead to risky driving behaviours resulting in crash incidents⁸.

Drivers in their 30s 40s and 50s benefit from both peak levels of cognition and many years of driving experience.

From 60 onwards, cognitive decline starts to set in, which may be a contributing factor to the increase in driver age risk for that population.

It is important to appreciate that different cognitive abilities will not all decline at the same rate⁹. Look not only at an individual's overall cognition level, instead break it down by all the respective driving-related cognitive skills.

Relatively simple neuropsychological assessments can provide insights into an individual's driving-related cognitive skills¹⁰. The feedback from these assessments can provide individuals with forewarning of any deficiencies - any 'blind spots', that they may have.

Self-awareness of the capacity to drive safely being an important first step in identifying areas of risk – altering beliefs about driving capability, and changing behaviour by developing compensatory in-vehicle strategies to enhance driving safety.

Summary:

1. Cognitive skills are essential to safe driving,
2. A multi-factor approach is required to measure cognition,
3. Assess regularly, cognitive skills change over the lifespan,
4. Ensure that drivers engage with the feedback; it's critical to producing positive driver behaviour change.

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⁸ Moleni, J. (2010). [Executive Functions and Risk Propensity in Adolescent and Adult Male Drivers: A Comparison](#) (Thesis, Master of Social Sciences (MSocSc)). University of Waikato

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