

Young drivers

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SWOV



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Summary

In 2009-2018, an annual average of 51 young drivers and passengers (aged 18-24) were killed in traffic. For young drivers, fatal crash risk is 4,5 times higher than for more experienced drivers. Crash risk is highest during the first year after acquisition of the driving licence, and subsequently decreases fast as young drivers gain more experience.

In 2015-2019, an annual average of 92 road deaths were registered due to crashes involving young drivers (aged 18-24). Relatively often, young male drivers were involved. Young drivers are relatively more often involved in crashes that occur under unfavourable conditions (e.g. in the dark, and in rain or snow), and in weekend nights. Crash risk increases when young people drive under the influence of alcohol or when they are distracted by phone use or by young passengers. Relatively often, young people drive under the influence of drugs or drive when they are fatigued. Their high crash risk is caused by a combination of their young age (the brain is not fully developed until the age of 25) and their lack of driving experience. They are more inclined to take risks and are susceptible to peer pressure. They also have trouble predicting how traffic situations will progress, anticipating potential dangers, and focusing their attention on relevant traffic elements. While risk reduction is not a simple matter, opportunities may be found in adding an intermediate phase in driver training – in between the phases of accompanied driving and the provisional licence phase – and in using several systems that may support young drivers.

SWOV fact sheet [Driver training and driving tests](#) elaborates on the road safety effects of driver training and driving tests.

1 How many casualties are involved in crashes with young drivers?

In 2009-2018, an annual average of 51 young drivers and passengers (aged 18-24) were killed in traffic¹ (Source: Statistics Netherlands; *Figure 1*).

¹ As of 2019, this data breakdown has no longer been available.



Figure 1. The number of road deaths among young drivers and passengers (aged 18-24) in 2009-2018 (Source: Statistics Netherlands).

An annual average of 92 road users were killed in registered crashes² involving young drivers in 2015-2019³ (BRON, 2015-2019). Of these fatalities, 36% concerned the young drivers themselves and 21% a passenger in the same age group. By way of comparison: in fatal crashes involving drivers aged 30 to 65, 40% were the drivers' own car occupants. Casualties among the crash opponents of young drivers were slightly more often car occupants (52%), but less often cyclists (25%) than casualties among the crash opponents of drivers aged 30 to 65, see Figure 2 (BRON, 2015-2019).

² Although the registered number of road deaths may differ from the actual number, we expect the registered numbers for young drivers to be fairly comprehensive.

³ We chose the 2015-2019 period, since the 2014 and 2020 data show trend breaks: in 2014, due to registration differences, and in 2020, due to the mobility effect of the corona pandemic.

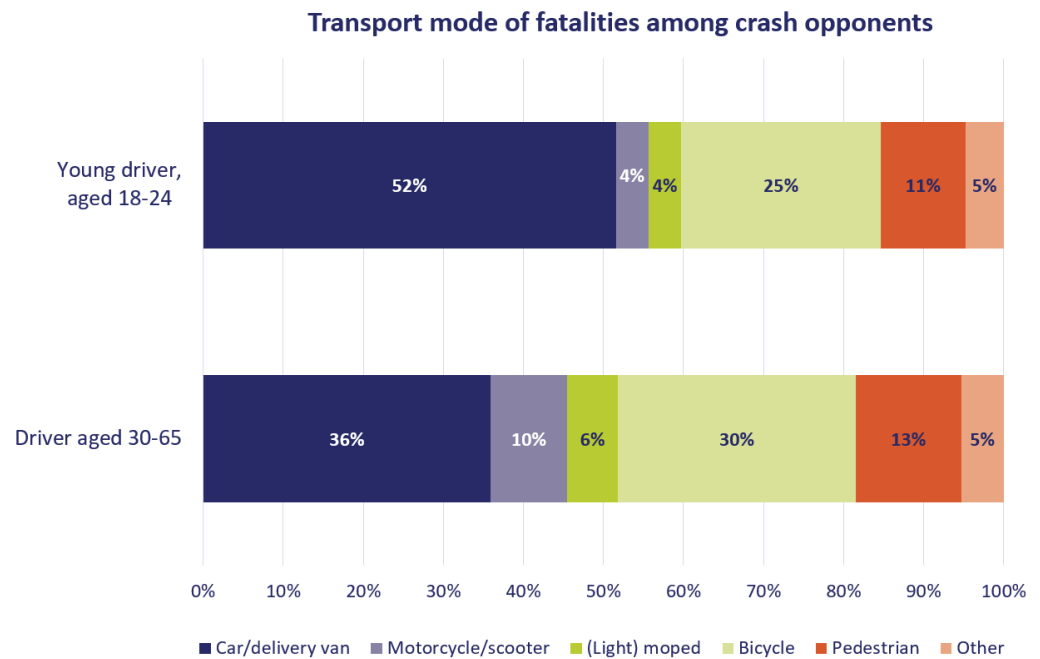
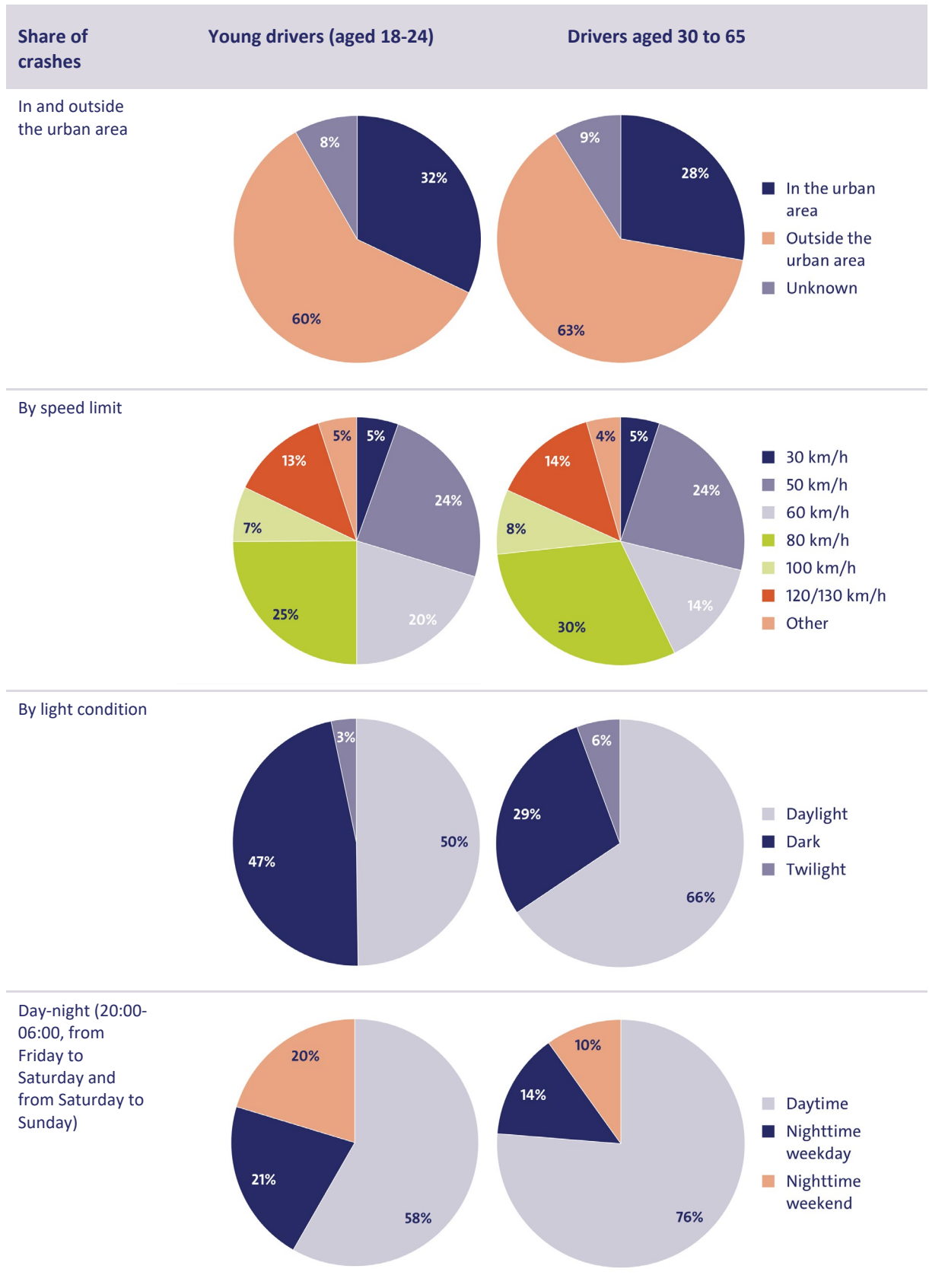


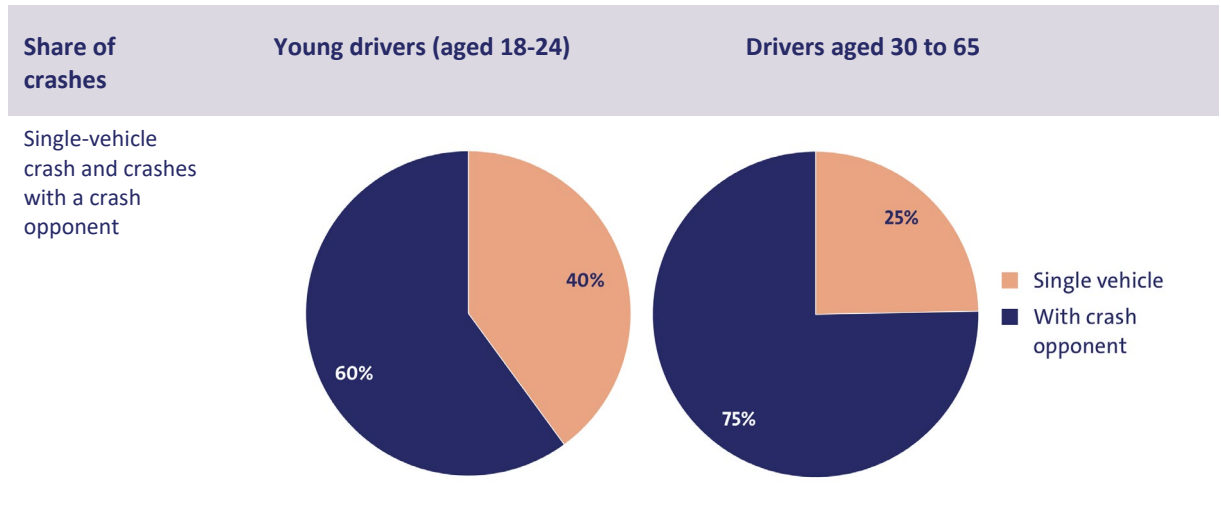
Figure 2. Fatalities among crash opponents by mode of transport, in crashes involving young drivers (aged 18-24) or drivers aged 30 to 65 (BRON, 2015-2019).

2 What kind of crashes are young drivers mostly involved in?

The crashes registered in the Netherlands show that young drivers are relatively often involved in crashes in the dark and in weekend nights (see *Table 1*). In 2015-2019, they were slightly more often involved in urban crashes and on 60km/h roads than drivers aged 30 to 65, but less often on 80km/h roads. Young drivers were also more often involved in single-vehicle crashes than drivers aged 30 to 65. Single-vehicle crashes are crashes in which no other road user is involved, such as collisions with trees or other objects (BRON, 2015-2019).

Table 1. Characteristics of crashes of young drivers (aged 18-24) and of drivers aged 30 to 65 in 2015-2019 (BRON, 2015-2019).





An international review of research into crashes involving young drivers shows that they are relatively often involved in crashes in the dark, and on rural roads [1].

3 Do young drivers have a higher crash risk than older drivers?

The risk of involvement in a fatal crash per billion kilometres travelled ⁴ is 4,5 times higher for young drivers (aged 18-24) than for drivers aged 30 to 65: 13 young drivers (aged 18-24) compared to 3 drivers aged 30 to 65 (BRON, 2015-2019, OViN/ODiN, 2015-2019).

4 How does crash risk develop during the driving career?

Somewhat older Dutch research shows that crash risk is highest just after acquisition of the driving licence and that it decreases fast during the first years due to drivers gaining more experience [2]. In 2017, Curry and colleagues found the same effect among a large group of American novice drivers [3]: the younger the driver, the higher the crash risk at the start of the driving career. During the first few years, the crash risk for young novice drivers does decrease more rapidly than it does for older novice drivers [3]. Vlakoveld [2] also clearly shows this in the figure below.

⁴ The number of kilometres travelled is based on passenger car drivers, because the number of kilometers travelled for professional delivery vans is not available per age group.

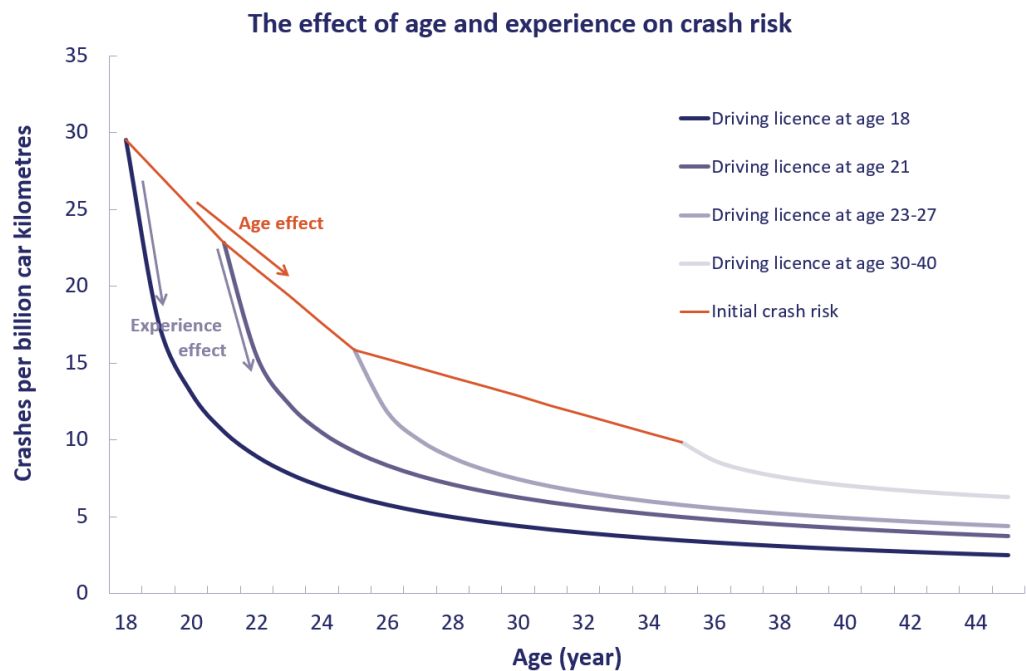


Figure 3. Decrease of crash risk for novice drivers who started their driving careers early and for novice drivers who started their driving career later/late (based on self-reported crashes and mileage; [2]).

5 Why is crash risk higher for young drivers?

Crash risk for young drivers is determined by several related factors [1]. The relatively high crash risk for young drivers is due to individual factors such as development of the brain, lack of higher-order skills (such as the ability to predict how traffic situations will progress), lack of driving skills and the driver's attitude towards driving a car. In addition, temporary factors and the social environment may increase the risk.

Development of the brain

A person's brain is only fully developed around age 25. The part of the brain that urges us to 'to think first and act later' is the last part to fully develop. It ensures that previous experiences are used to make decisions [4]. The part of the brain that regulates emotions, motivation, and satisfaction of needs is much quicker to fully develop [5]. Due to this asynchronous development, young drivers are more inclined to take risks, are susceptible to peer pressure and seek to satisfy their own needs such as 'pleasure' [6]. The capacity of our working memory, that enables us to remember items as long as they are relevant to us, also continues to develop during adolescence. The slow development of this capacity is associated with a self-reported increased crash risk [7].

Higher-order skills

Reference is often made to higher-order skills or executive functions that are still in the making due to the slow development of the brain. Thus, young drivers have trouble predicting how a traffic situation will progress, which makes them less proficient in anticipating potential dangers than more experienced drivers [8]. They also have trouble fully appreciating risks and are inclined to overestimate their skills. That is why their (risky) behaviour is not in accordance with their abilities [9]. In addition, a certain negligence towards risk makes particularly young men tolerant of higher traffic risks [10]. Due to the limited capacity of the working memory and the inability to fully control impulses, young road users are less able to process stimuli and focus their attention on relevant elements of the traffic situation, to make decisions, and plan how to behave [7].

Driving experience

Young drivers run the highest risks during the first year of driving independently (for more information, see the question [How does crash risk develop during the driving career?](#)). They consider the acquisition of a driving licence to be proof of their driving proficiency, which was after all established by an examiner [11]. However, they still have to gain experience in applying the acquired skills in different situations during the first few years after their initial qualification [12].

Attitude towards driving and risky driving behaviour

For young drivers that really appreciate cars and love driving, or for those who really enjoy going out, crash risk is higher than average (e.g. see the Danish study by Møller and Sigurðardóttir [13]). Their friends affect the risk behaviour of young drivers. The attitude of their friends towards risky driving behaviour (the peer group standards) relates to the extent to which young drivers display risky driving behaviour (e.g. see studies in Germany [14] and Israel [15]).

Factors that temporarily reduce fitness to drive

When comparing young drivers to middle-aged drivers, the following effects of temporary factors can be noted:

- Young drivers do not drink-drive more often, but do run higher risks when drink-driving (see the question [Is the use of drugs and alcohol a problem among young drivers?](#) and SWOV fact sheet [Driving under the influence of alcohol](#)).
- Young male drivers more often drive under the influence of drugs. See the question [Is the use of drugs and alcohol a problem among young drivers?](#) and SWOV factsheet [Drugs and medicines](#) for more information about drug use by young drivers.
- International research shows that young drivers are more often distracted by young passengers while driving [16] and by the use of audio devices and mobile phones [17], which greatly increases crash risk. For more information about this subject, see the question [Is distraction a problem for young drivers?](#)
- For young drivers, fatigue is of more importance, because they more often drive at night, when the natural inclination to fall asleep is felt ([18]; SWOV fact sheet [Fatigue](#)). In addition, a mismatch exists between the biological development of the sleep-wake rhythm, the amount of sleep young people need and the daily rhythm imposed by school, education or work [19]. Yet, for young people fatigue caused by lack of sleep is hard to intuit and therefore also hard to control [20]. A UK study shows that lack of sleep is related to a higher crash risk [21].

- Extreme emotions may cause young drivers to display risk behaviour. The way in which emotions affect behaviour, depends on the personality of the young drivers and the context in which they find themselves [22].

Social environment

A 'sporty driving style' is adopted to impress friends. For young drivers with one or more young passengers, crash risk is higher than if they drive without passengers. Conversely, crash risk decreases in the presence of middle-aged passengers. The presence of young passengers increases risk more strongly for male drivers than for female drivers. For young male drivers, the effect of the presence of a passenger is greater when the passenger is male than when she is female [16]. Parents set the example for their children; a parent's driving behaviour therefore predicts the driving behaviour of young drivers [23]. Moreover, a young driver's risk behaviour depends on the extent to which parents encourage safe behaviour and set clear boundaries [4].

Speed

International literature shows that young drivers are relatively often involved in crashes caused by not adjusting their speed to the traffic conditions [24], for example when cornering [25]. The inability to adjust speed to traffic conditions is related to several factors mentioned above, such as insufficient driving experience, trouble in balancing risk behaviour and one's own skills and coping with peer pressure. Dutch research into self-reported speeds shows that young drivers do not exceed speed limits on motorways just after driving licence acquisition, but that this changes when they are somewhat older (aged 20-24) [8].

Environment

Young drivers relatively often drive in conditions that also increase crash and injury risk for experienced drivers: they often drive in somewhat older cars with fewer passive and active safety devices [26] and they probably drive in the dark more often.

6 Is the use of drugs and alcohol in traffic a problem among young drivers?

Alcohol

According to key figures of Trimbos Institute, the Netherlands Institute of Mental Health and Addiction, young adults (aged 18-29) are more often prone to excessive or heavy drinking than older adults [27]. During weekend nights, however, young drivers do not drink-drive more often than older drivers [28], but, compared to older drivers, their crash risk is higher at a lower blood alcohol level [29] [30]. This is probably caused by inexperience in alcohol consumption, inexperience in driving and by a combination thereof. Of all young drivers with a blood alcohol level in excess of the limit, 60% are accompanied by one or more passengers [31]. Because of this

accumulation of risks, drink-driving by young drivers is a matter of concern. For more information about drink-driving, see SWOV fact sheet [Driving under the influence of alcohol](#)).

Drugs

Young men more often drive under the influence of drugs than both older drivers and young women, especially where cannabis use is concerned. Yet, not much is known about the relationship between substance use and crash risk (see SWOV factsheet [Drugs and medicines](#)). What international research has made clear, however, is that the use of multiple drugs, or the combination of drugs and alcohol results in a higher crash risk [32] [33].

7 Is distraction a problem for young drivers?

For young drivers, distraction by mobile phones or other in-car systems, but also distraction by peer passengers, increases crash risk. See SWOV fact sheet [Distraction in traffic](#) for more information about distraction in traffic in general.

Young people are inherently curious about new stimuli [19], they have trouble focusing on the traffic stimuli that are most opportune, and their ability to suppress impulsive reactions is not very well-developed yet (see the question [Why is crash risk higher for young drivers?](#)). Among other things, this is reflected by increased distraction by mobile phones and other media. Young American drivers (aged 16-29) are more often engaged in distracting activities such as texting behind the wheel (3.3 % of the driving time) than drivers aged 30 to 64 (1.1% of the driving time) [34]. A study that compared drivers of different age groups shows that operating a screen (e.g. for texting, searching the internet, or entering a phone number), or reaching for an object, will increase the risk of a crash for all drivers in all age groups [34] [35] [36]. Unlike older drivers, younger drivers also run a higher crash risk if they are accompanied by young passengers [16] [34] [37] [38] [39], or if they make a phone call while driving [34] [37]. Conversely, if they are accompanied by an adult passenger, the crash risk for young drivers is lower than when they are unaccompanied [39] [40].

8 Does the present driver training adequately prepare for independent driving?

Dutch driver training aims to teach aspiring drivers to acquire the skills needed to drive a car, to apply traffic rules and to teach them how to behave in traffic. Higher-order skills that are troublesome for young people (see the question [Why is crash risk higher for young drivers?](#)) are hardly practiced at all. Yet, these skills are essential to safe traffic participation. This is one of the

reasons why a strong link between driver training and crash risk for young drivers is hard to ascertain (see SWOV fact sheet [Driver training and driving tests](#)).

In the Netherlands, freedom of education is laid down by law. Therefore, the government cannot impose what topics should come up during driving lessons. That is why the Netherlands, in contrast to other countries, does not have a national curriculum. Driver training topics are therefore largely determined by what is tested during driving tests. This implies that, in spite of their importance to road safety, a number of skills that are hard or impossible to test are not addressed at all. Examples of these omissions are risk acceptance, self-awareness, and resilience to peer pressure [24] [41] [42] [43]. Young drivers will have to develop these higher-order skills by clocking up mileage behind the wheel. At the time of writing this fact sheet (July 2021), experiments to reduce crash risk for young drivers are underway [44] [45]. For more information about driver training and driving tests in the Netherlands, see SWOV fact sheet [Driver training and driving tests](#).

9 Which measures were taken and what were their effects?

Provisional licence

In the first five years after initial qualification, whatever the driving licence category, a simple demerit point system applies. The associated licence is called a provisional licence. Two serious traffic offences for which the driver was apprehended are followed by an investigation to assess the offender's driving skills. The effectiveness of provisional licencing appears to be limited. Research has not been able to show that provisional licencing has a deterrent effect (general preventive effect) on novice drivers [46] [47]. Knowledge about the rules and sanctions, and the driver's own opinion about the legitimacy of the rules, determine compliance with the rules, as shown by a study of the support base for graduated licencing (which includes provisional licencing) among young people in Australia [48]. For more information about the provisional licence, see SWOV fact sheet [Driver training and driving tests](#).

Lower alcohol limit for novice drivers

International research shows that lowering the alcohol limit for novice drivers results in less drink-driving and fewer crashes. Dutch figures, however, do not show such a reduction. In the Netherlands, lower alcohol limits for novice drivers (mostly young drivers) were introduced in 2006. Data about drink-driving by young road users in the four years before and after the introduction of the lower limits (2002-2010) show that drink-driving by young road users did not decrease more strongly than drink-driving by older road users [28]. Neither did the number of alcohol-related road casualties among young people decrease in the first two years after introduction of the lower limits [49]. For more information, see SWOV fact sheet [Driving under the influence of alcohol](#).

LEMA

The Light Educational Measure Alcohol (LEMA) is a rehabilitation course intended for novice drivers who were caught drink-driving with a blood alcohol content between 0.5 and 0.8, and for experienced drivers caught drink-driving with a blood alcohol content between 0.8 and 1.0. The course intends to make participants aware of the causes and risks their problem behaviour entails and to show them how they may change their behaviour to avoid future problems. Participants have to pay for the course themselves. A study by the Research and Documentation Centre WODC found no demonstrable effect of LEMA on recidivism (both general traffic offence recidivism and drink-driving) [50]. For more information, see SWOV fact sheet [Traffic enforcement](#).

Accompanied driving (2toDrive)

Since 2011, accompanied driving – in the Netherlands known as ‘2toDrive’ – has given young people the opportunity to drive a car under the supervision of an adult, starting at the age of 17. The experience gained under supervision is expected to result in fewer crashes once these young drivers start driving independently. An evaluation of the 2toDrive experiment in 2015 was inconclusive about its road safety effect [51]. In other countries, for example Sweden and Germany, positive effects on crash rate were reported, although there are other countries where no positive effects were found, such as Norway and France. The number of kilometres driven while accompanied and the variation in circumstances (sufficient learning opportunities) are aspects that are important to the effectiveness of accompanied driving (SWOV fact sheet [Driver training and driving tests](#)).

10 How can driver training, theory tests and practical driving tests be improved?

The literature shows that the quality of driver training and driving tests does not affect the road safety of young drivers (SWOV fact sheet [Driver training and driving tests](#)). Additional training or adding an extra phase to the graduated licence may improve driver training or driving tests.

Additional training

Additional training following licence acquisition may affect the road safety of young drivers if it addresses higher-order skills and social factors that are relevant to their high crash risk. Examples are hazard perception training and training courses to enhance traffic insight and self-awareness. Moreover, young drivers may benefit from general training courses about risk behaviour and ways to increase resilience. SWOV fact sheet [Driver training and driving tests](#) addresses these issues in more detail.

Graduated driver licensing

At the moment, the Netherlands have implemented two phases of graduated driver licencing (see SWOV-fact sheet [Driver training and driving tests](#)):

- a learner phase (accompanied driving: 2toDrive) in which novice drivers are supervised to gain experience in driving after initial qualification;
- a provisional licence in which the novice driver can drive independently, governed by strict rules.

The introduction of an intermediate phase during which young road users are only allowed to drive in relatively safe conditions (for example no alcohol or no young passengers) could result in a reduction of risk for young drivers [52]. This allows novice drivers more time to practice and to gain experience with situations that are not a priori risk-increasing. Safety effects of graduated licencing are mainly due to a delay in exposure to dangerous driving circumstances and to accompanied driving; there are less strong indications that graduated licencing will improve young people's driving skills [53] [54]. There are, however, indications [55] that active parent involvement in the phases of graduated licencing will reduce crash risk for young drivers.

Modular driver training

Modular training is often mentioned as a method to improve Dutch driver training. However, in the Netherlands, teaching methods may not be imposed on driving schools. The 'Driver Training in Steps' (In Dutch: De Rijopleiding In Stappen (RIS)) and its successor 'Tailored Driver Training' (In Dutch: De Rijopleiding Op Maat (ROM)) take a modular approach to teaching candidates to drive. RIS consists of four modules in an ascending order of difficulty (for more information, see rijbewijs.nl). An initial study shows that ROM had a positive effect on driving behaviour half a year after licence acquisition [56]. Yet, no solid conclusions may be drawn, since the study did not make use of random selection. Further research into the effectiveness of modular driver training in reducing crash risk for young drivers is needed, since modular training is not only known for the speed with which skills are acquired but also for reduced retention of these skills and the insufficient application of the skills in new situations [57]. Moreover, scientific research shows that the quality of the driver training does not affect the road safety of young drivers, since driver training teaches basic skills that are a prerequisite for safe traffic participation, but hardly affects the factors that increase crash risk for young drivers (see SWOV fact sheet [Driver training and driving tests](#)).

11 Which other measures can be taken?

Systems for monitoring behaviour and feedback

Systems that monitor driving behaviour of young people and give feedback to the young drivers themselves or to their parents/supervisors have existed for some time; they are sometimes deployed by insurance companies. Driving behaviour is monitored by in-car devices, a datalogger or a phone app. The system measures g-forces exerted on the car, speed, road position, use of safety belts and distance to other traffic. It can give direct feedback on driving behaviour, or

feedback to the young drivers or their parents/supervisors after the car journey. International research shows that monitoring-feedback systems may reduce dangerous driving behaviour by more than 50% [33] [58]. If this also translates into a reduction of crash risk, has not yet been sufficiently researched to allow for sound conclusions. Implementation thresholds of monitoring-feedback systems concern acceptance by young drivers and their parents/supervisors that is related to issues of privacy and the bonds of trust between parents and children. Positive framing of the use of monitoring-feedback systems may improve acceptance rates, for example by adding a game element [59]. Expectations are that such a system will not be effective for all young drivers. Particularly young drivers who overestimate their own skills will benefit from the system, as Ouimet and colleagues [60] showed for alcohol interlock instalment in the cars of young drivers.

Systems to prevent distraction by phone use

Possibly, telephone use while driving can be prevented by certain phone apps. Various apps are available on the Dutch market (for a description see the [ANWB website](#)). The apps can block incoming messages for as long as the young drivers are behind the wheel which reduces distraction. Yet, we expect that it is precisely the group of young drivers that display the most dangerous behaviour that will not use such an app, or will find ways to circumvent it [38]. Installing a 'soft blocking' app – which only blocks the telephone sound while driving – is a less rigorous option that might therefore be easier to accept [61]. In the Netherlands, the Auto-modus app of insurance company Interpolis was assessed. This app not only blocks incoming messages, but also hands out compliments or awards merit points to young drivers when they have not used their phones while driving. Compared to the control group, the participants reported less phone use in the weeks they used the app [62].

Publications and sources

Below you will find the list of references that are used in this fact sheet; all sources can be consulted or retrieved. Via [Publications](#) you can find more literature on the subject of road safety.

Relevant reviews about young drivers:

International handbook on young drivers: Fisher, D.L., Caird, J.K., Horrey, W.J. & Trick, L.M. (2017). [*Handbook of teen and novice drivers: research, practice, policy, and directions*](#). CRC Press, Boca Raton.

Dutch review of the state of knowledge about young drivers, dating from 2005: Vlakveld, W.P. (2005). [*Jonge beginnende automobilisten, hun ongevulsrisico en maatregelen om dit terug te dringen \[Young, novice motorists, their crash rates, and measures to reduce them. A literature study\]*](#). R-2005-3 [Summary in English]. SWOV, Leidschendam.

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