

Use of the mobile phone while driving

Summary

Using a mobile phone while driving has negative effects on driving behaviour and increases the crash rate. This is not only because drivers are physically, visually and audibly distracted while operating the phone and the vehicle simultaneously, but more particularly, because they also have to divide their attention between using the phone and driving (cognitive distraction). As the major hazard derives from cognitive distraction, hands-free phoning has no notable safety advantages compared to hand-held use. However, a total prohibition of mobile phones is not realistic. For this reason, only hand-held use is forbidden in many countries. In addition, technical measures, information and education can enhance responsible use of the mobile phone.

Background and content

In almost 80% of all crashes and 65% of all near-crashes some kind of distraction or inattention plays a part in the three seconds prior to the (near-) crash (Neale et al. 2005). Distraction is caused by an activity, event or object in or outside the vehicle while driving. Inattention, on the other hand, may occur without a specific external cause and may be the result of thinking about other things or daydreaming. The prevalence of driver distraction is expected to increase in the near future, as a result of a growing number of technological applications becoming available in motor vehicles. The mobile phone is one of the applications that is universally available and accepted. The first mobile phones only had a call function, but recent mobile phones (smart phones) have an increasing number of features that may distract the driver.

This fact sheet describes the reasons why it is hazardous to use a phone in the car, gives an estimate of the increased risk and discusses the measures and the effectiveness of legal prohibition. This fact sheet discusses the use of mobile phones by car drivers only. Information about the use of mobile phones by cyclists and pedestrians and its consequences can shortly be found in the SWOV fact sheet *Use of portable media devices by cyclists and pedestrians* (to be published).

In which ways are drivers distracted?

There are various types of distraction while driving (Ranney et al., 2000):

1. visual distraction, such as, watching a screen instead of the road;
2. auditory distraction, such as reacting to a ringtone;
3. bio-mechanical/physical distraction, such as using a mobile phone manually;
4. cognitive distraction, such as concentrating on the conversation and not on the driving task.

As the examples show, all these kinds of distraction play a part in the use of a mobile phone while driving. Cognitive distraction mainly occurs during the actual conversation.

Why is the use of mobile phones hazardous?

Various (review) studies have been published discussing the behavioural effect of the use of a mobile phone while driving (Caird et al., 2008; Dragutinovic & Twisk, 2006). These studies have shown that the following aspects have negative effects on road safety.

Slower reactions

A telephone conversation causes considerably slower reactions to the traffic environment. The increase in reaction time while phoning turns out to be 0.25 seconds on average, and is even higher while dialling a telephone number (0.36 seconds). While phoning, drivers start applying the brakes later when reacting to changes in speed of the vehicle ahead of them or reacting to road signs, and eventually brake more strongly: they come to a standstill more quickly. The distance to a vehicle ahead, a stop line or a junction turns out to be shorter at standstill.

Less control

Drivers appear to have less control over the vehicle while being on the phone. Keeping in lane turns out to be more difficult and turning left or merging is also negatively affected. While phoning, drivers also adjust less well to possible hazardous road conditions, such as a slippery road surface.

Increased mental effort

Mobile phone use requires greater mental efforts. This results in drivers paying less attention to other things and, for example, overlooking aspects of the traffic situation. This applies to details present in the peripheral field of vision in particular. The situation awareness, consisting of the elements of perception, understanding and prediction, deteriorates in all three aspects, because the telephone conversation demands all the attention. The extent to which the driving performance deteriorates is dependent on the emotional intensity of the conversation and the demands set by the driving task at a particular moment.

Do drivers adjust their behaviour?

Drivers can adjust their behaviour in different ways. On a strategic level, drivers can take decisions about the *use* of the phone itself. Subsequently, drivers can adjust their *driving behaviour* if they use the phone.

Even though most drivers realize that mobile phone use renders the driving task more difficult, they nevertheless tend to use the phone when they consider the conversation to be important. The extent to which drivers adjust their phone use partly turns out to be dependent on the driver's age. Young drivers, who generally think that they can sufficiently compensate for distraction during the driving task and who often overestimate their driving performance, use the phone more frequently while driving (Schlehofer et al., 2010). What makes it difficult for people to adjust their phone use is their inability to estimate to what extent this actually affects their driving task (Horrey, Lesch & Garabet, 2008).

Drivers often adjust their driving behaviour while using the phone in order to be able to perform this task: compensatory behaviour. The most obvious example of compensatory behaviour is lower speed and (sometimes) greater variation in speed. Drivers also tend to drive at greater distances from cars ahead.

Is hands-free phoning safer than hand-held phoning?

Hand-held versus hands-free phoning is and remains one of the most frequently studied issues. An ample majority of the studies conclude that hands-free phoning has no significant advantage compared to hand-held phoning. Although in the case of hand-held phoning only one hand is available for the driving task, the most negative characteristic of mobile phones equally applies for hands-free phoning: shifting the focus of attention from the driving task to the conversation. The negative effects on the driving task, such as the increased reaction time, are similar for hand-held and hands-free phoning (Caird et al., 2008) and the crash rate is also similar (McEvoy et al., 2005). A number of studies show that drivers using hand-held phones compensate for the negative effects of phoning more readily than drivers using hands-free phones.

Is it safer to talk to passengers than to talk on the phone?

Passengers are a well-known source of distraction. For this reason, one of the predominant arguments against the prohibition of mobile phoning is that a conversation on the phone does not differ from a conversation with a passenger. Indeed, the contents of the conversation turn out to be hardly different. However, the major difference is that a conversation with a passenger is self-regulating as a result of direct contact. The passenger is aware of the driving situation, so that the complexity and the pace of the conversation is often adjusted (Drews, Pasupathi & Strayer, 2008). The person at the other end of the phone is not aware of the traffic situation and can therefore not take this into account.

How and how often do car drivers use a mobile phone?

Figures from 2008 (Intomart GfK, 2008) indicate that 48% of Dutch drivers with a driving licence for passenger cars phone from their cars at least once a week. Around 30% of this group indicate that they use a hand-held phone occasionally. This percentage is higher for drivers of leased cars: 39%. Men turn out to use hand-held phones more often than women (34% vs. 26%). Also younger drivers (25-34 years) turn out to use hand-held phones more often in comparison (40%). Apart from that, people report to make use of a phone reactively (answering the phone) more frequently than actively (phoning) while participating in traffic. No Dutch figures are available about the use of the phone while driving for purposes other than a telephone call, such as, text messaging or searching for information.

What is the risk of using a mobile phone in the car?

Neither in the Netherlands, nor in other countries data about the use of a mobile phone in the car and its use prior to a crash is collected structurally. This makes it very hard to determine the risk of the use of a mobile phone in the car. Moreover, from the point of view of possibly liability, it is highly unlikely that a driver involved in a crash will tell the police that he/she was phoning right before the crash. Smaller-scale studies show that drivers using a mobile phone while driving are estimated to have a factor 2 to 9 higher crash rate than drivers not using a phone. Redelmeier & Tibshirani (1997) and McEvoy et al. (2005) showed that the crash rate was four times higher in the case of mobile phoning compared with non-usage of a mobile phone. This need not imply a direct causal relationship between the use of a mobile phone and the crash rate. In fact, it turns out that people who phone in the car also behave hazardously in other respects. For instance, mobile phone users use a seatbelt less often than non-users, drink and drive more frequently and commit more speeding offences (zie Beck, Yan & Wang, 2007).

How does the risk of using a mobile phone compare with drink driving?

Research has been carried out that compares the risks of using a mobile phone in the car with drink driving (Strayer, Drews & Crouch, 2006). This research shows that it is almost equally hazardous for a driver to use a mobile phone, as it is to drive with a 0.8‰ blood alcohol concentration. Although the risks are similar, the specific effects actually differ: while using the mobile phone, drivers mostly tend to drive more slowly (even if asked to drive at a specific speed); they react more slowly to road signs and they fail to notice a considerably larger number of direction signs. On the other hand, drivers who drink and drive operate at a higher speed and apply a more aggressive driving style with shorter headways.

What are the effects of the extra features of the mobile phone?

Initially, research into the effect of mobile phone use on driving behaviour was restricted to hand-held/hands-free *phoning*. Meanwhile, the use of the phone for text messaging has increasingly become the subject of research, especially in the United States and Australia. When the phone is used for the purpose of text messaging, visual, as well as physical distraction is usually important, in addition to cognitive distraction. Therefore, this behaviour is considered as even more hazardous than mobile phoning. When using the text messaging feature, people turn out to react more slowly to information in the peripheral field of vision, they drive more slowly, sway more and watch the road less often compared with using the call function (Libby & Chaparro, 2009). The more recent mobile phones, the so-called smart phones, have even more features that may distract the driver, such as an address book, E-mail, a diary, navigation and Internet. No research has (yet) been conducted into the effects of the use of these specific features.

How effective is a legal prohibition?

One of the most frequently applied legal measures against phone use in a vehicle is the prohibition of hand-held use of phones. In the Netherlands, this prohibition has been in force since April 2002. In a number of countries, hands-free use of the mobile phone is also prohibited. However, the effect of legislation on driving behaviour turns out to be disappointing, especially in the case of young people (see for instance Foss et al., 2009). In the Netherlands, no objective data is available about the use of the mobile phone since the introduction of the legal prohibition. More subjective data, about self-reported use (Zandvliet, 2009; see *Table 1*), shows that the use of hand-held phones in the car has been increasing, rather than decreasing the last few years: in 2003, the first year following the introduction of the legal prohibition, 77% stated never to use a hand-held phone in the car; in 2005 this was 75% and in 2007 70%. Compared with the situation prior to the legal prohibition, however, there has been an improvement: in 2001, 60% stated never to use a hand-held phone. Hands-free phoning has also increased, rather than decreased: in 2003, 63% stated never to do this; in 2005 this was 59% and in 2007 54%. The legal prohibition of hand-held phoning seems to have had an effect on hands-free phoning as well: namely in 2001, 42% stated never to phone hands-free. In 2003 this was 63%.

	2001	2003	2005	2007
Hand- held				
Often	4	1	2	2
Sometimes	36	22	24	29
Never	60	77	75	70
Hands-free				
Often	26	14	14	17
Sometimes	32	23	27	29
Never	42	63	59	54

Table 1. *Percentage of people indicating that they often, sometimes or never use a hand-held or hands-free phone while driving in 2001, 2003, 2005 and 2007 in the Netherlands (Zandvliet, 2009).*

In the Netherlands, the number of fines for hand-held mobile phoning has sharply increased over the years: from 55,000 in 2003 to 135,000 in 2009 (figures from the Central Fine Collection Agency (CJIB)). Obviously, these figures not only refer to the number of offences, but are also dependent on the level of enforcement.

A positive public opinion is important for the success of a legal measure. Various studies show that a general 'feeling' prevails that it is hazardous to use a hand-held mobile phone while driving and that it is necessary to restrict this. However, in general, the idea is that hands-free use of mobile phones in traffic is highly non-hazardous (Dragutinovic & Twisk, 2006).

Which further measures could be taken in addition to legislation?

In addition to the legislator, telephone manufacturers also play a part in enhancing road safety. In order to reduce the risk of using a phone while driving, they can take human characteristics into account when designing new mobile phones. For instance, voice-activated devices are being developed that are expected to interfere less with the driving task compared with manually operated devices. It is also possible to develop technical provisions that make it impossible to use a phone while driving. A number of telephone providers and car producers have launched a campaign to make the public aware of the hazards of distraction while driving.

The driving course should also pay attention to the problem of distraction and, subsequently, to the use of a mobile phone while driving. Campaigns about the use of a mobile phone while driving should not only emphasize the risks, but should also focus on alternative behaviour: if you need to make an urgent phone call, first stop the car in a safe spot.

Conclusion

Based on the results of behavioural studies, we conclude that the use of a mobile phone has a negative effect on driving behaviour. This is caused by cognitive distraction, whether or not in combination with visual, auditory and physical distraction. Although physical distraction can be reduced or diminished by various appliances (for instance, hands-free devices and voice activation), cognitive distraction remains the most important problem of using the phone while driving. Hands-free phone use has therefore no significant safety advantages compared with hand-held use.

Education and information campaigns can contribute to making the public more aware of the risks of the use of a mobile phone in traffic. However, research has shown that people who are aware of the risks do not always adjust their behaviour accordingly; this is an issue with young road users in particular. The contribution of education and information to pushing back the use of a mobile phone while driving may therefore be limited.

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